Equity, Inclusion, and Access in Educational Systems

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Abstract

Against the backdrop of globalization and social transformation, educational equity, inclusion, and access have emerged as the core agenda of global education governance. UNESCO's Education 2030 Framework for Action has clearly set the goal of advancing inclusive, equitable, and quality education, yet persistent and widespread educational disparities remain across countries, regions, and social groups worldwide, posing severe challenges to the global realization of this educational goal. This study aims to clarify the core connotations and internal logical correlations of educational access, equity, and inclusion, systematically analyze the current global practical dilemmas and key influencing factors in their advancement, and propose targeted collaborative optimization paths for their development from a global perspective combined with local educational practices. Adopting a theoretical analysis framework based on human capital theory, social justice theory, multicultural education theory and inclusive education theory, the research conducts a comprehensive and in-depth exploration of the three core concepts through the integration of global practical investigation and logical deduction. The key findings reveal that educational access, equity, and inclusion form a progressive and collaborative "foundation-core-extension" relationship, with their practical advancement constrained by four major factors: economic, institutional, cultural, and technological elements. Meanwhile, the global practice of the three concepts is confronted with prominent dilemmas including regional and group gaps in educational access, uneven resource allocation in educational equity, and prevalent discrimination and insufficient inclusive resources in educational inclusion. To address these issues, the study puts forward a four-dimensional collaborative optimization path involving resource allocation, institutional guarantee, ecological construction and technological empowerment. This research provides important theoretical support and practical guidance for the construction of a modern educational system, and offers a reference for global education governance to effectively narrow educational disparities and advance the development of inclusive, equitable and quality education on a global scale.

Keywords: Educational equity; Educational inclusion; Educational access; Global education governance; Optimization paths

Introduction

Amid the profound waves of globalization and far-reaching social transformation, educational equity, inclusion, and access have evolved into the core agenda of global education governance, becoming a universal pursuit for all countries committed to educational modernization (UNESCO, 2015). UNESCO's Education

2030 Framework for Action has explicitly articulated the strategic goal of advancing inclusive, equitable, and quality education for all, which has since served as a guiding principle for educational reform and development across the globe. Despite the broad consensus and collective efforts in the international community, the global landscape of education development is still plagued by prominent and persistent inequities.

Marked disparities in educational resources and opportunities exist across countries and regions; vulnerable groups including rural populations, low-income families, and people with disabilities continue to encounter formidable barriers in accessing high-quality education; and the digital divide, exacerbated by the popularization of information technology, has further widened the gap in educational development, posing severe challenges to the global realization of the inclusive and equitable education goals set in the framework.

While existing scholarly research has explored educational equity, inclusion, and access as individual constructs, with studies either focusing on single dimensions of educational inequality or discussing inclusive education for specific marginalized groups, there remain notable research gaps in the current academic discourse. First, most studies lack a systematic clarification of the core connotations of educational access, equity, and inclusion as an integrated system, and fail to deeply unravel their inherent progressive logical relationships, leading to a fragmented understanding of the three concepts in practical applications. Second, global research on these three concepts often either conducts macro-level global trend analysis or micro-level local case studies, lacking a comprehensive exploration that combines a global perspective with local practical conditions to sort out the universal dilemmas and their underlying influencing factors.

Third, the proposed solutions for addressing educational inequities and exclusion are often one-dimensional or sector-specific, lacking a holistic and collaborative optimization framework that can address the multi-faceted constraints of the issue and adapt to the global diversity of educational contexts. In addition, few studies have constructed a complete theoretical analysis framework based on the integration of multiple interdisciplinary theories to examine the three concepts, resulting in a lack of sufficient theoretical support for the formulation of targeted and feasible global education governance strategies (Schultz, 1961).

The overall aim of this study is to construct a systematic theoretical and practical framework for educational access, equity, and inclusion, and to propose targeted collaborative optimization paths to address the global dilemmas of uneven educational development, thereby providing theoretical reference and practical guidance for the advancement of global education governance and the construction of modern educational systems. To achieve this overarching aim, the study sets four specific research objectives: first, to clearly define the core connotations of educational access, equity, and inclusion, and to unravel their internal progressive and interactive logical relationships; second, to systematically sort out the current status of global practice in advancing the three concepts and identify the key dilemmas and challenges faced by different countries and regions; third, to conduct an in-depth analysis of the fundamental factors that restrict the realization of educational access, equity, and inclusion from multiple dimensions; fourth, to propose a multi-dimensional collaborative optimization path system that is in line with global development characteristics and can adapt to local practical needs. This study is grounded in human capital theory, social justice theory, multicultural education theory, and inclusive education theory, and constructs a complete interdisciplinary theoretical analysis framework to ensure the scientificity and comprehensiveness of the research process and conclusions (Rawls, 1971).

This study makes both theoretical and practical contributions to the field of global education governance, with its academic novelty embodied in three key aspects. Theoretically, the study systematically clarifies the core connotations of educational access, equity, and inclusion and their inherent "foundation-core-extension"

progressive collaborative relationship, constructing an integrated theoretical framework for the three concepts; it also integrates four interdisciplinary theories to form a comprehensive analytical paradigm, filling the research gap of fragmented understanding of the three concepts in existing scholarship and enriching the theoretical system of global inclusive and equitable education (Banks, 2019).

