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The mission of the journal is to provide a medium for professional discussion on a wide range of educational issues. The journal publishes original research and perceptive essays from Russian and foreign experts on education, development and policy. "Voprosy obrazovaniya/Educational Studies Moscow" strives for a multidisciplinary approach, covering traditional pedagogy as well as the sociology, economics and philosophy of education.

Conceptually, the journal consists of several parts:

- Theoretical materials and empirical research aimed at developing new approaches to understanding the functioning and development of education in modern society
- Papers on current projects, practical developments and policy debates in the field of education, written for professionals and the wider public
- Statistical data and case studies published as "information for reflection" with minimal accompanying text
- Information about and analysis of the latest pedagogical projects
- Reviews of articles published in international journals

Target audience: Leading Russian universities, government bodies responsible for education, councils from federal and regional legislatures, institutions engaged in education research, public organizations and foundations with an interest in education.

National Research University Higher School of Economics

Voprosy obrazovaniya/Educational Studies Moscow

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Introduction from the Editor in Chief

Dear Readers,

We are pleased to bring to your attention a special edition focused on a critical topic: the educational systems of the BRICS countries. In today's rapidly evolving world characterized by unprecedented levels of interconnectedness, international cooperation in education has become crucial. Education is a dynamic process that demands continuous adaptation and innovation to stay relevant in a rapidly changing world.

New technologies, societal challenges, and economic realities impact educational practices. Ignoring these factors and avoiding dialogue and cooperation with international colleagues may lead to stagnation and underdevelopment. We hope that this issue will contribute to a better understanding of the challenges and opportunities for education in the BRICS countries and encourage further collaboration and exchange of ideas. We risk finding ourselves in a situation where our educational systems fail to meet the demands of the modern world, prepare graduates for future challenges, and ultimately contribute to society's progress. This is why we aim to serve as a platform for active exchange of knowledge, experience, and best practices among researchers, practitioners, and policymakers in the education field within the BRICS countries (Brazil, Russia, India, China, and South Africa).

In this issue, we discuss fundamental epistemological questions related to the role of teachers as an essential part of the education system. With the ongoing reforms and changes, it is important not to lose sight of the importance and role of teachers in the learning process. Additionally, it is crucial to continually assess their motivation, professional skills, and willingness to innovate. These factors require constant monitoring and evaluation, as reflected in the research published in this issue.

The diverse range of countries featured in this issue gives special significance to the topic discussed. The examination of educational systems in China, South Africa, India, and Brazil is of utmost importance, as these nations represent not only distinct cultural landscapes and civilizations, but also some of the largest populations of the world. The future not only of these countries, but also of the entire globe, rests on the quality of education provided to children in these regions. The BRICS nations' educational systems collectively account for approximately one-third of the global education landscape, highlighting their global significance and impact.

Each article published in this issue critically addresses important challenges faced by education in the BRICS countries, including ine-

quality in access to high-quality education, teacher and student motivation, literacy improvement, and the identification and support of gifted children.

These issues are common in many countries around the world, and the experience of BRICS nations can provide valuable insights into finding effective solutions. This issue therefore serves as a guide to some of the most important and current areas of education in BRICS today.

We hope that this issue will serve as a valuable resource for anyone interested in education and human development. We invite you to join the discussion and share your own experiences to help create a brighter future for education within BRICS and beyond.

Ya. Kuzminov, PhD

Editor in Chief of "Educational Studies Moscow",
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Introduction to the special issue "Educational Mosaic: Understanding BRICS States"

The collection of articles in this volume covers all levels of education, spanning from primary schools to doctoral education. Particular attention is given to how educational practices in the BRICS countries reflect global challenges — from ensuring equitable access to quality education to preparing professionals for innovation-driven economies. In addition, the studies represent most of the BRICS countries, covering gifted and talented education in Brazil (Pomortseva et al.), discussing teacher education in Russia (Ivanov et al.), overcoming social inequalities through educational opportunities in India (Gaur et al.), doctoral education in China (Niu & Xiao), promoting teacher resilience (Versfeld et al.) and supporting teacher motivation and change-efficacy in South Africa (Leask et al.). Several studies focus on the comparative analyses by covering language policies (Collins & Reagan), vocational education (Maltseva et al.), and higher medical education (Drozdova et al.) across the BRICS countries.

At the level of school education, the articles illustrate a wide range of strategies aimed at supporting teachers and learners, which is especially important in contexts marked by social and economic inequalities. In terms of school education, Versfeld et al. in the article *Measuring Teacher Resilience in the Global South* report on the intervention supporting and developing teacher resilience and social connectedness in economically challenged primary schools in South Africa. In *Motivation and Change-Efficacy of Teachers in the Adoption of Literacy Interventions,* Leask et al. shift the focus to high schools, examining the factors contributing to teachers' adoption of literacy interventions in challenged settings of rural South Africa. Pomortseva et al. draw the reader's attention to Brazil in their article titled *Special Teachers for Special Students: Training Educators for Gifted Students in Regular Classrooms in Brazil,* describing the increased interest of researchers and practitioners in development of gifted and talented education at school. In the paper *Double Reduction Policy in Chinese Education: Promises, Outcomes, Perspectives,* Shcheglova and colleagues present the results of a systematic literature review and describe benefits, challenges, and ways forward in terms of implementation of the double-reduction policy in schools of China. Finally, Ivanov and colleagues describe teacher workforce in Russia in the article *The Fragile Centrality of Teachers: Demographic and Institutional Strains in the Russian Education Workforce.*

Maltseva and co-authors make a successful attempt to describe the vocational education by analyzing private-public partnership in technical and vocational education and training (TVET) in Russia, India, and China in the article *Private-Public Partnership in TVET: An Overview of Current Practices in the BRICS Countries.* In addition to

the cross-cultural comparison, the paper identifies some essential conditions for effective partnerships in emerging economies.

Higher education within the BRICS context also comes into focus, as it plays a crucial role in shaping the human capital required for the future development of national economies. Several articles of the special issue focus on higher education and educational outcomes. For instance, the article *Academic Track Choices, Educational Achievements and Social Inequality* by Gaur and colleagues brings to the forefront the interplay between students' marginalized backgrounds and their academic achievement, which is lower than that of their privileged peers across all education levels (high school, bachelors, and MBA). Jingjing Niu and Yu Xiao report on the development and quality assurance of the doctoral education in Chinese universities in their paper *What Drives the Transformation? Unpacking China's Reforms in Doctoral Education.*

Finally, two of the articles provided a comparative analysis across all BRICS member states at the time of the publication of this special issue. Drozdova and colleagues identified similarities and differences in the training in medical universities of the BRICS countries for future pediatricians in the article titled *Higher Medical Education of Pediatricians in the BRICS countries.* Collins and Reagan, in their turn, present a comparison of language policies across the BRICS members and propose a meta-framework for analyzing the language policies employed in each country in their paper *Language Policy and Language Planning in the BRICS Countries: Toward a Meta-Framework for Responding to Linguistic Diversity.* Such comparative perspectives not only highlight unique national solutions but also provide a foundation for the exchange of best practices among the BRICS countries.

The brief review outlines the educational mosaic of the core BRICS member states and provides some comparative studies that can shed light on the developments in the emerging economies of the Global South. The studies presented in the special issue outline the cutting-edge developments, new practices, and a great deal of research as well as theoretical gaps that could be addressed by researchers and readers. In this way, the special issue does more than document the current state of education systems in the BRICS countries; it also opens avenues for further inquiry into sustainable and innovative solutions for education in the Global South.

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Language Policy and Language Planning in the BRICS Countries: Toward a Meta-Framework for Responding to Linguistic Diversity

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Abstract   This article offers a meta-framework for analyzing the different language policies employed by the BRICS countries to address the challenges posed by the presence of linguistic diversity. This meta-framework has a broader utility, and could be used more generally in the development, implementation, analysis, and evaluation of language planning efforts and specific language policies in other settings. The underlying research question for the article is how different BRICS countries respond to linguistic diversity, especially with respect to state schooling. The literature on which this article is based examines the different types of language planning, language policy decision-making, and the nature of and responses to linguistic diversity in all ten BRICS countries.

The status of languages is a profoundly political issue that defines the national narrative of most states. For some, privileging one tongue underscores a message of unity, continuity, and independence, while other states point to diversity as a sign of tolerance and inclusivity. Restoring the importance of the "national" language may be seen as freeing the state from colonial or imperial repression, while recognizing plurality revives a rich cultural heritage. In either case, language

policy can give a sense of renewal and independence from the unipolar world order that has privileged some nations over others. This liberating outlook is at the core of the message of the BRICS countries[1].

The BRICS is a grouping that was formed in 2009 and united Brazil, Russia, India, China, and South Africa. In 2024, it was augmented by Egypt, Ethiopia, Iran, Saudi Arabia, and the United Arab Emirates. The group was projected as an alternative to the G7 and champion of the "Global South". The dominant BRICS narrative emphasizes reforming global governance and giving a more credible voice to the developing world. The BRICS nations do not in any sense constitute a unified political or ideological organization, but they do to some extent share a number of fairly common economic interests. The BRICS nations collectively cover around 30% of the Earth's land area, comprising almost 45% of the global population and about 27% of the worldwide GDP. Its major player is China, which seeks to challenge America's global economic dominance. At its opening summit in Johannesburg, the BRICS club was presented as a group that could exert significant influence in the international political and economic order traditionally dominated by neoliberal Western countries. In a multipolar world, the BRICS would be an example of South-South cooperation. As Song Wei, a professor from the School of International Relations and Diplomacy at Beijing Foreign Studies University, suggested: "BRICS has solidified the consensus among developing countries and has emerged as a powerful advocate for the development needs of these countries. Whether it is advancing economic collaboration or advocating fairer global governance, the BRICS has consistently championed the practical interests of developing countries"[2].

By August 2024, more than 30 countries, including Indonesia, Vietnam, Venezuela, and Kazakhstan, had applied to join BRICS, so its message seems to resonate widely. In the age of U.S. President Donald Trump, there is some reason to expect this trend to only increase. The value of the BRICS nations for our research is not in their likeness but in their very diversity, which mirrors in many ways that of much of the world.

This article looks at how the cooperation promised by the current narrative is reflected in language policies, where collaboration between developing countries might challenge the imperialist and colonial legacies the BRICS countries share. As Isheloke [2019] suggests in her discussion of the "BRICS Language Dilemma", "The BRICS as an organisation is concerned with language problems <…> The paradigm shift between the lingua franca as inherited from the colonialists

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[1] At the time of writing, the BRICS countries were Brazil, Russia, India, China, South Africa, Egypt, Ethiopia, Iran, Saudi Arabia, and the United Arab Emirates.

[2] Growing interest in BRICS membership signals consensus among Global South / Global Times. 31 July 2024: https://www.globaltimes.cn/page/202407/1317126.shtml (accessed 25.08.2025).

and the more democratic choice of the language". The BRICS has no central authority or charter but does provide networking opportunities for bureaucrats, academics, and civil activists to share ideas and initiatives in various policy areas [Kirton, Larionova, 2022]. For individual member states, especially China and Russia, language promotion abroad is a significant aspect of their cultural diplomacy.

The role of education is emphasized by Valeeva and Prata-Linhares: "Within the BRICS nations, a collaborative spirit in the educational sphere emerges as a vital impetus for positive advancement in their academic landscapes. The journey of education evolution in these realms is distinguished by its comprehensive breath and rapid progression" [Valeeva, Prata-Linhares, 2024. P. 27]. For example, plans are in place to "facilitate the recognition of academic qualifications"[3].

The BRICS nations prioritize the preservation of their own cultural identities, oppose Western cultural dominance, and advocate for national values and traditions. They promote a more inclusive global cultural system, in which non-Western nations have increased visibility and cultural impact. The analysis offered here assumes that language policies are not just about communication but are deeply reflective of the cultural ambitions of BRICS countries.

This article will offer a meta-framework for understanding language diversity and the responses to it in the BRICS countries. The focus is on language policy and planning, i.e., deliberate efforts by governments to influence the function, structure, or acquisition of languages within their jurisdiction in order to achieve specific sociopolitical, cultural, or economic objectives.

Research questions

The underlying research question for this article is how different BRICS countries respond to linguistic diversity, especially concerning state schooling. The research questions are:

1. How do BRICS countries address linguistic diversity within their state schooling systems?
2. What are the distinct approaches to language policy in education across the BRICS countries, and how do these reflect broader socio-political goals?
3. Can a meta-framework based on the diverse language policies of BRICS countries be developed to classify and understand language policies in other global contexts?

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[3] Mashininga K. Beyond BRICS: The Shaping of New Development Narratives / University World News (African Edition). 5 October 2023: https://www.university-worldnews.com/post.php?story=20231002145405429 (accessed 25.08.2025).

4. How do the differences in language policy among the BRICS countries contribute to our understanding of global language policy trends and their implications for education?

The article asks whether the promise of an alternative global network is reflected in language policy. The creation of a meta-framework based on the BRICS countries will help not only better understand the peculiarities of the education received in these settings but — given the wide range of approaches in the BRICS countries — also classify and understand language policies elsewhere. The analysis offered assumes:

· language policy refers to actions, decisions, and regulations formulated by governmental institutions, designed to address language issues; and
· language planning is the systematic execution of such policies, emphasizing the methods used.

The distinction between policy and planning in the literature on language broadly reflects that in political science. An underlying presumption is that policy, as understood in both disciplines, mirrors the ability of the political élite to have their preferences reflected in practice, especially in state funded contexts. It is also assumed that, along with other symbols and cultural practices, language is a key element in national identity. Of significance to the cases examined, it is understood that membership of BRICS does not provide citizens with a sense of supranational identity, especially compared to entities like the European Union (EU). There are no common institutions or symbols that promote a unified identity among the citizens of the BRICS members.

The meta-framework proposed here juxtaposes two dichotomous variables for each of the BRICS states: ethnolinguistic diversity and dominant educational language policies. A meta-framework of this type has multiple purposes, especially in its ability to synthesize and communicate core information in a field [Partelow, 2023. P. 510]. The meta-framework offered in this article simplifies each state's intricate social and political realities, but it nevertheless provides a valuable framework for comparative study, establishing foundational principles for comprehending complex social phenomena and enhancing communication within and between disciplines. As Wickramsinghe [2006] has suggested, it facilitates "the multi-faceted nature of the knowledge… including its subjective and objective as well as tacit and explicit components" (p. 558). At the same time, no meta-framework, however useful for comparative purposes, can replace the value of single-case studies; therefore, the two sorts of analyses should be used together.

Literature review

In a poll conducted by the Pew Research Center across over 20 countries, a median of 91% of respondents indicated that proficiency in their nation's predominant language is essential for being regarded as a "true national" [Pew Research Center, 2024]. Although 81% said sharing their country's customs and traditions were important, birthplace and religion were significantly less essential to national identity according to respondents.

Ruíz [1984; 1990; 2010] identifies three orientations that can be taken concerning how language policy is viewed:

- language-as-problem;
- language-as-right, and
- language-as-resource.

The issue is whether language diversity is fundamentally a problem to be overcome or a benefit to be enjoyed. The language-as-problem orientation focuses on the complications and challenges created by linguistic diversity, viewing linguistic diversity negatively. Such a perspective results in the disempowerment of individuals and groups and may promote ethnic divisiveness, conflict, and strife. The language-as-right orientation focuses on principles of social justice and on the acceptance that language rights are fundamental. Finally, the language-as-resource orientation argues that linguistic diversity is best seen as cultural capital that society should develop.

Language planning and language policy formulation and implementation are essential elements of social and educational policy, especially in the post-colonial world. Efforts are made to address the legacy of colonialism and the ongoing presence of considerable cultural and linguistic diversity. National and official language selection questions seldom avoid controversy, debate, and conflict. The post-World War II era saw a dramatic expansion in language planning efforts as many former colonies gained independence. Numerous language policies were developed in the context of the domination of a former colonial language, most often English or French. Several factors have tended to support the ongoing domination of former colonial languages, including the need for national integration, comparative costs, international communication, and the "world system" (see [Clayton, 1998]). Language policies can also reflect "élite closure", by which a small, privileged group of individuals or organizations maintain control and influence over public policies, often marginalizing less powerful groups [Wornyo, 2015]. In Indonesia, for example, the ideal of "One Nation, One People, One Language" is a core project for a nation of "hundreds of ethnic groups with neither a common racial identity, a common culture nor a common tongue to unite them" [Harper, 2013].

Although language planning efforts have tended to be top-down, they are most effective when they have significant grassroots support.

Inevitably, language planning is profoundly political and involves public decisions about language, its use, status, and development. Implementation efforts are inevitably ideological and controversial. In relatively few BRICS countries are these decisions made in a democratic context. As Ostwald et al. suggest: "Governments of ethno-linguistically diverse societies face a difficult dilemma in opting for which language to use in the education system. While allowing each ethnic group to use its own language is seen as vital for cultural preservation and increasingly as a basic human right, it may also inadvertently undermine social cohesion by contributing to de facto segregation of schools" [Ostwald, Ong, Gueorguiev, 2017. P. 89].

The typology of the language environment offered here is based on each state's formal declaration and its practical approach. The typology in Table 1 focuses on how the political élite perceived the role of language, especially in the development of the country. National leaders may view linguistic homogeneity as an instrument for preserving sovereignty, enhancing economic connections, exerting soft power and, therefore, wish to see their perspective reflected in educational practice. On the other hand, the élite may regard the preservation of diversity as an instrument for social harmony in an ethnolinguistically divided state. The élite's propensity to adopt one or other of these approaches may reflect wider state-building strategies, particularly in countries that have not been independent long.

Table 1

		Diversity	
		High	Low
Dominant	Monolingual	**Privileged**	**Protective**
	Plurilingual	**Pluricultural**	**Promotive**

Research Methodology

By their nature, language planning and policy studies are both interdisciplinary and comparative. The key variable in the analysis offered here is governmental language policy, especially as reflected in educational policy. Each BRICS country is discussed to assess whether official policies are tolerant of diversity or encourage uniformity. It is not assumed that high linguistic diversity leads to political conflict. Still, diversity needs to be addressed in public policy as a problem, a rights issue, or a resource, particularly in education (see [Ruíz, 2010]).

The Economist Intelligence Unit (EIU) Democracy Index distinguishes the political régime in the case study countries according to five key criteria: electoral process and pluralism, functioning of government, political participation, political culture, and civil liberties (see [Geissel, Kneuer, Lauth, 2016]). These metrics offer a broad perspective on the state of democracy and political régimes but further comments will be used to characterize the case study political régimes.

According to the Freedom House Index, the BRICS range from free democracies to authoritarian régimes. For instance, South Africa is ranked as "free" though, in the EIU Democracy Index, it is labeled a "flawed democracy", reflecting institutional weaknesses and corruption. The assumption is that autocratic governments more readily convert their language preferences into policies, though success of the latter may still rely on popular acceptance.

Every one of the BRICS countries possesses a degree of linguistic diversity, although the origins, nature, and implications of that diversity vary considerably. They diverge in extent due to the number of languages present in the country, the role of the former colonial language(s) in contemporary society, the distinction between the national and official languages, and the methods of policy implementation. They also differ in the underlying ideologies that guide language planning and policies. This difference is especially evident in the educational domain, where approaches to linguistic diversity range from commitments to promoting bilingualism and multilingualism to efforts to establish and maintain a single national and official language. The different approaches are characterized as a monolingual or plurilingual norm to reflect the principal policy implementation pattern rather than the official narrative. In Table 2, the dominant approaches are juxtaposed with the ethnic and cultural diversity of each state studied as measured by the Ethnolinguistic Fractionalization (ELF) Index established by Fearon to enable comparison among the BRICS nations. ELF aims to quantify the probability that two randomly selected individuals from a population belong to different ethnic groups. The metric evaluates ethnic variety on a scale from 0 to 1, with 0 signifying complete homogeneity (all individuals belong to the same group) and 1 representing maximal diversity (all individuals belong to distinct groups). In the article, low scores (e.g., 0.1 or lower) signify a predominantly homogeneous society with limited ethnolinguistic diversity. Conversely, elevated scores (e.g., 0.7 or above) indicate a state characterized by substantial ethnolinguistic diversity and fragmentation. Intermediate scores, approximately between 0.4 and 0.6, indicate modest diversity. A high score is often associated with social fragmentation, political instability, and conflict, which present challenges to the political élite. The ELF Index may not capture the full complexity and dynamics of ethnic diversity of each state, but it points to the broad ethnolinguistic pattern.

For each BRICS country, there is a substantial body of literature dealing with issues of language planning and policies, and in virtually every instance, these issues have proven to be both complex and controversial. Such controversy is especially common where language policies are concerned with the provision of education [Ferguson, 2006; Lambert, Shohamy, 2000; Tollefson, Tsui, 2004], and this is understandable, since, as Kennedy noted: "The close relationship between use of a language and political power, socioeconomic de-

velopment, national and local identity and cultural values has led to the increasing realization of the importance of language policies and planning in the life of a nation. Nowhere is this planning more crucial than in education, universally recognized as a powerful instrument of change" [Kennedy, 1983. P. iii].

Educational language policy in the BRICS nations

Brazil became an independent country in 1825. It is "an example of a settled colony that since independence has achieved a significant status among South American nations and that has successfully adopted Portuguese as its national and dominant language supported by a strong belief in the hegemony of the standard variety" [Spolsky, 2017. Pp. 66–67]. Although most of the population speaks Portuguese as their native language, there is extensive linguistic diversity, including both indigenous and immigrant languages [Sousa, Dionísio, 2019]. The indigenous languages are endangered, with no more than 40,000 speakers mostly in the northern region [Rodrigues, 2005]. In 2002, Brazilian Sign Language (*Libras*) was recognized as the official language of the Brazilian Deaf community [Piconi, 2014]. Although the use of other languages is not forbidden by law (and some schooling does take place in different European languages), virtually all public education in Brazil takes place in the medium of Portuguese. Recently, English has been added to the curriculum as a mandatory subject at the secondary level beginning in Grade 6. However, there are "manifestations of linguistic prejudice, one against external elements and the other against supposedly inferior internal elements, pointing out to a common origin: the myth that the Portuguese language in Brazil is characterized by an astonishing unity" [Massini-Cagliari, 2004. P. 3].

In Russia, the historical tension between Russian, the lingua franca and the dominant language of the state, and the actual linguistic diversity present continues to be a social and political issue (see [Abdullayev, 2019]). This tension reflects history dating back to imperial times. The Soviet era was somewhat more complex, with various approaches toward linguistic diversity. Initially, nationality policies (in which language policies were embedded) emphasized the use and value of local languages and cultures in building socialism; later, the focus shifted to the creation of a common socialist identity fostered by the shared use of Russian as the language of the USSR [Martin, 2001].

In the Russian Federation, language policy is primarily a federal responsibility. In July 2018, the State Duma adopted legislation that made schooling in all languages other than Russian optional. While there was no reduction in the required number of hours of instruction at the federal level (the number is determined at the regional level), many speakers of other languages saw this as the renewal of the historic policy of Russification, and protests were held in several parts of the Russian Federation. In any event, all students are expected to

become literate and fluent in the Russian language. The conflict in Ukraine has accentuated the importance of the use of Russian language as a sign of national and cultural solidarity [Baranova, 2024]. As Noack notes, "promotion of language and culture has an important role to play, as Russia sees preserving, and possibly expanding, the role of the Russian language and of Russian culture in this area (the so called "near abroad") as a guarantee of political influence" [Noack, 2021. P. 2].

In India, one of the most linguistically diverse countries on the planet, while English and Hindi both play essential roles politically, economically, and educationally, there are a substantial number of other indigenous languages spoken by significant numbers of people, many of which have some degree of official status and recognition [Bhattacharya, 2017; Groff, 2017]. There are 22 "scheduled languages" (including Hindi) which have some legal recognition[4]. In addition, many other languages, which are spoken by many people, do not currently have status as scheduled languages, including Rajasthani, Haryanvi, Bhili, Gondi, and Tulu. Finally, a few languages are identified as "classical languages", including Kannada, Malayalam, Odia, Sanskrit, Tamil, and Telugu.

In India, language policy is a shared responsibility between the central and state governments. The federal government sets broad guidelines and recognizes official languages, while states have significant authority to determine and implement language policies within their territories. This division reflects India's linguistic diversity and the need for flexibility in managing it. The medium of instruction in government schools in India varies among Hindi, English, and various regional languages. Private schools tend to use English, while government schools tend to use Indian languages. In 2020, a National Education Policy was introduced which mandated schools to use regional languages up to Grade 5 and preferably 8 [Mahapatra, Anderson, 2022]. Prime Minister Modi declared that "education in the mother tongue is initiating a new form of justice for students"[5]. In practice, the implementation of the policy is varied with different approaches adopted by state governments [Miglani, Bika, 2024].

There is a clear north — south divide, with northern states predominantly speaking Indo-Aryan languages, such as Hindi; while southern states mostly speak Dravidian languages, such as Tamil. The conflict

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[4] The "scheduled languages" are those identified in the Eighth Schedule to the Constitution of India. Inclusion on the list of scheduled languages commits the government to the ongoing development of the language (e.g., corpus development), as well as ensuring the right of any person to take civil service examinations in any of the scheduled languages (see [Bhattacharya, 2017; Laitin, 1989]).

[5] https://economictimes.indiatimes.com/news/india/national-education-policy-will-give-due-respect-to-every-indian-language-pm-modi/articleshow/102230742.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst (accessed 27.08.2025)

between national and regional identity has been a persistent and divisive issue in Indian politics. Certain political parties support elevating a single national language, while others underscore the significance of safeguarding regional languages and dialects. Language politics is intricately associated with regional identity and pride, as numerous states in India are ardently protective of their linguistic history. The federal government has endeavored to elevate Hindi as the national language; nonetheless, a persistent political conflict exists about the medium of instruction in schools.

The primary responsibility for language policy in China lies with the central government. It formulates and implements policies to advance Mandarin as the official language while permitting restricted local usage of minority languages within the designated framework defined by the central authority. Local discretion concerning language is more marked in areas with significant ethnic minority populations, such as Tibet, Xinjiang, and Inner Mongolia. Generally, however, the central control over language is unchallenged. For example, under the gambit of "patriotic education", "the whittling of opportunities to engage in the Tibetan language extends from kindergarten to the university level"[6]. Nevertheless, the linguistic situation in the People's Republic is quite complex. Although Mandarin is the widely used national language, there are hundreds of related varieties of Chinese, many of which are not mutually intelligible. Because it is non-alphabetic, written Chinese can function as a common language [Yuming, Wei, 2013]. Standard Chinese is the medium of instruction in most schools in China. In both elementary and secondary schools, ethnic language is also used for some recognized minority groups.

Turning to South Africa, it is worth mentioning the *taalstryd* ("language struggle"), which has played an important role, first as a critical element in Afrikaner nationalism in the late 19th and early 20th centuries [Rotberg, 1987; Steyn, 1987] and later as both an instrument of apartheid and a symbol of resistance to it [Kadt de, 2006; Webb, 2006]. Ironically, "the African National Congress (ANC) <…> promoted English as the language of liberation from apartheid" [Mufwene, 2023. P. 1].