Methodologically, the study adopts a research perspective that combines global macro analysis with local practical investigation, breaking the dichotomy of single macro or micro research in existing studies, and realizing a comprehensive exploration of universal dilemmas and specific practical conditions of global educational development, which provides a new methodological reference for subsequent relevant research. Practically, the study identifies the multi-dimensional key influencing factors restricting educational access, equity, and inclusion from economic, institutional, cultural, and technological perspectives, and further proposes a four-dimensional collaborative optimization path system including resource allocation, institutional guarantee, ecological construction, and technological empowerment.

Unlike the one-dimensional solutions in existing research, this path system realizes the coordinated promotion of multiple dimensions, and can provide targeted and feasible policy recommendations for different countries and regions to address educational inequities and exclusion, effectively supporting the construction of modern educational systems and the advancement of UNESCO's Education 2030 Framework for Action goals in the global context. In summary, the explicit clarification of the research gap and the unique theoretical and methodological novelty of the study significantly strengthen its academic contribution, and provide a new research direction and practical blueprint for the global research and practice of educational equity, inclusion, and access.

Educational access is the basic premise of the three concepts, covering four core dimensions: physical, economic, information, and institutional. Physically, it refers to the convenience of individuals accessing educational institutions (such as the geographical distribution of schools); economically, it emphasizes the affordability of educational costs (such as tuition fees, living expenses); informationally, it involves the accessibility of educational information and resources (such as enrollment information, teaching materials); institutionally, it focuses on the fairness and feasibility of educational access systems (such as enrollment policies). In the digital age, digital access has become an important extension of educational access, including the popularization of digital devices and the coverage of network infrastructure.

Educational equity is the core value of the three concepts, following the "principle of equal opportunity" and "difference principle", and includes three levels: starting point equity, process equity, and outcome equity. Starting point equity emphasizes that every individual should have equal access to educational opportunities regardless of their family background, region, gender, or physical condition; process equity focuses on the balanced allocation of educational resources (such as teachers, funds, and facilities) and the fairness of teaching processes; outcome equity advocates that individuals should obtain corresponding educational achievements and development opportunities through education, and reduce the impact of non-educational factors on educational outcomes. The core of educational equity lies in the balanced allocation of educational resources.

Educational inclusion is the extension and sublimation of the three concepts, emphasizing the acceptance of diverse groups, the elimination of discrimination and exclusion, and the construction of adiverse and symbiotic educational ecology through three dimensions: acceptability, adaptability, and integration. Different from inclusive education that focuses on special groups (such as disabled students), educational inclusion has a wider coverage, involving all marginalized and vulnerable groups (such as ethnic minorities, migrant children, and low-income families). It requires educational institutions to adjust teaching content, methods,

and management systems to meet the differentiated needs of diverse groups and ensure that every individual can be integrated into the educational system.

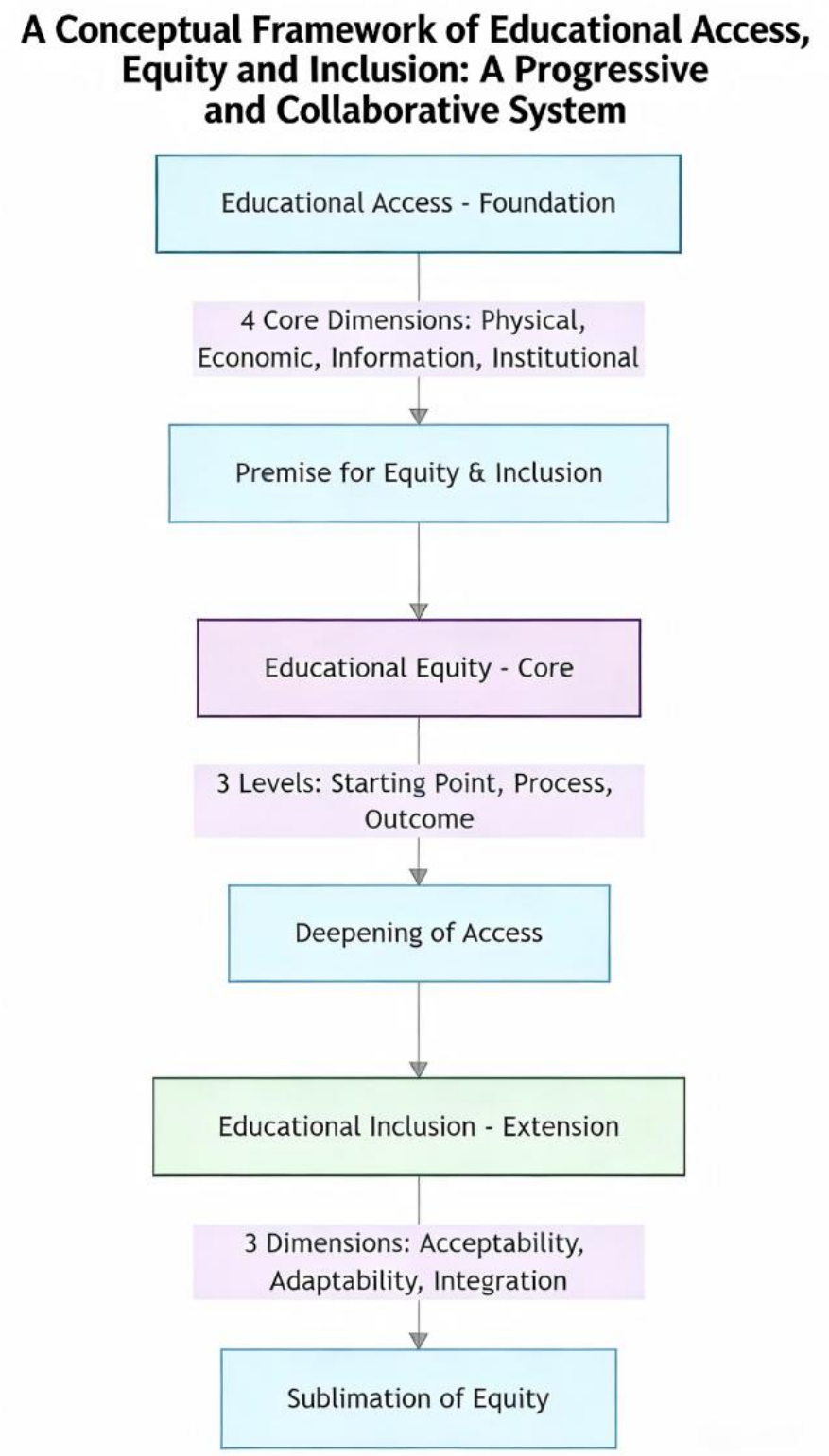

FIG 1. A Conceptual Framework of Educational Access, Equity, and Inclusion: A Progressive and Collaborative System

Educational access, equity, and inclusion form a progressive relationship of "foundation-cor e-extension", and the three mutually support and complement each other: Educational access is the premise of equity and inclusion. Without convenient and feasible access to educational opportunities, the realization of educational equity and inclusion is impossible.Only when individuals can effectively obtain educational resources and opportunities can we further discuss the fairness of resource allocation and the inclusiveness of the educational system.

Educational equity is the deepening of educational access. On the basis of solving the problem of "whether there is access to education", educational equity further addresses the issue of "whether the access is fair". It requires not only that individuals have access to education but also that they can obtain relatively balanced educational resources and fair treatment in the educational process. Educational inclusion is the sublimation of educational equity. On the basis of realizing the balanced allocation of resources, educational inclusion further meets the differentiated needs of diverse groups. It goes beyond the "equalization" of equity and pursues the "personalization" and "adaptability" of education, ensuring that every individual can develop their potential in the educational system (Ainscow, 2020).

The theoretical basis of this study mainly includes four aspects: Human capital theory: From an economic perspective, it points out that education is an important way to accumulate human capital, and the improvement of educational access and equity is conducive to optimizing the allocation of human resources and promoting economic and social development, providing an economic theoretical basis for the research. Social justice theory: From an ethical perspective, it emphasizes that education is an important carrier of social justice, and educational equity and inclusion are important manifestations of social justice, laying an ethical foundation for the research. Multicultural education theory: From a cultural perspective, it advocates respecting cultural diversity, opposing cultural discrimination, and providing theoretical support for the construction of an inclusive educational ecology. Inclusive education theory: Focusing on the educational rights of special groups, it provides practical experience and theoretical reference for the expansion of the connotation of educational inclusion.

Global Practical Status and Core Dilemmas. Dilemmas in Educational Access. Globally, although certain progress has been made in improving educational access, prominent gaps and problems still exist: Significant regional gaps: The global net primary enrollment rate has increased to 90%, but there are huge differences between regions. The net primary enrollment rate in sub-Saharan Africa is only 78%, and about 50 million children are out of school. Developed countries have basically popularized compulsory education, while some developing countries still face severe challenges in educational access. Prominent urban-rural and group gaps: In most countries, the educational access conditions in urban areas are significantly better than those in rural areas. Rural areas are faced with problems such as insufficient educational institutions, backward facilities, and lack of teachers.

At the same time, vulnerable groups such as the poor, disabled, and ethnic minorities also face multiple obstacles in accessing education. The digital divide exacerbates inequalities: The popularization of digital technology has brought new opportunities for educational access, but it has also widened the educational gap. During the COVID-19 pandemic, 1.6 billion students around the world were affected by school closures. Due to insufficient digital access (such as the lack of computers and network coverage), students indeveloping countries and poor areas were unable to carry out online learning normally, further widening the educational gap (World Bank, 2022; Young, 1989).