In the post-apartheid era, the adoption of 11 official languages — or rather 12, after South African Sign Language was added in 2023 (see [Reagan, 2020]) — demonstrated a solid commitment to multilingualism, as can be seen not only in the official language policy but also in the creation of the Pan South African Language Board. That commitment has mainly remained rhetorical, however, as English has increasingly come to dominate most of the significant sectors of society (see [Beukes, 2009; Orman, 2008]). The situation concerning medium of instruction policies in South Africa is complicated. Theoretically,

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[6] Miller M. China's Legal Warfare Closes a Beloved Tibetan School / The Diplomat, no 119, October 2023: https://thediplomat.com/2024/09/chinas-legal-warfare-closes-a-beloved-tibetan-school/ (accessed 27.08.2025).

students are taught in their home language up to Grade 3; after that, the medium is usually English, except in Afrikaans-medium schools. All students must also study two of the country's official languages as mandatory subjects. The Basic Education Laws Amendment (BELA) Bill, signed into law in September 2024, has the potential to significantly change the status of languages at the school level. The act re-assigns language policy from local school governing bodies to provincial education officials and changes how schools choose the language of instruction. BELA has been criticized by the Afrikaans community in particular as it is portrayed as undermining the constitutional right to mother-tongue education[7]. Critics suggest that BELA will require single-language schools to adopt dual-medium instruction.

In Egypt, the linguistic policies implemented by the central government are consistently enforced nationwide, allowing negligible space for regional diversity or independence in this domain [Serreli, 2024]. Though spoken informally in different places, local dialects of Arabic lack official recognition and promotion in public policy. Arabic is the medium of instruction in government schools in Egypt. However, English is now a foreign language in Grade 1, and other languages (especially French, German, and Russian) are studied. The Coptic community, a notable religious minority, uses a unique language in religious circumstances. Even though Arabic is the most widely spoken language, Coptic is still taught in Coptic schools and employed in religious ceremonies, demonstrating that, to some extent, different communities have different linguistic strategies. Despite the central government's significant emphasis on Arabic, minority languages such as Nubian, Siwi (a Berber dialect), and Bedouin dialects are spoken by ethnic groups in southern Egypt and the Western Desert. Nonetheless, these languages possess minimal acknowledgement in formal contexts. The presence of these languages in education, media, or public life is limited, indicating that Egypt's linguistic policies do not address regional diversity.

Iran exhibits a high degree of linguistic diversity. Persian (Farsi) is the predominant language spoken by the majority population and the designated official language of the state. In addition to Persian, Iran's languages encompass Azeri, Kurdish, and Turkmen. Furthermore, there is a multitude of indigenous languages and dialects. The linguistic geography of Iran is demarcated. Widely entrenched in historical context, the many languages spoken in Iran have significant importance in shaping the regional and ethno-national identities inside the country; "de-

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[7] One of the more significant post-apartheid changes has been in the status of Afrikaans. While Afrikaans is still one of the country's 12 official languages, its relative status has decreased significantly and there are ongoing concerns about the language rights of speakers of Afrikaans (see [Combrink, 1991; Giliomee, Schlemmer, 2001; Steyn, 1990; 1992; Webb, 2002]).

spite Iran's rich multicultural fabric, its heavily centralized educational system, [is] influenced by conservative factions" [Azizi et al., 2024].

From its inception, the contemporary Iranian state has made efforts to alter the linguistic composition of the country in favor of Persian [Mohammadpour, 2024]. All political and government communication, forms, and signage are in Persian [Mirhosseini, Miryouness Haghi, 2024]. In its pursuit of establishing a uniform "nation-state", the Iranian government has implemented several measures, including a standardized universal education system in Persian. Despite linguistic regional differences, all students in the country are considered to be Persian-speaking. Educational policies emphasize Islamic values, character and morality as well as Iranian Revolutionism [Moharami, Daneshfar, 2022][8]. Students study English as a foreign language beginning in middle school, and other foreign languages — most notably, Arabic, Chinese, French, German, and Spanish — are also taught [Golchin, Mansouri, 2024].

Ethiopia has a long history of ethnic and cultural diversity, with many different groups coexisting for centuries. Historically, there have been times of relative ethnic harmony, particularly under rulers, who promoted a unified Ethiopian identity. However, the country is currently experiencing significant divisions along ethnolinguistic lines, reinforced by the ethnic basis of its federal structure: "Ethiopia's national unity is greatly influenced by ethnic identity. In the framework of ethnic federalism, the politicization of ethnicity has fueled ethnic divisions, resulting in uniqueness and distinctions that may impede attempts to forge a nation and shared goals" [Birhan, 2024. P. 41].

In Ethiopia, language policy is primarily a federal responsibility, although 12 regional states and two cities also play a significant role. The ongoing disputes over federal versus regional authority are all reflections of the current ethnolinguistic challenges the country faces. There are between 90 and 110 languages spoken in Ethiopia. Since the 12th century, the dominant language in Ethiopia has been Amharic. It is currently spoken by nearly 40 million people as a native language and an additional 25 million as a second language. It served as the sole official language of Ethiopia until the 1995 Constitution granted all Ethiopians the right to use their native language in primary education, as well as giving other languages official status in different parts of the country. Until 2020, Amharic remained the only working language in Ethiopia at the national level, but today, there are five official working languages: Afar, Amharic, Oromo, Somali, and Tigrinya [Yohannes, 2021]. At primary school, Amharic, Oromo, and other indigenous languages are used as media of instruction. English has become the language medium at the secondary level (and in universities).

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[8] It is important to note that several scholars have suggested a fundamental tension with respect to the teaching and learning of English in Muslim societies (see [Dewi, 2012; Karmani, 2005a; 2005b; Karmani, Pennycook, 2005; Mohd-Asraf, 2005; Rahman, 2005; Solloway, 2017, 2018]).

In Saudi Arabia, governance is highly centralized under the monarchy, with regional governors directly appointed by the king. The country is divided into 13 administrative regions, but these regions do not have autonomous powers. The Ministry of Education controls the entire educational system, and schools have little autonomy. The vast majority of the population speak Arabic, the official national language. As Almesaar [2024] asserts, "Islam has a place in the Saudi future as long as it is moderate and non-extreme; the preservation of Saudi culture will rely heavily on the preservation of Arabic language, and it will be a carrier of national identity".

Nevertheless, in 2021, the Ministry of Education introduced English language instruction starting from the first grade of primary school. Under previous policies, English was typically introduced later in the curriculum. The change was part of a process initiated in *Vision 2030*, a roadmap to the Kingdom's economic development, introduced in 2016. It aimed to reduce the country's dependence on oil, diversifying its economy, and developing sectors including education.

The United Arab Emirates (UAE), a federation of seven emirates with a population of about 10 million, is "one of the most multicultural and multilingual countries in the world" [Coelho, Khalil, Shankar, 2022. P. 670]. Only about 12% are Emirati citizens, with the remainder comprising expatriates. While the official language is Arabic, English is widely used, and many languages are also spoken [Siemund, Al-Issa, Leimgruber, 2021]. Government schools are Arabic-medium, with all students studying English throughout their schooling. While "there are concerns around <…> Arabic domain loss, and effects on identity and belonging", the government emphasizes a policy of inclusion towards the expatriate communities [Hopkyns, 2024].

Discussion   What we have shown in this article, and what is reflected in the meta-framework, is that the BRIC countries' approaches to linguistic diversity range from structured accommodation in South Africa and India to an emphatic promotion of state languages in Russia, Brazil, and China. Saudi Arabia also prioritizes the core language but increasingly recognizes English as globally significant. Further, in each state the approach to language reflects broader goals, such as assimilation, political integration, or economic development. This latter aim is particularly evident in Saudi Arabia but also influences linguistic education in India and South Africa. Similar recognition of global economic realities can be seen in other contexts, but the BRICS states collectively aspire to a new world order, so their approach to education is instructive for economically developing countries in particular. In this article, we have presented a meta-framework based on the diverse language policies of BRICS countries that can, indeed, be utilized to classify and understand language policies in other global contexts. Based on the

meta-framework, it appears that he global trend in language policies, at least as demonstrated by the BRICS nations, may be seen as encouraging the local and facilitating the global.

Conclusion   Language planning and language policies in general, and in the educational domain in particular, serve a variety of different ends. Language can serve as a tool for empowering groups and individuals, for creating and strengthening national bonds and ties, and for maximizing educational and economic development, but it can also be used to maintain and perpetuate oppression, social class discrimination, or social and educational inequity. Language planning efforts, if they are to be defensible, must entail the active involvement and participation of those for whom they are intended. Only when emerging in such a context can language planning efforts contribute to the creation of more just, humane, and legitimate social and educational policies. As Tollefson argued, "the foundation for rights is *power* and <…> constant *struggle* is necessary to sustain language rights" [Tollefson, 1991. P. 167] (emphasis in original).

The diverse language policies in education among BRICS nations are influenced by their unique political, demographic, and ethnic environments. These distinctions illustrate the intricacies of each nation's internal dynamics and present diverse options that could facilitate effective language policies. As BRICS persists in tackling systemic disparities, language policy will remain a pivotal emphasis, underscoring the necessity for adaptable and inclusive solutions amid worldwide power and influence transitions. The BRICS nations are deliberately collaborating in the face of changing global paradigms by tackling systemic inequalities and promoting the concept of an alternative global order. However, their approaches to language policy, particularly in educational institutions, continue to be varied. These variations stem largely from the political and ethnic attributes of each state.

In this article, we have provided a meta-framework for analyzing the different language policies employed by the BRICS countries to address the challenges posed by the presence of linguistic diversity in society. We believe that this meta-framework has a broader utility as well, and that it could be used more generally in the development, implementation, analysis, and evaluation of language planning efforts and specific language policies in other settings. Unitary states with distinct center/periphery levels of development may also display deep linguistic political divisions. Language becomes politically contentious when it intersects with political cleavages based on ethnicity, class, regionalism, and historical inequity. Conversely, language tends to be less controversial when a political system acknowledges, values, and safeguards linguistic diversity. There is what May [2008. P. 15] has called an "often-difficult balancing act between maintaining cohesion on the one hand and

recognising pluralism on the other within modern nation-states", a balancing act that Bullivant [1981] described as "the pluralist dilemma", and which is in one way or another manifested in virtually every case explored here. It is only by acknowledging this "pluralist dilemma" — the reconciliation of "the diverse political claims of constituent groups and individuals in a pluralistic society with the claims of the nation-state as a whole" [Bullivant, 1981. P. x] that the challenges of linguistic diversity can be addressed in different societies. We believe that the meta-framework proposed here may be useful in helping to accomplish this.

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Higher Medical Education of Pediatricians in the BRICS Countries

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Abstract   The aim of the study is a comparative analysis of the organization of training in medical universities of the BRICS countries for future pediatricians. What are the common characteristics and differences between higher medical education in Brazil, Indonesia, China, Egypt, India, Iran, Russia, United Arab Emirates (UAE), Ethiopia and Republic of South Africa?

The study has revealed that the Bologna education system has been fully preserved only in China and the UAE, while Russia plans to abolish it from 2025. Pediatric faculties are organized in three countries: Brazil, Russia, and China. If basic medical education lasts from four to six years, then further training in pediatric residency is required, the duration of which is an additional 2–4 years. In almost all countries (except China), the objective and structured clinical exam (OSCE) is recognized as the major examination for obtaining a pediatrician's diploma and specialist board certification.

All in all, each BRICS country has its own educational standards. The level of accessibility of higher medical education varies, but initiatives are being taken to improve the quality of education, including a unified educational system and assessment of learning, exchange of experience.

BRICS is an association of ten major developing economies (as of May 2025), characterized by common features in the organization of higher education, including the professional training of pediatricians. The first level of medical higher education is based on a fairly broad concept and plays a fundamental role in obtaining basic skills and abilities, on the basis of which further board certification in narrower specializations is possible. Pediatrics is one of the most important and complex areas of medical science. As an independent specialty, it arose relatively recently, since previously the same doctor had been engaged in the treatment of children and adults [Mikirtichan, Suvorova, 1998]. At present, medical higher educational institutions include pediatric departments, students of which feel more competent and confident than their colleagues decades ago. The organization of the educational process is to ensure training of many highly-qualified pediatricians. Against this background, the professionalism of the faculty has become particularly important. Professors are assigned a variety of tasks and responsibilities in teaching [Bryman, 2007] in addition to developing the skills and competencies of examining and treating students, and subsequently creative development and self-realization in the profession [Bagrationi, Filonovich, 2024].

The aim of the study was a comparative analysis of the organization of pediatric training in medical universities of BRICS countries. What are the similarities and differences between pediatric higher medical education in Brazil, Indonesia, China, Egypt, India, Iran, Russia, UAE, Ethiopia, and the Republic of South Africa? To answer this question, we set the following research objectives:

1) to assess the availability of basic higher medical education in the BRICS countries;
2) to determine the availability of the Bologna system and pediatric specialization in undergraduate medical education, program duration and diploma confirmation procedure upon completion;
3) to clarify the availability of residency in pediatrics and evaluate training duration;
4) to analyze the control over the system of pediatric education in BRICS countries through OSCE (Objective Structured Clinical Examination).

1. Methodology

At the first stage of this study, we searched and analyzed scientific literature available in bibliographic databases (PubMed, Scopus, Web of Science, Google Scholar, eLibrary, Googlescolar, CyberLeninka), summarizing and assessing information on training medical personnel in the field of pediatrics in various countries. In particular, more than 60 sources were studied without language restrictions, which included one monograph and 34 full-text articles. In addition, we performed a thematic search on 35 official Internet websites.

We found that the existing studies are not systematized and overlook some BRICS member countries. This prompted us to conduct a comprehensive analysis, systematization, and generalization of disparate data from publications, as well as the official websites of the leading medical educational institutions.

For our study, we selected 10 countries that are full members of the organization. Our research does not cover the "partner countries" of BRICS. In our view, the first criterion for a comparative assessment of pediatric education in the countries under study is the general availability of education. This term means a combination of such factors as the total number of higher education institutions offering pediatric training, their geographic accessibility, and the preferential basis for training — state (financed from the country's budget) or commercial (financed by students).

The next evaluation criterion is the duration of pediatric training and the degree of its compliance with the Bologna system (as the most widespread educational arrangement in the world). The presence of residency/internship in pediatrics, as well as the format of training, including medical practice, are also, in our opinion, an important comparative criterion. Finally, the form of knowledge assessment, specifically, if there is a panel-held examination, is also considered. The abovementioned criteria allow us to obtain a comprehensive understanding of the pediatric personnel training system in the BRICS countries and to structure our analysis.

2. Research results
2.1. Pediatric education in Russia

The history of pediatric education in Russia began with the creation of the pediatric faculty at Second Moscow State Medical Institute (currently Pirogov Russian National Research Medical University) in 1930, which initially included two departments: the protection of motherhood, infancy and childhood and the protection of the health of children and adolescents. Since last century, pediatric education has undergone many changes, including those in the number of disciplines studied and the duration of training. As medical science progressed, the training of young specialists acquired a dynamic character because any major discoveries and innovations in medicine in a certain way influenced both the qualifications of medical doctors in future.

In Russia, the generally accepted standard for obtaining higher medical education is completing a unified specialist course, which lasts 5–6 years on average. The training in the specialty "Pediatrics" (currently coded under number 3.1.21) differs from instruction in other fields. Instruction within the subject area involves training directly at the patient's bedside in children's hospitals. The presence of pediatric training programs in multidisciplinary state universities indicates the availability of medical education. Below is a list of the highest rated Russian medical universities (2025 Rankings):

1) I. M. Sechenov First Moscow State Medical University (Moscow);
2) Pirogov Russian National Research Medical University (Moscow);
3) Saint Petersburg State Pediatric Medical University (Saint Petersburg);
4) Kazan State Medical University (Kazan);
5) Pavlov First Saint Petersburg State Medical University (Saint Petersburg); and some others.

Importantly, clinical and fundamental medicine cannot exist without each other, being mutually complementary. As a result, many universities have developed training programs in many fundamental sciences that are directly or indirectly related to medicine. The main feature of educational fundamental areas is their training structure, mainly rooted in the Bologna system.

The range of Bologna-based master's and bachelor's programs, both in medical and non-medical universities, has expanded (Table 1).

Table 1. **Educational programs of the Bologna system integrated into the educational system of medical universities in Russia**

Stage	Program cipher
Bachelor's degree	*12.03.04 "Biotechnical systems and technologies":* Engineering in biomedical practice *03.19.01 "Biotechnology":* Biotechnology of biologically active substances, medical biotechnology, Technology of medicinal preparations *09.03.02 "Information systems in technology":* Information systems and technologies *03.45.02 "Linguistics":* Linguistics *22.03.01 "Materials Science and Materials Technology":* Materials Science and Materials Technology *38.03.02 "Management":* Healthcare Management, Organization Management, Healthcare Management *01.03.03 "Mechanics and Mathematical Modeling":* Mechanics and mathematical modeling in medicine *03.28.03 "Nanomaterials":* Nanomaterials *09.03.03 "Applied Informatics":* Applied informatics in healthcare *03.37.01 "Psychology":* Psychology *34.03.01 "Nursing":* Preschool and school medicine, organization of nursing activities, pedagogical activities in the system of medical education, nursing, management of nursing activities *39.03.02 "Social Work":* Medical and social work with the population, social work *38.03.07 "Commodity Science":* Commodity science and examination of goods
Master's degree	*09.04.02 "Information systems and technologies":* Intelligent information systems in medicine *45.04.02 "Linguistics":* Foreign language and intercultural professional communication, Language of medicine: communication in the media environment *22.04.01 "Materials Science and Materials Technology":* Bionic systems in medicine *04.38.02 "Management":* Strategic management and marketing in healthcare, strategic management of quality of medical activities and risks in healthcare *33.04.01 "Industrial Pharmacy":* Industrial production of medicines, radiopharmaceuticals, specialist in industrial pharmacy in the field of quality control of medicines, pharmaceutical technology

Stage	Program cipher
	39.04.02 "Social Work": Clinical social work and social rehabilitation, social security, social work with different groups of the population, Management of social work in the health care system
	34.04.01 "Management of Nursing Activities": Nursing management
	49.04.02 "Physical education for individuals with health problems (adaptive physical education)": Sports training for people with disabilities (including the disabled) and others

Notably, only a few medical specialties are subject to the Bologna education system — as a rule, they are those branches of medicine that are mostly related to fundamental sciences. The acquisition of higher medical education is regulated by federal laws[1], as well as local regulatory and legal acts that form specific sets of rules for educational activities in each medical educational organization.

After completing a specialty in pediatrics, any specialist can either immediately take up primary; health care (a district pediatrician in a polyclinic; a pediatrician in a hospital admission department), or complete a residency program in any narrow specialization — either adult or pediatric. It is noteworthy that graduates of the «General Medicine» direction can also complete residency programs in any of the pediatric specialties, since their basic training program, although to a lesser extent, also includes disciplines related to the study of children's health.

Each student has an opportunity to join an international internship program in pediatrics, which is aimed at receiving experience from foreign specialists. This helps in mastering language skills, thereby facilitating participation in international conferences and/or cooperation with foreign medical research centers. Internships contribute to the development of both domestic and foreign medicine as they help share innovations and new approaches to the medical process. In addition to internships, in order to acquire new knowledge and skills, students can do various courses and training programs in narrow specializations at any educational institution in Russia.

Board certification of specialists is a key link in the implementation of professional activities of each medical doctor. It determines the compliance of each specialist with the standards for the implementation of medical activities in a specific medical specialty or pharmaceutical activity. Thus, there is the first personal (upon completion of basic higher medical education), primary specialized (upon completion of residency, master's or professional retraining programs) and periodic

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[1] Federal Laws: No. 273-FZ (as amended on 08.08.2024) of 29.12.2012 "On Education in the Russian Federation" Art. 69 and Art. 82: https://minzdrav.gov.ru/ru; No. 323-FZ (as amended on 24.07.2024) of 21.11.2011 "On the Fundamentals of Health Protection of Citizens in the Russian Federation" Art. 69 and Art. 100: https://minobrnauki.gov.ru/ (accessed 01.10.2025).

board certification (Fig. 1)[2]. The procedures and stages of board certification of specialists are similar; the differences are only in the specialization obtained, since the primary board certification determines the broadest possible format for demonstrating the acquired skills. All future Russian medical doctors perform OSCE to assess their clinical competence.

Fig. 1. **Admission to professional activity through specialist board certification[3]**
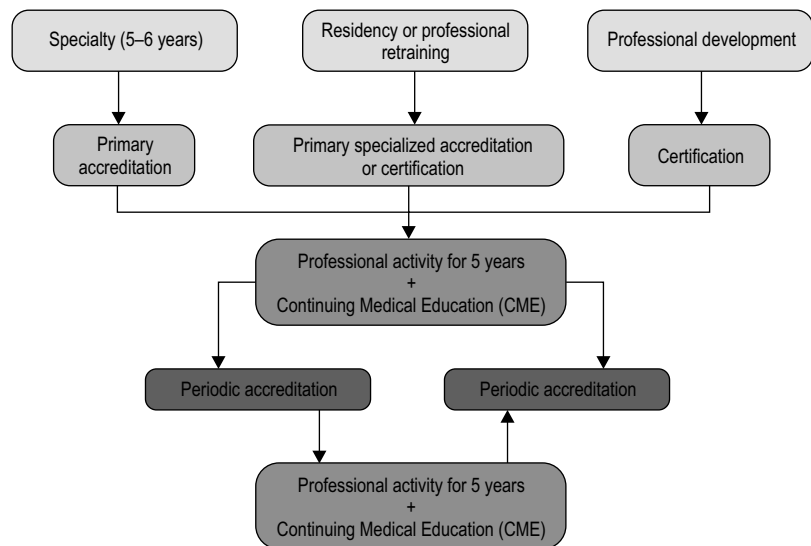
Between accreditations, each medical doctor constantly improves their own skills and knowledge, which implies a system of continuous medical education. In order to update information in the field of healthcare, doctors are offered various options, such as advanced training courses, interactive educational modules, or participation in conferences[4].

Considering Russian pediatric education, we can conclude that it is accessible to all segments of society due to the large number of state-funded places, including targeted-admission ones. The educational institutions are adequately equipped for admitting and training students. High intellectual demands are placed on applicants and students, which has a positive effect on the further level of training of specialists and the development of their proper professional compe-

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[2] Official website of federal accreditation centers: https://fca-rosminzdrav.ru/ (accessed 01.10.2025).

[3] Portal of continuous medical and pharmaceutical education of the Ministry of Health of the Russian Federation: https://edu.rosminzdrav.ru/specialistam/vo/ (accessed 01.10.2025).

[4] Adapted from the portal of continuous medical and pharmaceutical education of the Ministry of Health of the Russian Federation: https://edu.rosminzdrav.ru/ (accessed 01.10.2025).

tencies. The training of a medical doctor is a continuous six-year specialist program, which does not fit into the structure of the Bologna system. For all specialists, obtaining proper qualifications is confirmed by board certification under the OSCE system. After that, the medical university graduate can choose between providing assistance at the level of primary medical and social care and further training under the residency program with the achievement of greater opportunities in the provision of specialized medical care. Clinical residency in both pediatrics and other specialties lasts two years.

The system of medical education in Russia has been reformed several times and is still being improved by executive state bodies. The need for changes is directly related to the introduction of innovations into the healthcare sector, which will eventually have a positive impact on the provision of medical care to the population.

2.2. Pediatric education in China

The prevailing trend in Chinese education in recent years has been active cooperation with Russia, in particular within the BRICS alliance, aimed at drug research, internships for medical specialists, import and export of medical products, safety and telemedicine[5]. Well-coordinated joint work allows us to complement each other's advantages in each of the priority areas of healthcare, which is likely to accelerate the modernization processes in Russian and Chinese medicine. Since 2014, the Russian-Chinese Association of Medical Universities (RKAMU) was established, which promotes cooperation in a number of areas, such as joint research (more than 200 major projects annually) or scientific and practical conferences[6].

Below is a list of the best medical universities in China that focus on training pediatricians[7]:

1) Sun Yat-sen University, Guangzhou: master's degree;
2) Sichuan University, Chengdu: master's and doctoral studies;
3) Southern Medical University, Guangzhou: master's and doctoral studies;
4) Wuhan University, Wuhan: master's and doctoral programs.

Clinical medical education in China almost completely follows the Bologna system (Fig. 2), namely, the standardized training model "5 + 3": the first five years include training for the bachelor's degree,

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[5] Official website of the Representative Office of the Russian Federation in the BRICS association in 2024: https://brics-russia2024.ru/ (accessed 01.10.2025).

[6] Official website of the Russian-Chinese Association of Medical Universities: https://asrmu.ru/ (accessed 01.10.2025).

[7] Official website of EduRank — independent ranking of universities worldwide, section "China's 100+ best Pediatrics universities (2025 Rankings): https://edurank.org/medicine/pediatrics/cn/ (accessed 01.10.2025).

and the remaining three years involve training in one of the programs, standardized residency or professional master's degree.

Fig. 2. **The share of disciplines in the educational programs of the Bologna system integrated into the educational system of medical universities in the PRC[8]**

Percentage of educational programs in PRC medical schools

Figure 2 demonstrates the current three-level education system, with each of the medical fields presented allowing students to achieve the degree of "Doctor of Science", or as is customary in foreign countries — the PhD (Doctor of Philosophy) degree, similar to the "candidate of science" degree in Russia. It is also possible to obtain the MD (Doctor of Medicine) degree, which is focused only on medical practice. Notably, pediatrics is not included in the list of bachelor's degree programs. Consequently, in China, graduates who have completed a master's or doctoral program in pediatrics become full-fledged pediatricians.

The clinical practice of students is integrated into the basic training program after Year Three. In Year Five, an internship program is completed, which can be regarded as a "pre-residency" that previously existed in Russia.

An important link in obtaining specialist qualifications worldwide is board certification, including OSCE. We have not received reliable data from official sources on the presence of the OSCE system throughout China as a generally accepted accreditation measure although there are studies that confirm the implementation of OSCE for graduates[9], including pediatricians.

Due to the fact that the training of young specialists is uneven and pre-graduate pediatric education according to one of the training models lasts three years, there is a serious shortage of qualified specialists. Based on this, close cooperation with the BRICS countries will help accelerate these processes and eliminate this insufficiency, including active participation of foreign specialists.

Being one of the most densely populated countries in the world, China has a large number of medical universities and clinical sites that train specialists in various fields, which makes medical education more accessible. Implementation of national projects, redirection of the economy, and active international cooperation allow students to improve the quality of education, thereby honing competencies of specialists-to-be.

2.3. Pediatric Education in Indonesia

Indonesia, the largest and most populous country in Southeast Asia, joined the BRICS association in early 2025[10]. Medical education in the country is subject to the Bologna system only at the undergraduate level: theoretical knowledge training lasts five years and clinical prac-

[9] How to Design and Apply an Objective Structured Clinical Examination (OSCE) in Medical Education: http://www.iberoamericanjm.periodikos.com.br/article/10.5281/zenodo.4247763/pdf/iberoamericanjm-3-1-51.pdf (accessed 01.10.2025).

[10] ASEAN Centre at MGIMO MFA of Russia: https://asean.mgimo.ru/opinions/koldunova-zarubejom-02-25?ysclid=m9uyskmkhc610201609&utm_source=yandex.ru&utm_medium=organic&utm_campaign=yandex.ru&utm_referrer=yandex.ru (accessed 01.10.2025).

tice — 1.5 years[11]. Pediatrics students do a specialized residency program with an emphasis on clinical skills and research activities. Below are the main universities that allow students to study pediatrics:

1) University of Indonesia, Jakarta (Universitas Indonesia);
2) Universitas Airlangga, Surabaya;
3) Universitas Gadjah Mada, Yogyakarta, etc.