Dilemmas in Educational Equity. Countries around the world have actively promoted the balanced allocation of educational resources and evaluation system reforms, but the problem of educational inequity is

still difficult to fundamentally solve: Imbalance in resource allocation: There is a huge gap in educational funding between regions and schools. The gap in per-student educational funds between eastern and western China reaches 1.5 times, and the gap in educational funding between wealthy and poor school districts in the United States exceeds 3 times. In addition, the quality of teachers in backward areas and weak schools is generally lower than that in developed areas and key schools, further exacerbating educational inequity. Significant gaps in process and outcomes: In the educational process, rural students and students from low-income families often face disadvantages such as insufficient learning support and backward teaching methods. In terms of outcomes, the academic performance and further education opportunities of rural students are significantly lower than those of urban students, and the intergenerational transmission of poverty caused by educational inequity is becoming increasingly prominent, increasing the risk of social stratification.

Dilemmas in Educational Inclusion. Many countries have issued anti-discrimination laws and regulations and promoted inclusive education reforms, but educational inclusion still faces many challenges: Prevalence of educational discrimination: Educational discrimination against vulnerable groups such as the disabled, ethnic minorities, and migrant children is still common. Some schools refuse to enroll disabled students on the pretext of insufficient conditions, and ethnic minority students may face cultural and language barriers in the educational process. Insufficient inclusive resources and inappropriate teaching: Most educational institutions lack professional inclusive teachers and teaching resources, and the curriculum and teaching methods are mainly designed for mainstream students, lacking adaptability to the differentiated needs of diverse groups. For example, the curriculum does not cover the cultural characteristics of ethnic minorities, and the teaching methods are not suitable for the learning characteristics of disabled students.

Imperfect social support system: The realization of educational inclusion requires the cooperation of families, schools, and society. However, at present, the social support system for inclusive education is not perfect. Families of vulnerable groups lack sufficient economic and psychological support, and social organizations' participation in inclusive education is insufficient, which restricts the integration of diverse groups into the educational system.

This study adopts a comprehensive theoretical and empirical analytical approach anchored in interdisciplinary theoretical foundations, with a dual focus on global macro perspectives and local practical conditions. The research design is structured to systematically address the research objectives, and to ensure the scientific rigor, logical coherence and practical relevance of the analysis of educational access, equity, and inclusion. The methodological framework integrates document analysis, logical deduction, global comparative analysis, and factor analysis, and is implemented in a phased research process to explore the core connotations, practical dilemmas, key influencing factors and optimization paths of the three core concepts, as detailed below.

Theoretical Foundation and Analytical Framework Construction The study is grounded in four interdisciplinary theories to construct a holistic analytical framework for educational access, equity, and inclusion. Human capital theory provides an economic perspective to explain the intrinsic link between educational development and social economic progress, and to analyze the economic constraints of educational equity. Social justice theory lays an ethical foundation for the research, framing educational access, equity, and inclusion as core manifestations of social justice and guiding the value orientation of the research.

Multicultural education theory offers a cultural perspective to support the construction of an inclusive educational ecology and the analysis of cultural barriers in educational development. Inclusive education theory provides practical experience and theoretical reference for expanding the connotation of educational

inclusion and analyzing the educational rights of marginalized and vulnerable groups. The integration of these four theories avoids the one-sidedness of single-theory analysis, and constructs a multi-dimensional theoretical analytical framework for the study.

Research Data and Source Collection To systematically analyze the global practical status and key influencing factors of educational access, equity, and inclusion, the study collects and collates a wealth of authoritative research data and policy documents, including: International organization reports, such as UNESCO's Education 2030 Framework for Action, UNICEF's The State of the World's Children 2023, and the World Bank's World Development Report 2022; National educational statistical data, such as China's Statistical Yearbook of Education 2023 and the U.S. National Center for Education Statistics' Condition of Education 2023 (Ministry of Education of the People's Republic of China, 2023). Core academic literature in the fields of educational equity, inclusive education and global education governance, including classic theoretical works and latest research papers. All data and documents selected are authoritative, up-to-date and representative, which provides a solid empirical basis for the subsequent analysis of practical dilemmas and key influencing factors.

Methodology

Conceptual Analysis and Logical Deduction First, the study adopts conceptual analysis to define the core connotations of educational access, equity, and inclusion, and sorts out their internal dimensions and basic characteristics. On this basis, logical deduction is used to explore the inherent progressive and collaborative logical relationships among the three concepts, and to clarify their "foundation-core-extension" hierarchical structure, laying a theoretical foundation for the subsequent empirical analysis. Global Comparative Analysis and Practical Dilemma Identification The study applies global comparative analysis to compare the educational development status of different countries, regions and social groups, systematically sort out the global practice of educational access, equity, and inclusion, and identify the universal dilemmas and regional characteristics in their development process. The comparative analysis covers both developed and developing countries, and focuses on the educational disparities between urban and rural areas, between mainstream groups and vulnerable groups, to fully reflect the global reality of uneven educational development.

Multi-dimensional Factor Analysis A multi-dimensional factor analysis approach is employed to deeply explore the key factors restricting the realization of educational access, equity, and inclusion. The study categorizes and analyzes the influencing factors from four dimensions: economic, institutional, cultural and technological, and clarifies the intrinsic mechanism of each factor on educational development, as well as the interactive relationship among various factors. For each factor, the study not only analyzes its specific performance and influence path, but also combines global practical cases to verify the analysis conclusions, ensuring the accuracy and persuasiveness of the factor analysis.

Inductive Synthesis and Optimization Path Construction Based on the analysis of practical dilemmas and key influencing factors, the study adopts inductive synthesis to summarize the core problems in the development of educational access, equity, and inclusion, and proposes a four-dimensional collaborative optimization path system including resource allocation, institutional guarantee, ecological construction and technological empowerment. The construction of the optimization path adheres to the combination of theoretical guidance and practical needs, and the coordination of global universality and local particularity, to ensure the targeted and operable of the proposed path.

Validity and Reliability Assurance To ensure the validity and reliability of the research conclusions, the study adopts multiple measures in the research process: The theoretical analytical framework is constructed on the basis of interdisciplinary theories, avoiding the limitations of single disciplinary perspective; All research data are derived from authoritative international organizations and national statistical departments, with high objectivity and authenticity; The research methods are comprehensively applied, and the mutual verification of different methods is realized to ensure the logical coherence of the research conclusions;

The research analysis is combined with a large number of global practical cases, making the research conclusions closely linked to the actual educational development and having strong practical relevance. This methodological design is highly consistent with the research objectives of the study, and provides a systematic and scientific research approach for clarifying the core connotations and internal logic of educational access, equity, and inclusion, analyzing their global practical dilemmas and key influencing factors, and proposing targeted collaborative optimization paths. The research results obtained through this methodological framework can provide reliable theoretical reference and practical guidance for the construction of modern educational systems and the advancement of global education governance.

Results and Discussion

Analysis of Key Influencing Factors In-depth Analysis Based on the Aforementioned

Methodological framework reveals that the practical dilemmas in the advancement of educational access, equity, and inclusion across the globe are not caused by a single factor, but by the combined action of multiple interrelated and interactive factors. These factors can be categorized into four core dimensions: economic, institutional, cultural and technological, among which economic factors are the fundamental constraints, institutional factors are the key driving and restricting forces, cultural factors are the deep-seated ideological obstacles, and technological factors exert a dual impact of empowerment and exacerbation. This chapter analyzes the specific performance, influence path and intrinsic mechanism of each factor on educational access, equity, and inclusion, and clarifies the interactive relationship among various factors.

Economic Factors

Economic factors constitute the fundamental material constraint affecting the realization of educational access, equity, and inclusion, as the development of education is inherently dependent on the support of economic resources, and the level of economic development directly determines the total amount, allocation mode and utilization efficiency of educational resources. National economic strength is the primary determinant of educational investment scale. Developed countries with strong economic strength can allocate sufficient financial resources to education, build a complete educational infrastructure system, improve the quality of educational personnel, and provide comprehensive financial support for vulnerable groups, thus effectively guaranteeing educational access, equity, and inclusion.

In contrast, developing countries are severely restricted by their economic development level, with insufficient educational fiscal investment, which leads to the shortage of educational infrastructure, the lack of professional teachers, and the inability to provide adequate financial support for students from low-income families, making it difficult to meet the basic needs of educational development and the differentiated needs of diverse groups. Regional economic imbalance further leads to the uneven allocation of educational resources. In most countries, economically developed regions (such as urban areas) can gather more educational funds, advanced teaching equipment and high-quality teachers, forming a good educational

development ecology; while economically backward regions (such as rural and remote areas) face severe shortages of educational resources due to insufficient economic support, with problems such as inadequate school-running conditions, low teacher quality and poor educational services, which directly widens the gap in educational access and equity between regions.

Family economic status is a micro-level economic factor that directly affects individuals' educational opportunities. Children from high-income families can not only afford the direct educational costs such as tuition fees and living expenses, but also obtain high-quality supplementary educational resources such as tutoring and extracurricular training, thus having more advantages in the educational process and outcomes. In contrast, children from low-income families may have to give up education due to their inability to bear basic educational costs, and even if they can access education, they often lack sufficient learning support, which restricts their educational development and leads to the intergenerational transmission of educational inequality and poverty.

Institutional Factors

Institutional factors are the key to realizing educational access, equity, and inclusion, as a scientific and perfect institutional system can effectively standardize the allocation of educational resources, guarantee the educational rights of diverse groups, and guide the healthy development of education. The rationality of the design and the intensity of the implementation of educational systems directly determine the degree of realization of educational access, equity, and inclusion. The educational resource allocation system is the core of institutional factors (National Center for Education Statistics, 2023). A scientific and reasonable funding allocation system can tilt educational resources to weak regions, weak schools and vulnerable groups, narrowing the gap in educational resources and promoting educational equity. On the contrary, an unscientific resource allocation system, which is overly inclined to economically developed regions and key schools, will further exacerbate the uneven distribution of educational resources, leading to the widening of the gap in educational access and quality between regions and schools.

The educational access system directly affects the equal acquisition of educational opportunities by diverse groups. Unreasonable enrollment policies, such as regional restrictions, household registration restrictions and school choice barriers, will hinder the equal access to educational opportunities for vulnerable groups such as migrant children, rural students and ethnic minorities, forming institutional barriers to educational access. In addition, the imperfection of the student status management system and the educational transfer system also restricts the free flow of educational resources and the equal access to education for mobile populations. The educational evaluation and enrollment system exerts a profound influence on the development of educational equity and inclusion.