Further education in more specialized areas involves completing master's and doctoral courses, depending on the availability of university programs. The duration of study varies depending on the university — from 1–2 to 3.5 years. Upon completion of residency, pediatricians are awarded the title of "child specialist" (Specialist Anak — Sp.A.). After completing residency, the specialist is required to do a one-year internship, and only after that are they entitled to engage in independent clinical practice. Since 2014, Indonesia has been conducting a national exam for professional suitability for medical doctors to accredit specialists — Indonesia Medical Doctor National Competency Examination (IMDNCE). Board certification is carried out in two stages: computer-based testing (MSQs-CBT) and OSCE. The country has problems with the availability of pediatric education, especially for low-income groups.

2.4. Pediatric education in the UAE

In the UAE, higher medical education takes place in several stages and includes a combination of international and local standards of training. Basic medical training lasts six years, followed by one year internship. Specialization in pediatrics takes place over the next four years.

The leading institution is the University of Sharjah, which was founded in 1997 with the vision to developing the qualities that are shared by renowned universities around the world[12]. The educational process in pediatrics includes both theoretical classes and clinical practices in hospitals and medical centers. Doctors undergoing training are required to pass exams to obtain a license from the UAE Council for Medical Professions. The university cooperates with foreign educational institutions to provide opportunities for student exchange and semester training in them. The University of Sharjah is actively implementing the Bologna system, aimed at harmonizing educational programs and improving the quality of education. The training program is organized by levels, including bachelor's, master's, and doctoral studies[13]. OSCE

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[11] Universities in Indonesia — Howtomove: https://howtomove.help/ru/articles/universities-in-indonesia (accessed 01.10.2025).

[12] Official website of the University of Sharjah: https://www.sharjah.ac.ae/en/Medical_Campus/Pages/default.aspx (accessed 01.10.2025).

[13] British educational portal Smapse Education: https://smapse.ru/university-of-sharjah-universitet-shardzhi/ (accessed 01.10.2025).

at university is an important element of training and knowledge control of future medical doctors.

Thus, in the UAE, the medical education system is subject to the Bologna system. To confirm their qualifications, students take the OSCE. The extremely small number of educational institutions in the UAE dictates the active recruitment of medical specialists from other countries, who are paid high salaries.

2.5. Pediatric education in Brazil

As in all BRICS countries, most Brazilian students study at public universities, and most of their medical practice and clinical training takes place in public hospitals. The following institutions offer specialization in pediatrics:

1) University of Sao Paulo (University of São Paulo);
2) The University of Campinas (Universidade Estadual de Campinas)[14].

Medical education in Brazil consists of two main stages: undergraduate and residency (specialization stage). The duration of the undergraduate degree is six years, of which the first three years are spent studying theoretical disciplines. From Year Four to Year Six, students work in hospitals and clinics under the supervision of experienced doctors. As in Russia, after completing a bachelor's degree, students can enter residency to obtain a narrow specialization. As for pediatrics, it takes 2–3 years to train for this profession.

After completing their undergraduate studies, medical doctors must pass a national examination (Exame Nacional de Revalidação de Diplomas Médicos — Revalida)[15]. Revalida is a government exam consisting of theoretical and practical tests that verifies the acquisition of knowledge, skills and competencies necessary for medical practice. The examination revalidates diplomas of doctors who have studied abroad and wish to work in Brazil[16]. Re-recognition of medical degrees is also carried out by public higher education institutions that adhere to Revalida. OSCE is also recognized in Brazil as one of the most valid, reliable, and effective tests for assessing clinical skills.

Summing up the system of training healthcare workers in Brazil, we note the capacity of the respective institutions, and as a result, the growth of personnel, including pediatricians in remote and low-income regions. Despite the lack of formal participation in the Bologna process, the medical education is divided into two stages: bachelor's de-

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[14] Data about the Brazilian universities offering specialization in pediatrics were obtained from publicly available databases: https://educationplanet.ru/braziliya-2/ (accessed 01.10.2025).

[15] Ministério da Educação: https://www.gov.br/mec/pt-br (accessed 01.10.2025)

[16] Ministério da Educação: https://www.gov.br/mec/ (accessed 01.10.2025).

gree and residency. The key elements of the knowledge assessment system are the national Revalida exam and OSCE.

2.6. Pediatric Education in India

To become a pediatrician in India, a doctor needs to obtain Basic medical education, the so-called MBBS (Bachelor of Medicine and Bachelor of Surgery). The program includes knowledge of pediatrics, though at a basic level. After receiving the MBBS degree, medical doctors can continue their education by enrolling in one of the postgraduate programs in pediatrics. The main options are MD (Doctor of Medicine) in pediatrics — a three-year program that specializes in the education and training of pediatricians; Diploma in Child Health (DCH) — a two-year program for those who want to quickly gain qualifications in pediatrics. The MD degree is considered more prestigious and provides opportunities for career growth[17].

Departments of Paediatrics are present in all medical universities in India. Almost all of them offer a DCH pediatric specialty after completing the bachelor's degree program[18]. The list of leading medical universities where students master pediatric programs most thoroughly, includes:

1) All India Institutes of Medical Sciences (AIIMS) in New Delhi;
2) Christian Medical College (CMC).

Medical education is built on a two-stage model: an undergraduate degree (MBBS) lasting 5.5 years, followed by specialization (a 3-year MD or a 2-year DCH program). Education is strictly regulated by government bodies, such as the Medical Council of India (MCI), which oversees the board certification of medical schools and educational standards. MD and DCH programs must be accredited by the MCI to ensure that they meet high standards of training.

The Medical Commission of India plays a key role in control over education quality and certification of specialists, regulating the administration of the unified entrance exam (NEET — National Eligibility Cum Entrance Test) for both undergraduate and residency programs[19]. Clinical skills are assessed during both training (through OSCE) and final certification.

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[17] Best Colleges for Paediatrics in India: https://leverageedu.com/discover/indian-universities/best-colleges-for-paediatrics-in-india/ (accessed 01.10.2025).

[18] Best Diploma in Paediatrics and Child Health Universities in India: https://university.careers360.com/colleges/list-of-diploma-in-paediatrics-and-child-health-universities-in-indiae (accessed 01.10.2025).

[19] National Eligibility Cum Entrance Test: https://neet.nta.nic.in/ (accessed 01.10.2025).

2.7. Pediatric education in Egypt

The basic educational program of higher medical education in Egypt takes five years, and residency training in pediatrics lasts for 3–4 years.

The leading medical universities in Egypt that offer world-class education, as well as postgraduate training and research programs in pediatrics include:

1) Cairo University;
2) Alexandria University;
3) Ain Shams University[20].

A bachelor's degree enables its holders to work or continue their education in postgraduate higher education programs. About 20% of bachelors of medicine continue their education in these programs, obtaining academic degrees in a particular specialty, and the remaining 80% begin working as general practitioners[21].

In postgraduate medical education in Egypt, there are two options: an academic pathway, leading to a degree (Master's-Doctorate) coordinated by a university (with a dissertation) and a scholarship program, coordinated by the Ministry of Health[22].

As in other BRICS countries, OSCE is used in Egyptian medical educational institutions to assess students' mastery of clinical and practical skills[23]. There are no distinctive features in the OSCE procedure itself as compared with this in other countries.

The availability of medical education in Egypt is quite high. The educational model is gradually strengthening the practice-oriented approach, providing training for pediatricians, who are able to work in both urban and rural medicine, approaching the principles of the Bologna system, with a clearer division into theoretical and practical stages. To obtain the qualification of a pediatrician after completing a bachelor's degree, a student does residency, access to which is regulated through entrance examinations, including OSCE, and competitive selection.

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[20] Data on medical universities in Egypt is obtained from publicly available sources: https://www.egyptianeducation.com/top-medicine-universities-egypt (accessed 01.10.2025).

[21] Medical Education in Egypt: Historical Background, Current Status, and Challenges: https://www.researchgate.net/publication/322335361_Medical_Education_in_Egypt_Historical_Background_Current_Status_and_Challenges (accessed 01.10.2025).

[22] Medical Education in Egypt: Historical Background, Current Status, and Challenges: https://www.researchgate.net/publication/322335361_Medical_Education_in_Egypt_Historical_Background_Current_Status_and_Challenges (accessed 01.10.2025).

[23] The Egyptian Journal of Hospital Medicine: https://applications.emro.who.int/imemrf/Egypt_J_Hosp_Med/Egypt_J_Hosp_Med_2018_71_7_3554_3558.pdf (accessed 01.10.2025).

2.8. Pediatric education in South Africa

Higher medical education in South Africa contributes to the diverse healthcare system, where pediatricians undoubtedly play a key role in ensuring the health of children. The largest medical institutions include:

1) University of the Witwatersrand;
2) University of Cape Town[24].

Basic medical education lasts six years, offering theoretical disciplines and practical classes in hospitals. After going to university, students receive a bachelor's degree and do a mandatory internship. The pediatric specialty requires additional training, including the following four years of training in a residency program[25].

In order to receive a diploma after completing a bachelor's degree, a student must pass exams consisting of two stages: a written test and a practical part — OSCE. Then, the student is required to work for one year in a rural hospital or small medical institution[26].

Although the system of training pediatricians in South Africa is quite effective, the following problems exist: uneven access to educational resources and a lack of funding. In this regard, new approaches and directions are being developed that contribute to improving the quality of medical care for children in the country[27]. South Africa is not part of the Bologna system. The country's pediatric education focuses on gradual acquisition of competencies and assessment of knowledge, including clinical skills, through OSCE.

2.9. Pediatric education in Iran

To obtain medical education in Iran, it is necessary to pass several stages of training. After successful completion of the national Konkoor exam, which is highly difficult and competitive and is conducted by the Iranian Ministry of Health and Medical Education, and admission to a medical university begins the six-year course of study to become a general practitioner (MD). Below is a list of the leading medical universities offering pediatric education:

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[24] Top 10 Medical Universities in South Africa: https://studygreen.info/best-univer sities-in-south-africa-to-study-medicine/ (accessed 01.10.2025).

[25] Main trends in the development of higher education in sub-Saharan Africa at the present stage: https://scipress.ru/pedagogy/articles/osnovnye-ten dentsii-razvitiya-vysshego-obrazovaniya-v-stranakh-afriki-yuzhnee-sakhary-na-sovremennom-etape.html (accessed 01.10.2025).

[26] Medical Education, Reflections and Perspectives from South Africa: A Review: https://bmcmededuc.biomedcentral.com/articles/10.1186/s12909-025-06910-8 (accessed 01.10.2025).

[27] Journal of modern science: https://cyberleninka.ru/article/n/tendentsii-razvi tiya-v-sisteme-obrazovaniya-v-sovremennoy-yuar-mesto-religii-v-obrazovatel noy-politike-gosudarstva/viewer (accessed 01.10.2025).

1) Tehran University of Medical Sciences (Tehran University of Medical Sciences);
2) Shiraz University of Medical Sciences (Shiraz University of Medical Sciences)[28].

The first two years are devoted to studying theoretical subjects, and the next three years are spent in clinical training, where students begin working with patients under the supervision of senior doctors. In the sixth year of internship, students gain practical skills in hospitals.

The specialty of pediatrics often requires high scores due to the popularity of this field, so students take entrance exams for residency, the duration of study for which is four years. After completing the residency, the medical doctor takes state exams and receives a license to practice medicine from the Iranian Medical Council[29]. Iran is not an exception in that OSCE is an important part of medical education and assessment of physicians' skills.

In general, medical education in Iran is formally accessible, as admission to universities is through the Konkoor entrance exam. As in other countries, applicants from rural and remote areas face challenges due to unequal access to quality training and resources. Officially, Iran is not a participant in the Bologna Process, but the structure of medical education reflects its principles: gradual acquisition of competencies, early involvement of students in clinical practice, and mandatory state examinations. Assessment of clinical skills and knowledge of future pediatricians includes written tests, oral examinations, and OSCE.

2.10. Pediatric Education in Ethiopia

Higher medical education for future pediatricians in Ethiopia includes several stages. The basic course of medical sciences lasts six years and includes theoretical study of disciplines and practical training, upon completion of which students receive a bachelor's degree. Specialization in pediatrics requires a three-year residency. Here, pediatrics students gain in-depth knowledge of childhood diseases and treatment methods and also spend a lot of time practicing in children's hospitals[30]. Programs that meet modern medical standards for training pediatricians are offered at several institutions, including the following universities:

1) Addis Ababa (Addis Ababa University);
2) Gondar (University of Gondar) [31].

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[28] Best Global Universities for Clinical Medicine in Iran: https://www.usnews.com/education/best-global-universities/iran/clinical-medicine (accessed 01.10.2025).

[29] IRI Medical Council: https://irimc.org/en/Regulations/Medical-Education (accessed 01.10.2025).

[30] World Education News + Reviews: https://wenr.wes.org/2018/11/education-in-ethiopia (accessed 01.10.2025).

[31] Ethiopian Universities Ranking: https://www.universityguru.ru/universitety-ethiopia (accessed 01.10.2025).

Pediatric medical education in Ethiopia is affordable as most universities are publicly funded. The only limiting factor is the geographical barrier. The OSCE is the basic medical examination administered to senior medical students. Higher education does not comply with the Bologna system. Unfortunately, the quality of education is limited by the lack of qualified teachers and necessary teaching materials, as well as the insufficient number of universities.

2.11. Summary of research results

To summarize the analysis of higher medical education in the BRICS countries, we offer the following table (Table 2).

Table 2. **Characteristics of higher medical education in the BRICS countries**

Country/ Criterion	Brazil	Egypt	India	Indonesia	Iran	China	Russia	UAE	Ethiopia	South Africa
Availability of basic medical education	+	+	+ MBBS*	+	+	+	+	+ MBBS*	+	+ MBCHB***
Faculty of Pediatrics	+	–	–	–	–	+	+	–	–	–
Bologna system	–	–	–	–	–	+	–	+	–	–
Duration of study in the bachelor's degree	6 years	5 years	5.5 years	5 years	6 years	5 years	6 years	6 years	6 years	6 years
Residency in pediatrics	+	+	+	+	+	+	+	+	+	+
Duration of training in the residency course	2–3 years	3–4 years	MD — 3 years DCH — 2 years **	1–3.5 years	4 years	3 years	From 2 to 4 years old	3 years	3–4 years	4 years
Availability of OSCE	+	+	+	+	+	–	+	+	+	+
Exams at the end of training	Reva-lida, OSCE	Internship — 2 years, then OSCE	OSCE	OSCE	Gosek-replacements + OSCE	State Examination Commission Replacements	Gosek-replacements + OSCE	OSCE	OSCE	OSCE

Notes: * MBBS — Bachelor of Medicine and Bachelor of Surgery; ** MD — Doctor of Medicine, DCH — Diploma in Child Health; *** MBCHB — Bachelor of Medicine and Bachelor of Surgery.

3. Discussion
3.1. The role of the Bologna system in organizing the education of pediatricians in the BRICS countries

The Bologna system of education is a pan-European model of higher education aimed at standardizing educational models, improving the quality of education and facilitating the academic mobility of students and teachers. Accordingly, the first stage of study is a bachelor's degree, lasting 3–4 years; the next one is a master's degree (1–2 years); research work and dissertation defense take place at the next stage of study — doctoral studies (3–5 years). In developed countries of Western Europe (such as Germany, France, Italy, or Belgium), the Bologna system is fully implemented and is the basic standard of higher education [Vyazovskaya, Ivanova, 2018]. The United States of America does not participate in the Bologna process, but their education system is quite close to this model.

The Russian pediatric school, its history, and the established system of maternal and child health care are the pride of the national healthcare system and one of the best practices in training medical personnel [Roshal et al., 2015]. Russia was a participant in the Bologna Process for almost twenty years. This period was marked by considerable developments in medical education.

After joining the Bologna process, Russia needed to create equal conditions for admission to higher education institutions, which led to the introduction of a unified state exam (USE) for all graduates, replacing entrance exams. It turned out to be difficult to introduce certain principles inherent in European education[32] in the country. Finally, on June 6, 2022, it was announced that Russia was withdrawing from the Bologna Process[33,34].

In China, as in other BRICS countries, healthcare plays a key role [Tikhonova, Kalinina, 2023]. The population density is very high, and the distribution of pediatricians across the country is extremely uneven [Zhang et al., 2019]. The Healthy China 2030 program will help achieve a balance between quality, cost savings, and the healthcare system itself, as well as accelerate the overall socio-economic development of the country [Tan, Zhang, Shao, 2019; Wang, 2021].

Regarding the Bologna education system in China, the authorities are considering a separate experimental eight-year training scheme aimed at training highly qualified specialists in the field of innovative medical technologies; upon completion of this program, graduates are awarded a bachelor's or doctoral degree [Wang, 2021]. In 2018, Peking

[32] Aisin K. Bologna education system: pros, cons and Russian characteristics / RBC Trends: https://trends.rbc.ru/trends/education/6295da569a7947202c6b2a0f (accessed 01.10.2025).

[33] The Ministry of education and science announced the development of its own education system in the Russian Federation / Izvestia: https://iz.ru/1339382/2022-05-24/minobrnauki-zaiavilo-o-razrabotke-v-rf-svoei-sistemyobrazovaniia (accessed 01.10.2025).

[34] Ministry of science and higher education of the Russian Federation: https://minobrnauki.gov.ru/press-center/news/novosti-ministerstva/72668/ (accessed 01.10.2025).

Union Medical College launched a pilot project "4 + 4" project, which involves 4 years of non-medical and 4 years of clinical medical education. However, this initiative did not bring any benefits in terms of educational quality; therefore, the "5 + 3" model remains the most popular educational model to this day [Hu, Du, 2020]. The three-stage education system in China allows students to achieve the degree of "Doctor of Science" or as is customary in foreign countries — the PhD (Doctor of Philosophy) degree, which is similar to the Candidate of Sciences degree in Russia [Simagina, Skorobogatova, 2023]. Notably, different training programs have some inconsistency with each other, which is why there is a difference in the quality of professional training of doctors [Wang, 2021]. A significant difference of this model from the Russian one is sticking to the Bologna system, which assumes that the graduate will subsequently receive a PhD and MD degree.

The stages of students' education in Indonesia include studying according to the Bologna system with passing the examination of the Medical College of Indonesia (Kolegium Dokter Indonesia) [Kittrakulrat et al., 2014]. Upon completion of due training in India, a Bachelor of Medicine and Surgery is awarded, but graduates must complete an additional two years of internship program before receiving a medical license [Badrawi et al., 2023]. The role of the Bologna system in medical education in Brazil, Ethiopia, UAE, Iran, Egypt, and South Africa has not been described in literature.

3.2. Accessibility of medical education in BRICS countries

Access to higher medical education in the BRICS countries is an important aspect of the healthcare systems. Each country has its own unique characteristics, including curriculum diversity, funding levels, language barriers, and accessibility for international students. While some countries offer high-quality education with an emphasis on international standards, others face challenges of limited resources and high competition for university places.

In the BRICS countries, the availability of medical education in pediatrics is significantly limited by geographical and financial barriers. In public universities, where training is financed by the state, there are high requirements for the achievement levels of applicants. It is typical for all countries that the poor strata of the population living in small settlements far from large cities, who also receive an insufficient level of secondary education, are limited in obtaining medical education. The National Medical Commission Bill (NMC Bill) in India encourages the establishment of medical schools in underserved areas [Sabde et al., 2020].

The medical education system in Egypt is a network of public and private universities, institutes and colleges, which implement professional educational programs aimed at developing the ability of future healthcare professionals to perform professional activities in com-

pliance with international standards [Hassan, Zakiryanova, 2021]. Access to higher medical education in Iran is easy thanks to the national entrance exam Konkoor [Farrohi-Hajeh-Pasha et al., 2017].

In the UAE, given the growing child population, training opportunities and access to higher medical education are limited, but employment opportunities are very high [Ibrahim, Al Tatari, Holmboe, 2015]. The shortage and inequitable distribution of physicians is an obstacle to universal health coverage, especially in low- and middle-income countries. In Brazil, medical school enrollment has increased in underserved areas [Figueiredo et al., 2021]. For other countries, access to education is poorly described in literature.

3.3. Residency and postgraduate education in BRICS countries

The main goal of residency is for the doctor to gain complete independence in all professional actions[35]. In all BRICS countries, residency is required to obtain a pediatric specialty.

Direct clinical practice of students in Russia begins from the moment of training in a higher educational institution, which involves integration into a healthcare facility to master the related soft and hard skills [Schildmann, Kampmann, Schwantes, 2004]. In fact, students rise through the levels, starting with the lowest one (junior medical personnel), gradually reaching the position of a medical doctor.

Importantly, after completing the basic stages of education in the PRC, doctors-to-be join the system of continuing medical education. Undergraduate and graduate programs are regulated by national and provincial departments of education, whereas standardized residency and continuing medical education programs are supervised by health departments at the same levels [Wang, 2021]. Just like Russia, the PRC has adopted board certification of medical education. In 2006, a pilot accreditation project was introduced in China based on the Global Standards of Basic Medical Education according to the World Federation for Medical Education (WFME).

The analysis revealed that board certification of medical personnel in all areas, including pediatrics, in all the BRICS countries under study is carried out through OSCE. Regarding historical aspects, in 1975 Ronald Harden first introduced OSCE to assess clinical competence. All medical students in Russia and other BRICS countries, starting from their junior years of study, go through several dozen stations where practical skills are comprehensively tested using various medical simulators and training devices that imitate real-life situations (situational tasks) and simulated (or standardized) patients. Under the rules of OSCE, the examiner evaluates the student's performance using a checklist or checklists [Harden et al., 1975].

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[35] Academy of Medical Education. How doctors undergo advanced training abroad: https://medobr.com/news/kak-prokhodit-povyshenie-kvalifikatsii-vrachey-za-granitsey/ (accessed 01.10.2025).

The Working Committee for the Accreditation of Medical Education (WCAME) was formed in China, and since 2016, the adopted document "Accreditation Standards for Basic Medical Education in China" has been in force. In 2020, WFME recognized WCAME as the executive body for board certification in China, which means that professional medical accreditation has become equivalent to international accreditation [Wang, 2021].

Drawing an analogy with the Russia, board certification according to the OSCE system has also been introduced in China [Zhang et al., 2025], as in many countries around the world according to the Global Minimum Requirements for Medical Education [Stern, Wojtczak, Schwarz, 2003]. However, we have not established whether this practice is applied throughout the country. Accreditation is carried out in two stages, including OSCE [Utomo et al., 2022].

Research into medical education in Brazil has revealed a shift from the teacher-centered and hospital-based approach to the student-centered and community-based one, focusing on clinical training [Mariani, Pego-Fernandez, 2011]. Most often, OSCE is conducted for students in Years Four and Five, as well as for bachelor's graduates before receiving a medical diploma [Troncon, 2004]. Postgraduate qualification examinations are taken upon completion of residency and entitle successful candidates to independent practice and registration with the medical council [Singh, Singh, Natu, 1998].

OSCE in India, as well as in other BRICS countries, is recognized as a reliable and effective multi-station test for objective and transparent assessment of practical skills in future doctors [Bhatnagar, Saoji, Banerjee, 2011; Juhi et al., 2023]. OSCE in Iran is part of the final examinations of medical residents before obtaining a license. OSCEs in Ethiopia make extensive use of standardized patients to improve assessment of students' communication skills in the context of the local culture [Dejene et al., 2024].

In recent years, countries in the Asia-Pacific region have been striving to advance medical care through the introduction of innovative medical technologies. A likely exception is Indonesia, which, according to research, does not have high rates of readiness for the integration of personalized medical care. The main approach to solving this problem is to establish an exchange of best practices with nearby, more developed countries in the region (for example, Singapore) in order to obtain optimal solutions in reforming the healthcare system [Pryazhnikova, 2022].

4. Conclusion   An analysis of medical education programs in the BRICS group shows that each country has its own unique approach to training health professionals, both general practitioners and pediatricians. Our analysis of education in ten countries also reveals similarities and some differences.

The Bologna education system has been preserved only in China and the UAE, and Russia plans to abolish it from 2025. Pediatric faculties are organized in only three countries: Brazil, Russia and China.

The duration of training for a pediatrician is quite long in all the countries studied. Basic medical education lasts between four and six years. Then, further training in clinical residency in pediatrics is required, which is 2–4 years long. In almost all countries (except China), OSCE is recognized as the leading examination for obtaining a diploma in pediatrics.

The diversity of educational programs in the BRICS countries determines special approaches to teaching pediatrics, which may be due to cultural differences. Each country faces the need to modernize medical curricula and increase clinical practice in order to improve personnel training. However, there are also common problems, such as the need to enhance the quality of training of specialists and university teachers, the introduction of modern technologies in the educational process, including distance learning, and the adaptation of educational programs to changes in the healthcare system. One of the solutions to these issues is cooperation between the BRICS countries, which can create opportunities for knowledge sharing in the field of training specialists in medical institutions. The development of joint programs, including international training standards, student and teacher exchange programs could lead to an improvement in the quality of pediatric care at the national and international levels, thereby

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The Fragile Centrality of Teachers: Demographic and Institutional Strains in the Russian Education Workforce

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Abstract   Teachers occupy a paradoxical position in contemporary societies: they are central to social reproduction and economic development, yet their profession remains structurally fragile. This article reports on demographic and institutional pressures shaping the teaching workforce in Russia between 2016 and 2024, situating the findings within global debates and the BRICS context. Drawing on national statistical data and institutional reports, we trace three interlinked dynamics: demographic ageing, workload intensification, and professional role transformation. The share of teachers aged 60 and above increased markedly in 2016–2024, while pupil-to-teacher ratios rose to nearly 20 in urban schools, highlighting escalating pressures on the staff. At the same time, teachers expanded their responsibilities becoming mentors, mediators, and digital administrators, reinforcing tendencies toward role overload and burnout. Interpreting these developments through the sociology of professions, human capital theory, and institutional resilience, the article argues that Russia exemplifies how demographic and organisational forces intersect to reconfigure teaching as a "semi-profession". While these processes mirror global trends, the Russian case reveals distinctive patterns shaped by uneven regional development and state-centered governance. The study contributes to comparative education by integrating demographic and institutional perspectives, thereby illuminating the fragile centrality of teachers in transitional education systems.

1. Introduction

Few occupations embody such a striking paradox as school teaching. On the one hand, teachers are celebrated as the linchpin of future societies: they are entrusted with preparing educating citizens, cultivating skills for knowledge economies, and sustaining cultural reproduction. On the other hand, the profession is persistently marked by fragility — relatively low salaries, chronic shortages, high turnover, and an ever-widening set of responsibilities. The combination of symbolic centrality and institutional vulnerability makes teaching a revealing area for studying the tensions of contemporary labour markets and welfare states and renders the profession unusually sensitive to demographic and organisational pressures [Ingersoll, 2001; Ingersoll, Strong, 2011; Sutcher, Darling-Hammond, Carver-Thomas, 2016].