A single evaluation standard that only focuses on academic performance ignores the differentiated learning characteristics and development needs of diverse groups, and forces educational institutions to adopt a unified teaching mode, which is not conducive to the personalized development of students and the construction of an inclusive educational ecology. The examination enrollment system that is overly dependent on examination results further exacerbates the competition for educational resources, and makes students from backward regions and low-income families face greater disadvantages in the enrollment process, leading to the widening of educational outcome gaps.

In addition, the enforcement intensity of educational systems is also an important factor affecting their implementation effect. Even if a perfect educational equity and inclusion system is formulated, the lack of

strict enforcement and supervision mechanisms will lead to the ineffective implementation of the system, and the educational rights and interests of vulnerable groups cannot be effectively guaranteed.

Cultural Factors

Cultural factors are the deep-seated ideological obstacles affecting educational access, equity, and inclusion, as traditional cultural concepts and social values will directly affect the educational attitudes and behaviors of families, schools and society, and shape the overall educational development ecology. Traditional backward gender concepts are an important cultural factor restricting educational access. In some regions with strong traditional gender concepts, the idea that "boys are more worthy of education than girls" is prevalent, leading to families investing more educational resources in boys and neglecting the educational development of girls, which directly results in a lower enrollment rate and educational attainment for girls, and forms gender inequality in education. The concept of "the uselessness of reading" prevalent in some social groups also restricts the improvement of educational access.

In some economically backward regions and low-income groups, due to the long-term inability to see the direct economic benefits of education, families hold a negative attitude towards education, are reluctant to invest in their children's education, and even let their children drop out of school to work early, which leads to the low educational participation rate of these groups and forms a vicious circle of "poverty - low education - further poverty". Cultural prejudice and discrimination against marginalized groups are the main cultural barriers to educational inclusion. Social and cultural prejudices against ethnic minorities, the disabled, migrant children and other vulnerable groups are widespread in many countries, which leads to discrimination and exclusion of these groups in the educational process. Schools and teachers often hold biased attitudes towards vulnerable group students, lack sufficient respect and understanding for their cultural characteristics and learning needs, and even refuse to enroll vulnerable group students on various pretexts, which seriously hinders the construction of an inclusive educational ecology and the realization of educational inclusion.

In addition, the lack of inclusive education concepts in schools and society is also an important cultural factor restricting educational inclusion. Most educational institutions still adhere to the traditional mainstream education concept, lack the awareness of accepting diverse groups and meeting differentiated needs, and the whole society also lacks sufficient publicity and popularization of inclusive education concepts, leading to the lack of a good cultural atmosphere for the development of inclusive education.

Technological Factors

Technological factors exert a dual impact of empowerment and exacerbation on educational access, equity, and inclusion in the digital age. On the one hand, the rapid development of information and communication technology has brought new opportunities for the development of education, and effectively empowered the sharing of educational resources and the improvement of educational access; on the other hand, the digital divide formed by the uneven development and popularization of digital technology has further exacerbated educational inequality, becoming a new factor restricting educational equity and inclusion. The positive empowerment effect of technology is mainly reflected in the promotion of educational resource sharing and the improvement of educational access.

The construction of digital educational platforms and the popularization of online education technologies have broken the geographical and time constraints of traditional education, making high-quality educational resources from developed regions and key schools radiate to rural, remote and backward areas,

effectively improving the accessibility of educational resources in these areas. For vulnerable groups who are inconvenient to receive traditional face-to-face education, digital education technology provides a new educational access channel, helping them to obtain equal educational opportunities and support. In addition, big data, artificial intelligence and other emerging technologies can realize the precise analysis of students' learning characteristics and needs, provide personalized teaching guidance and learning resources, and help to improve the quality of education and the realization of educational inclusion.

The negative exacerbation effect of technology is mainly manifested in the digital divide, which refers to the gap in the popularization and application of digital technology between different regions, groups and individuals. The digital divide is mainly reflected in two aspects: one is the infrastructure divide, that is, the gap in the coverage of network infrastructure and the popularization of digital devices between developed regions and backward regions, between urban and rural areas, between high-income families and low-income families; the other is the digital literacy divide, that is, the gap in the ability to use digital technology and access digital educational resources between different groups.

The digital divide makes students from developed regions and high-income families have better digital access conditions and digital literacy, and can fully enjoy the benefits of digital education technology; while students from developing regions, backward areas and low-income families are at a disadvantage in digital access and digital literacy, unable to effectively carry out online learning and access digital educational resources, which further widens the gap in educational access, quality and outcomes between different groups, and exacerbates educational inequality. In addition, the lack of inclusive design of digital educational resources is also an important factor restricting the technological empowerment of vulnerable groups. Most digital educational resources are designed for mainstream students, without considering the special learning needs of the disabled, ethnic minorities and other groups, such as the lack of braille versions, sign language videos and multilingual versions of digital teaching materials, which makes vulnerable group students unable to effectively use digital educational resources, and the technological empowerment effect cannot be fully realized.

Collaborative Optimization Paths

Based on the above analysis of dilemmas and influencing factors, this study proposes four-dimensional collaborative optimization paths to promote the development of educational access, equity, and inclusion.A. Optimize Resource Allocation.