These pressures are global. Comparative evidence documents persistent shortages, often prevailing in mathematics and science and in upper-secondary tracks, where labour-market demand outpaces supply [OECD, 2019; 2021; 2023] The teaching workforce is ageing across many systems. While attrition among early-career teachers remains high, the role expectations have broadened — from subject expertise towards mentoring, pastoral care, digital reporting, and conflict mediation [OECD, 2020; Worth, van den Brande, 2020]. The growing misalignment between the breadth of teachers' work and the incentives to assume it is frequently discussed through the lenses of work intensification and burnout [Apple, 2005; Maslach, Leiter, 2016], and it intersects with long-standing debates about teaching as a "semi-profession", the boundaries and autonomy of which are persistently contested [Etzioni, 1969; Abbott, 1988].

In Russia, these tensions have been brought into sharp focus. Between 2016 and 2024, the number of school-age children grew by nearly one-fifth, while the teacher workforce remained broadly flat. At the national level, pupil-to-teacher ratios have increased noticeably in recent years, with the growth particularly pronounced in urban schools [Zair-Bek, Anchikov, 2022]. At the same time, the share of teachers aged 60+ rose from 11% to 16.4%, with particularly high numbers in physics and chemistry and notable regional disparities. Such developments resonate with international evidence on ageing and shortages, yet they are sharpened in Russia by uneven territorial dynamics: large metropolitan regions increased staffing, while several peripheral regions experienced double-digit declines in the number of teachers. Beyond headcounts, formal role expansion — mentoring, conflict mediation, and digital accountability — has continued, with administrative load being a recurring theme in institutional documents [OECD, 2020]. Placing Russia within a broader comparative frame clarifies the relevance. Across emerging economies, BRICS included, systems confront similar structural pressures — ageing, shortages, STEM imbalances — while mobilising distinct institutional responses [OECD, 2019; 2023; UNESCO, 2023]. In India and South Africa, for instance, research points

to persistent pupil-to-teacher ratio stresses, uneven regional staffing, and the need to replace mathematics and science teachers in the long run [Kingdon, 2020; Spaull, 2013] Brazil continues to debate the attractiveness of teaching and uneven staffing across states [Gatti, Barretto, André, 2011], while China is taking measures to mitigate local shortages and expand mentoring and induction [Liu, Onwuegbuzie, 2012; Yuan, Devos, Tormey, 2016]. Although institutional architectures differ, the constellation of pressures is recognisably shared.

This paradoxical positioning invites a more conceptual reflection. Rather than treating demographic ageing, workload intensification, and professional transformation as discrete problems, we approach them as mutually reinforcing issues, which apparently redefine what it means to be a teacher. The sociology of professions alerts us to the interplay between expanding duties and constrained autonomy in "semi-professions", a tension that helps explain teachers' contested jurisdiction over pedagogical and pastoral work [Abbott, 1988; Etzioni, 1969][1]. From the perspective of human-capital and demographic economics, ageing simultaneously signals a reservoir of accumulated expertise and a looming replacement gap; early-career attrition magnifies the risk that knowledge will not be reproduced at scale [Ingersoll, 2001; Sutcher, Darling-Hammond, Carver-Thomas, 2016]. Institutional theory, in turn, suggests that the combined dynamics of demographic ageing, intensified workload, and expanding professional roles are not merely labour-market arithmetic: they are stress tests for the resilience of schooling as an organisational field. These tests are increasingly indicative of the current state of affairs in teaching [Apple, 2005; OECD, 2020; Worth, van den Brande, 2020]. Seen this way, Russia is not just another national case but also a strategically positioned instance in which global pressures intersect with a transitional, state-centered governance legacy, producing distinctive entanglements of demographic, institutional, and professional change.

The novelty of this article lies in tracing demographic, institutional, and professional factors explicitly. Empirically, we provide a longitudinal account (2016–2024) of demographic shifts, workload, and role expansion in Russia, using disaggregated statistics and institutional sources. Conceptually, we integrate insights from the sociology of professions, work-intensification and burnout research, and comparative education to interpret how these forces jointly reconfigure teaching. In addressing this integration, we respond to the following research gap: while international scholarship has richly documented shortages, ageing, and attrition in high-income settings (e.g., [OECD, 2019; 2023; Ingersoll, 2001; Maslach, Leiter, 2016]), far less is known about how

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[1] The term semi-profession [Etzioni, 1969] refers to occupations, such as teaching, nursing, or social work, that possess significant social responsibility but only limited professional autonomy, authority, and control over entry or standards, compared with full professions, such as medicine or law.

these processes combine in transition economies, where demographic change, uneven regional development, and state-centred governance produce distinctive patterns of strain and adaptation [Kingdon, 2020; Spaull, 2013; Yuan, Devos, Tormey, 2016]. By examining Russia through the composite lens, we aim to contribute to both an empirically grounded account of recent transformations and a conceptual clarification of how demographic and institutional pressures co-produce professional change.

This article continues a line of analytical work over the past decade, showing that pressures on the teacher workforce — shortages, weak retention, and expanding role demands — have endured or even deepened. International monitoring reports have repeatedly documented these patterns [OECD, 2019; 2020; 2023; UNESCO, 2023; European Commission, 2019], while country-level studies confirm that similar challenges persist across both high-income and emerging contexts [Sutcher, Darling-Hammond, Carver-Thomas, 2016; Worth, van den Brande, 2020; Kingdon, 2020; Spaull, 2013; Gatti, Barretto, André, 2011].

The goal of this research is to analyse how demographic, institutional, and professional pressures have transformed the Russian teaching workforce over the past decade, and to interpret these processes within broader theoretical and comparative frameworks. Specifically, the study seeks to examine how workforce ageing, workload intensification, and evolving professional roles interact as interconnected dynamics that influence the sustainability of the teaching profession.

Accordingly, the research addresses the following questions:

1. How have demographic and institutional changes affected the structure and composition of the teaching workforce in Russia since 2016?
2. In what ways have teachers' professional roles, workloads, and responsibilities expanded, and how do these shifts relate to attrition and retention?
3. How do the Russian trends compare with those observed in the other BRICS countries and internationally, and what do they reveal about the resilience of education systems facing similar pressures?

These questions anchor the article's central concern: to explain the fragile centrality of teachers within contemporary education systems. By connecting demographic, institutional, and professional dynamics, the study seeks to illuminate how the very foundations of the teaching profession are being redefined under conditions of strain. This approach bridges empirical analysis with theoretical reflection and leads into the following discussion of how similar processes have been understood in international research.

2. Literature review

The teaching profession has long been the subject of scholarly concern, precisely because it encapsulates a paradox of high symbolic importance and structural fragility. Comparative and national studies consistently underscore how teacher shortages, demographic ageing, workload intensification, and contested professional identities intersect in shaping the sustainability of education systems [Ingersoll, 2001; Maslach, Leiter, 2016; OECD, 2020]. This section reviews four strands of literature most relevant to the present study: teacher supply and attrition, demographic ageing, work intensification and burnout, and the sociology of professions.

Research on teacher labour markets highlights persistent imbalances between supply and demand. For example, in the United States, as Ingersoll [2001] demonstrated, teacher turnover, rather than recruitment shortfalls alone, is a major driver of staffing instability. The subsequent paper by Ingersoll and Strong [2011] emphasised the role of induction and mentoring in improving retention. The Learning Policy Institute's report by Sutcher, Darling-Hammond, and Carver-Thomas [2016] provided a comprehensive model of teacher supply and demand, predicting a "coming crisis" without systemic reforms. European analyses reach similar conclusions: shortages in mathematics and science teaching remain widespread, with some systems relying heavily on underqualified staff [European Commission, 2019].

The BRICS countries face comparable challenges. Kingdon [2020] notes that India struggles with uneven pupil-to-teacher ratios across states, while Spaull [2013] documents chronic staffing shortfalls in South Africa, particularly in mathematics and science. In Brazil, according to Gatti, Barretto, and André [2011], the profession remains unattractive due to low salaries and limited career progression, contributing to teacher shortages in key regions. These findings resonate with Russian evidence of high attrition among young entrants and persistent regional disparities [OECD, 2019; 2020; Mertsalova et al., 2022].

Ageing has emerged as a critical feature of teacher labour markets. OECD [2019; 2023] reports highlight the rising share of teachers aged over 50 across Europe and Asia, raising concerns about replacement needs. Worth and van den Brande [2020] analyse longitudinal workforce data in England, showing that older teachers are overrepresented in some subjects, with implications for succession planning. Demographic economics interprets ageing as a dual-edged process: while experienced staff embody significant human capital, the scarcity of younger entrants jeopardises intergenerational knowledge transfer [Hanushek, Rivkin, 2007].

Comparative research illustrates how different systems respond to ageing. In the case of China, Liu and Onwuegbuzie [2012] link ageing and stress to turnover intentions, while Yuan, Devos, and Tormey [2016] emphasise mentoring structures to integrate younger teachers.

South African projections warn of looming replacement gaps as older cohorts retire [Spaull, 2013]. The Russian case mirrors these global trends but exhibits sharper territorial imbalances: ageing is concentrated in smaller, rural regions, particularly with regard to physics, chemistry, and mathematics teachers [OECD, 2019; Zair-Bek, Anchikov, 2022; Zair-Bek, Mertsalova, Anchikov, 2020].

A parallel body of literature emphasises the intensification of teachers' work. Apple [2005] described the expansion of audit cultures and accountability regimes, situating teachers within broader neoliberal transformations of education. This aligns with analyses of workload expansion beyond teaching into bureaucratic and pastoral duties [Day, Gu, 2010]. The psychological dimensions are captured by burnout research: Maslach and Leiter [2016] identify workload, role conflict, and emotional demands as central risk factors.

Evidence from BRICS adds nuance. Indian studies point to administrative overload and low autonomy as drivers of teacher dissatisfaction [Kingdon, 2020]. In China, rising work stress is associated with higher turnover intention, especially among younger teachers [Liu, Onwuegbuzie, 2012]. In Brazil, qualitative research documents frustration with excessive administrative tasks and insufficient institutional support [Gatti, Barretto, André, 2011]. Similar patterns of workload intensification have been observed in Russia, where national monitoring and education statistics point to a steady rise in teaching hours, especially among mathematics and science teachers, reflecting global tendencies toward role expansion and work overload [OECD, 2020; Kolesnik, Boyarkina, 2024].

The sociology of professions provides a conceptual framework for interpreting these empirical trends. Etzioni [1969] described teaching as a "semi-profession", highlighting its partial autonomy and contested jurisdiction. Abbott's [1988] "system of professions" theory situates teaching within a competitive division of labour, where boundaries shift under institutional pressures. More recent scholarship has re-examined teaching through the lens of professionalisation, accountability, and role conflict [Hoyle, Wallace, 2005].

This literature illuminates why teaching often combines high social value with weak institutional protections. The Russian case underscores these tensions: teachers are tasked with increasingly complex roles, namely, a mentor, mediator, and digital administrator, while their authority remains bounded by bureaucratic oversight [OECD, 2020].

Taken together, the four strands establish a clear baseline: teacher shortages, demographic ageing, work intensification, and contested professional status are global phenomena. Yet much of the empirical and theoretical literature remains anchored in high-income contexts [Crossley, Watson, 2003; Connell, 2007]. Less is known about how these processes intersect in transition economies, where demographic decline, uneven regional development, and state-centred gover-

nance create distinctive constellations of strain. Russia offers a unique vantage point: it exemplifies global pressures while revealing nationally specific dynamics, especially sharp regional disparities and the persistence of Soviet legacies in governance. By integrating insights from the sociology of professions, human capital theory, and institutional resilience, the present study addresses this gap, situating Russian evidence within international debates.

3. Methodology and data
3.1. Research design

This study combines national statistical analysis with institutional sources to identify transformations in the Russian teaching workforce between 2016 and 2024. Our methodological approach is explicitly longitudinal and multi-scalar: we track changes in the aggregate size and structure of the profession, disaggregate these by subject, age group, and region, and interpret patterns through the lens of the sociological research results. We also use institutional documents such as regulations and laws stipulating the evolving role of teachers. By situating descriptive statistics within broader conceptual debates, we aim to move beyond "headcount" analyses of supply and demand toward an integrated account of how demographic, organisational, and professional pressures intersect.

3.2. Data sources

The empirical foundation of this study rests on a combination of official statistics (Russian Federal State Statistics Service; The Ministry of Education of the Russian Federation), sociological surveys and policy analysis, enabling a comprehensive and dynamic analysis of the Russian teaching workforce. The primary source is the federal statistical observation of schools aggregated on the regional and federal level. The Ministry of Education of Russia publishes these forms annually[2]. These statistical forms provide unified methodological tools for collecting information on teacher age, qualifications, work experience, employment trajectories, and staff schedule. Its continuity allows to track longitudinal changes and reliably capture structural shifts in the composition of the workforce.

To contextualise these patterns, we draw on demographic and socio-economic indicators published by The Federal State Statistics Service[3], which situate teacher labour dynamics within broader population and economic trends. These contextual data are essential for interpreting regional disparities and understanding how broader demographic shifts and fiscal conditions shape school staffing.

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[2] https://edu.gov.ru/activity/statistics/general_edu

[3] https://rosstat.gov.ru/statistics/accounts; https://rosstat.gov.ru/folder/12781; https://rosstat.gov.ru/labor_market_employment_salaries; https://rosstat.gov.ru/statistics/price

In the quantitative stage, 245 expert questionnaires were collected from eight regions of Russia; after data cleaning, 197 valid responses remained (20% were discarded). The respondents included 55% school principals and 45% deputy principals. Two-thirds had held administrative posts in their current schools for more than five years. By school type, 70% represented secondary schools, 18% general schools, and 12% advanced schools such as gymnasia and lyceums. Average school size varied from 265.5 students in basic schools, 615.6 in secondary schools, and 857.1 in secondary schools with advanced programs. A majority of respondents (54%) worked in rural settings. The age profile followed national patterns, with most administrators aged 40–59 and women constituting 92% of the sample. The survey instrument contained around 40 questions, organised into six thematic blocks: school characteristics; resource provision; teacher workforce composition and working conditions; teacher trajectories and attrition factors; managerial practices for teacher retention; and peculiarities of the territory. The questionnaire was administered electronically via the Anketolog.ru platform.