Increase Educational Investment in Weak Areas. Governments should increase financial investment in rural, poor, and remote areas, tilt educational funds to weak regions and schools, and narrow the gap in educational resources between regions and urban and rural areas. Specifically, it includes improving the school-running conditions of rural schools (such as renovating school buildings, updating teaching equipment), increasing the allocation of teachers in weak areas (such as implementing teacher support policies, improving teacher treatment), and ensuring that students in weak areas can enjoy quality educational resources (UNICEF, 2023).

Improve the Full-Stage Funding System. Establish and improve a full-stage educational funding system covering compulsory education, high school education, and higher education, focusing on supporting students from low-income families, disabled students, and other vulnerable groups. Through scholarships, grants, and student loans, reduce the economic burden of students' education and ensure that no student drops out of school due to poverty.

Promote the Construction of Digital Educational Resources. Accelerate the construction of digital educational platforms and the sharing of high-quality educational resources, and promote the popularization of digital devices and network infrastructure in rural and backward areas to bridge the digital divide. Develop digital educational resources suitable for diverse groups (such as sign language teaching videos for disabled students) and improve the digital access level of educational resources.

Improve Institutional Guarantees

Improve Laws and Regulations on Educational Equity. Formulate and improve laws and regulations related to educational equity and inclusion, clarify the educational rights and interests of diverse groups, and prohibit all forms of educational discrimination. Strengthen the enforcement of laws and regulations, and investigate and punish acts that violate educational equity and inclusion (such as schools refusing to enroll disabled students).

Reform Access and Student Status Management Systems. Cancel unreasonable restrictions in enrollment policies (such as household registration restrictions, regional discrimination), and establish a fair and open educational access system. Improve the student status management system, ensure that migrant children can enjoy equal educational opportunities in the place of residence, and promote the free flow of educational resources.

Build a Diversified Evaluation and Examination Enrollment Syste. Break the single evaluation standard based on academic performance, and establish a diversified educational evaluation system that pays attention to students' comprehensive quality and individual development. Reform the examination enrollment system, increase the weight of comprehensive quality evaluation, and reduce the impact of examination results on educational outcomes, so as to promote the realization of process equity and outcome equity.

Build an Inclusive Ecology

Strengthen Inclusive Teacher Training. Incorporate inclusive education concepts and skills into teacher training programs, improve teachers' awareness of inclusive education and the ability to teach diverse groups. Train special teachers for disabled students and ethnic minority students to meet the differentiated teaching needs• Promote the Reform of Diversified Courses and Personalized TeachingAdjust the curriculum system, incorporate multicultural content and the needs of vulnerable groups into the curriculum, and enhance the adaptability of the curriculum. Adopt personalized teaching methods (such as differentiated teaching, mixed teaching), and formulate targeted teaching plans according to the characteristics and needs of students to ensure that every student can obtain appropriate educational support.

Create an Inclusive Campus Culture and Improve the Social Support System. Strengthen the publicity and education of inclusive concepts in schools, eliminate discrimination and prejudice, and create a harmonious and inclusive campus culture. Establish a linkage mechanism among families, schools, and society, encourage social organizations to participate in inclusive education, and provide economic, psychological, and resource support for vulnerable groups to promote their integration into the educational system.

Innovate Technological Empowerment

Build a Smart Education Platform. Integrate educational resources through smart education platforms, realize the precise allocation of resources and personalized teaching guidance. Use big data technology to analyze students' learning characteristics and needs, and provide targeted learning resources and teaching services to improve the efficiency and quality of education.

Promote Educational Technologies Suitable for Diverse Groups. Develop and popularize educational technologies suitable for disabled students, ethnic minority students, and other groups, such as assistive technologies for disabled students (hearing aids, braille readers) and multilingual teaching technologies for ethnic minority students. Improve the applicability of educational technology to diverse groups.

Establish Inclusive Design Standards for Digital Educational Resources. Formulate inclusive design standards for digital educational resources, requiring digital resources to consider the needs of diverse groups in terms of content, form, and operation. For example, digital teaching materials should provide multilingual versions and braille versions, and online teaching platforms should be compatible with assistive technologies to ensure that disabled students can use digital resources normally.

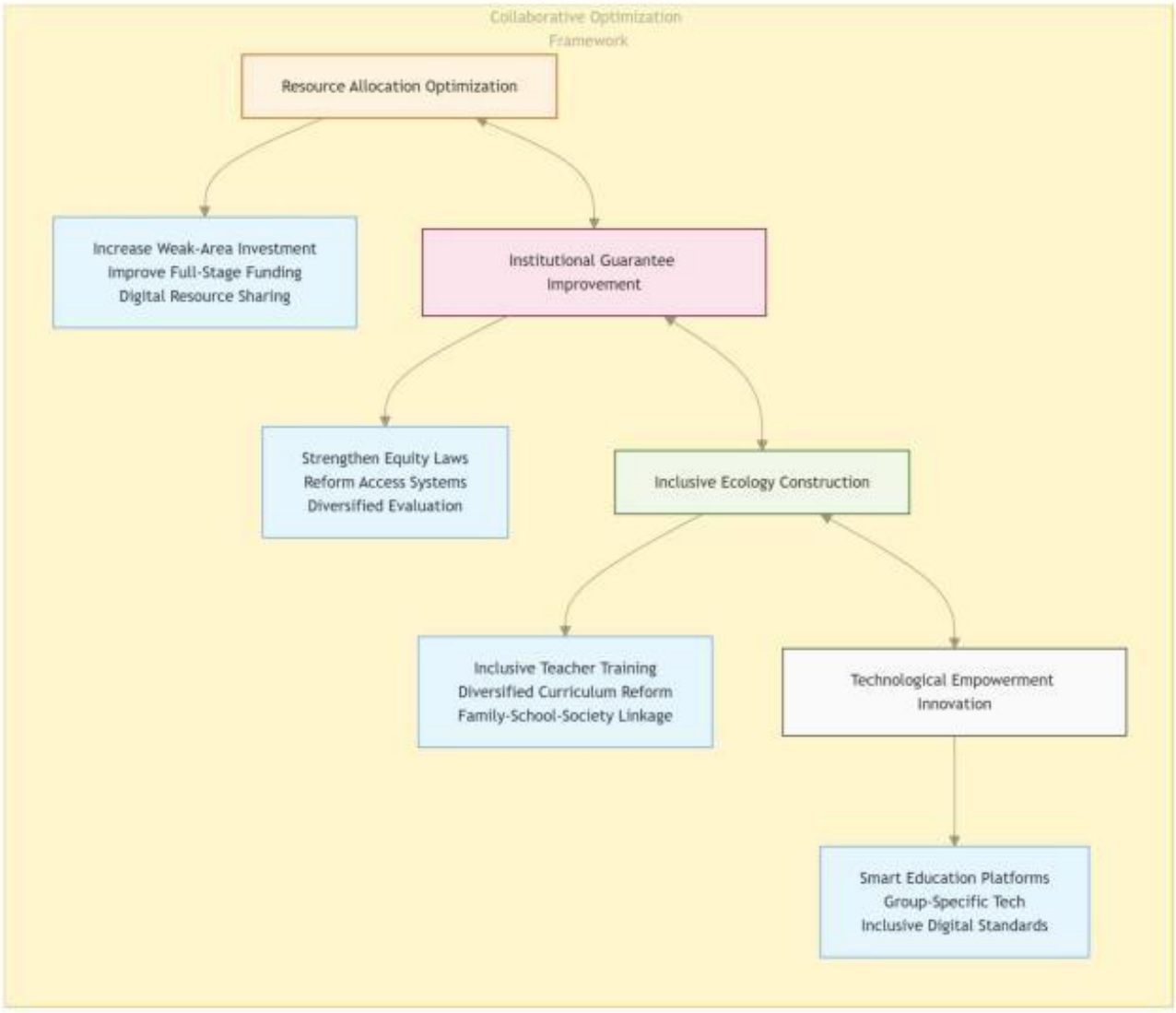

Fig 2. Collaborative Optimization Framework

Conclusion

This study systematically explores the core theoretical connotations, internal logic, practical dilemmas, influencing factors, and optimization paths of educational access, equity, and inclusion, and draws the following conclusions: Educational access, equity, and inclusion form a progressive and collaborative relationship of "foundation-core-extension". Educational access is the premise, educational equity is the core, and educational inclusion is the sublimation. The three mutually support and jointly constitute the core value dimension of the modern educational system. Globally, the practice of educational access, equity, and inclusion has made certain progress, but it still faces prominent dilemmas: significant regional, urban-rural, and group gaps in educational access; uneven allocation of resources and obvious gaps in process and outcomes in educational equity; widespread discrimination and insufficient inclusive resources in educational inclusion.

The practical dilemmas of the three concepts are mainly affected by four major factors: economic factors (fundamental constraints), institutional factors (key grasp), cultural factors (deep-seated obstacles), and technological factors (dual effects). The optimization of educational access, equity, and inclusion needs to adopt four-dimensional collaborative paths: optimizing resource allocation, improving institutional guarantees, building an inclusive ecology, and innovating technological empowerment. Only through the coordinated promotion of multiple dimensions can the continuous improvement of the global educational system be realized.

Although this study has achieved certain research results, there are still limitations. Future research can be carried out from the following aspects: Strengthen micro-level empirical research: Conduct in-depth case studies on specific regions, schools, and groups, and verify the effectiveness of optimization paths through micro-level empirical data to provide more targeted policy recommendations. Focus on the impact of emerging technologies: With the development of technologies such as artificial intelligence and blockchain, further explore the impact of emerging technologies on educational access, equity, and inclusion, and study how to better use emerging technologies to promote the development of the educational system.

Deepen international comparative research: Conduct comparative studies on the practices and experiences of educational equity, inclusion, and access in different countries and regions, summarize the general laws and special experiences of educational development, and provide reference for global educational governance. Track dynamic development: Educational equity, inclusion, and access are dynamic development processes. Future research should track the changes in global educational development in real time, analyze the new dilemmas and challenges faced, and adjust and optimize research conclusions and policy recommendations in a timely manner.

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