The qualitative stage comprised 36 semi-structured interviews with key stakeholders: 9 school leaders (including 5 from rural schools), 8 representatives of teacher-training institutions (5 from pedagogical colleges), 7 regional education officials, and 12 municipal administrators (4 from urban municipalities; 8 from mixed ones). The interviews followed a flexible guide, focusing on the scale and drivers of teacher attrition, the typical "profile" of teachers leaving the profession, retention practices at school and municipal levels, and the role of teacher-training institutions. Each interview lasted on average 50–70 minutes, was audio-recorded with participants' consent, and subsequently transcribed for analysis.

Quantitative data were processed using SPSS 28 and Excel. The analysis relied primarily on descriptive statistics, including frequency distributions, cross-tabulations, and measures of central tendency and dispersion. Qualitative data were analysed in Atlas.ti 23 through the multi-stage coding strategy. Open and axial coding were employed to derive the initial categories and then consolidate them into broader analytical dimensions, enabling us to establish linkages between the themes. Co-occurrence analysis was used to trace intersections of categories (e.g., workload with health, or remuneration with career decisions). To ensure analytical robustness, coding was conducted independently by three researchers, followed by triangulation to reconcile discrepancies and refine category structures.

This design provides both breadth, through statistically interpretable survey data, and depth, through qualitative accounts that capture institutional logics, professional identities, and regional policy environments. Quantitative surveys and interviews provide information on aspects that cannot be fully observed in statistical registers,

such as teachers' motivations, professional trajectories, and the institutional mechanisms underpinning recruitment and attrition. These data help illuminate how educators themselves interpret role expansion, workload intensification, and salary dynamics, complementing the structural evidence from administrative sources.

4. Results
4.1. Education policy focus on teachers

Historically, the teacher workforce has been central to Russian educational policy considering teaching profession as a strategic resource for national development. Since the mid-2000s, a sequence of national projects has sought to address both quantitative and qualitative aspects of the profession. The National Project "Education" (2005) introduced supplementary payments for homeroom teachers and bonuses for outstanding teachers, directly linking teacher motivation to material incentives. The project for the Modernisation of Education (2007) went further by reforming remuneration systems, shifting general schools to per-capita financing, and investing in teacher professional development. A subsequent programme, the national educational initiative "Our New School" (2010), emphasised improving the teacher corps through a mix of moral and material incentives, recruitment of new specialists, systematic certification of teaching and managerial staff, and the modernisation of both initial and continuing teacher education.

The federal focus on teachers was reinforced by Presidential Decrees of 2012 and 2016, which expanded responsibilities for regions in aligning salaries and performance management with national benchmarks. These initiatives culminated in the 2018 Presidential Decree, launching the National Project "Education", which introduced the national system of professional growth for teachers and the flagship programme "Teacher of the Future". The programme institutionalised new mechanisms of early-career support, including structured assistance during the first three years of work, and created a system of voluntary independent assessment of professional qualifications.

Over the past decade, these overlapping initiatives have converged in three key reforms: the institutionalisation of the professional standard for teachers; the introduction of the federal model of certification, shifting from regional, tenure-based systems to competency-based evaluation; and the expansion of teachers' formal functions to include administrative work, mentoring, and psycho-pedagogical support. While these changes have clarified expectations and created new career trajectories, they have also increased workload by broadening the substantive scope of teachers' labour.

Finally, remuneration reform has remained at the centre of debate. Since 2018, federal policy has moved toward a unified national model of pay with a clear division between base (70%) and performance-related (30%) components, aiming to reduce regional disparities and provide transparent criteria for incentive payments. Together, these

measures illustrate how teacher workforce policy in Russia has been consistently embedded within priority projects, with teachers remaining a constant focus of national education reform.

In recent years, many of these initiatives have continued to develop. Since 2023, the implementation of the teacher professional standard and the associated certification model has been normatively supported at all levels. The Institute of Mentorship, which existed in Soviet times, has been reinstated in a modernised format, with clearly defined and regulated functions. The institute is expanding and substantially shapes opportunities for horizontal career growth, not only vertical advancement through category levels.

Remuneration reform also warrants attention. Long-standing grievances concern both levels of pay and the mechanisms for determining fair remuneration. A gradual shift is under way, designed to equalise conditions across regions and schools by defining basic principles in a unified national model, including a standardised relationship between base and incentive components and uniform criteria for awarding bonuses.

This regulation has benefits, but it has also become a source of increased workload because labour functions have expanded. The policy landscape forms both the context for system analysis and institutional basis for understanding the state of teacher corps.

4.2. A snapshot of teacher corps

Despite sustained policy attention to the teaching workforce, significant challenges and tensions persist. Over the past two decades, federal and regional initiatives have sought to professionalise, regulate, and support teachers, positioning them as a cornerstone of national development. Yet the current state of the teacher corps reflects a complex interplay of demographic pressures, institutional reforms, and socio-economic constraints.

In the 2024–25 school year, Russia employed approximately 1.13 million teachers. Of this number, around 63,500 worked as external part-timers or on civil-law contracts, indicating that the effective pool of full-time teachers is significantly smaller. Since 2016, the number of teachers in state schools has declined by about 2.2%, while that in non-state schools has increased by 28.2%. Regional cases of teacher workforce dynamics differ sharply. Between 2016 and 2024, the scale of change ranged from the steepest declines of 15–17% in several regions to significant increases of 15–20% in others. For instance, the number of teachers grew most notably in Moscow (+22.0%), St. Petersburg (+20.9%), Leningrad Oblast (+17.3%), the Chechen Republic (+17.0%), the Republic of Ingushetia (+16.0%), and Sevastopol (+15.7%). By contrast, the sharpest contractions were observed in the Republic of Mordovia (−17.5%), the Komi Republic (−14.9%), Smolensk Oblast (−15.7%), and Kurgan Oblast (−14.9%).

At the same time, the student cohort has expanded by 18.5%, from 15.2 million to 18 million. This mismatch between stagnant or declining staff numbers and rising pupil numbers has produced a sharp increase in the pupil–teacher ratio. In 2016, the ratio stood at 14.1 students per teacher; by 2024 it had risen to 16.8. The OECD average is 13.0, indicating that Russian teachers now carry heavier student loads than their counterparts in most advanced education systems.

Another key characteristic to understand the state of teaching staff is age structure. The ageing of the teacher workforce is one of the most visible structural trends (Fig. 1). Over ten years, the number and share of pre-retirement and retirement-age teachers increased, especially those aged 60+. In 2016, 11% of teachers were over 60; by 2024, this figure had risen to 16.4%. The losses are not concentrated among the oldest or the youngest cohorts, rather, they fall in the "effective" middle-age segment defined as teachers aged 35–59 — the share of this group shrank from 67% to 61% over the same period. This cohort is the most productive segment of the workforce, and its decline signals weakening of the system's core human resources.

Fig. 1. **School teachers age structure dynamics, %, 2016 and 2024**
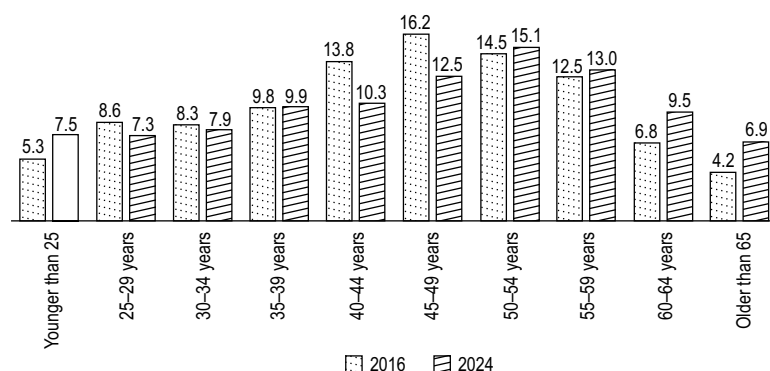
Teacher vacancies offer another lens to understand the shortage of teachers. Official data report that only 2.8–3.4% of teaching posts remain unfilled. Notably, these figures include positions covered by external part-timers. Once these are excluded, the effective vacancy rate rises to 7.4%, more than double the official figure. Schools rely heavily on multiple jobholding to cover teaching hours, either by assigning extra loads to internal staff or by contracting external part-timers. The subject profile of vacancies shows acute imbalances. STEM fields are hardest hit: physics posts show a 9.8% vacancy rate, mathematics 9.7%, and computer science 9.5%. These are precisely the disciplines prioritised by national education policy as strategic for Russia's economic development, yet they suffer the sharpest shortages.

Next, we consider the dynamics of class numbers and class sizes. In recent two years, the number of classes has not grown, while the number of students per class has increased. This indicator is not merely descriptive but political — an instrument of state policy to regulate teacher workload — linking to our next metric measured in teaching load (the norm of working hours for one rate is 18 hours per week). We compute teaching load as the ratio of occupied staff rates to the number of teachers. The limitation is that this captures only in-class teaching; actual workload includes extra-class activities and other duties that are not fully visible.

Even so, we observe a substantial rise over the decade. The average number of hours taught increased from 1.2 teaching load in 2016 to 1.48 in 2024. Consequently, the Ministry of Education set a target ceiling of 1.4 teaching load per teacher; currently there is some exceedance. Growth differs across subjects, but it is particularly alarming in mathematics, a core discipline, where teachers are compelled to take on more hours (1.6 teaching load), which is reflecting acute staff shortages and the high demand for mathematics instruction. Regional variation is striking and sometimes hard to explain without reference to regional education and policy factors: average loads range from 1.07 to 1.86 teaching load across regions. Principals, under pressure, sometimes resort to practices that are difficult to characterise as fully lawful, loading teachers heavily and not always formally accounting for hours that exceed a double teaching load.

Remuneration issues are another relevant aspect to understand the state of teacher corps, especially in the context of ageing workforce and increased workload. Teacher remuneration in Russia consists of several components that vary by region, qualification, tenure, and school characteristics. The base salary represents a fixed rate, calculated according to the teaching load (one full-time equivalent equals 18 hours per week), qualification category, and level of education; it typically accounts for about 30% of total income. Compensatory payments are added for work in special conditions, such as rural areas or regions with adverse climates, and for additional responsibilities, including homeroom teaching, working disabled students, or combining positions. The scope and amount of such payments are determined at the regional and school levels. Performance-based incentives depend on teacher achievements, including student results, participation in competitions, or the use of innovative teaching methodology; school governing boards define the criteria for these bonuses. In addition, teachers may receive one-off awards, for example for exceptional service.

By 2023, only four regions had not achieved parity between teacher salaries and the average wage in the regional economy. Since the fourth quarter of 2024, relevant statistics have been closed, limiting monitoring. Between 2015 and the first half of 2024, the gap between

the nominal average school teacher's salary and its real value (measured in 2015 prices) increased by a factor of 1.74 (Fig. 2). While the nominal salary rose substantially from 32.6 to 71.4 thousand rubles, the real salary in 2015 prices grew far less — from 32.6 to only 41.1 thousand rubles. In terms of purchasing power, teacher salaries changed little: the number of standard consumer baskets affordable to a teacher increased only marginally, from 2.4 to 3 over the decade. This stagnation in real income underscores one of the key sources of dissatisfaction in the profession and highlights why salary reforms remain central to debates on teacher retention and workforce stability.

Fig. 2. **Real and nominal teacher salaries dynamics, 2015−2024**
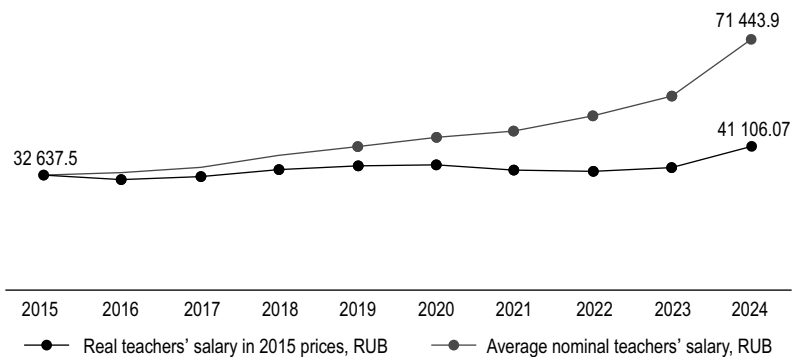
The proportion of teachers with additional sources of income, such as tutoring (about 16.5%), or teaching and administrative work at other educational institutions (about 4%), remains relatively constant [Zair-Bek, Anchikov, 2022]. The need for part-time work remains high.

School leadership plays a critical role in shaping the conditions under which teachers work. Principals allocate workload, manage incentives, and implement professional standards. The director corps, however, faces its own demographic and competency challenges. The number of school administrators declined by 23.4 thousand between 2016 and 2024. The cohort has also aged markedly: the proportion of administrators over 60 has increased by 55%, while the share of younger leaders under 35 has fallen by one-third. Few young administrators enter the profession. Principals struggle with the expanded demands of school management in an era of accountability, reporting, and reform. Schools have changed fundamentally over the past decade, but leadership renewal has not kept pace.

These deficits in quantity, age structure, and competencies directly affect the teaching workforce. Principals who lack up-to-date managerial skills may overburden their staff, fail to implement mentorship effectively, or misalign incentives. Thus, leadership gaps amplify the structural pressures already documented.

4.3. Beyond statistics: Sociological insights into the teaching profession

While statistical evidence reveals the structural contours of the teacher workforce, these aggregate trends give an incomplete picture. They identify the scale of the challenge but do not fully capture the lived experience of teachers or the mechanisms driving retention and attrition. To deepen understanding, it is necessary to complement statistical analysis with sociological evidence, which illuminates the factors shaping teacher satisfaction, professional trajectories, and decisions to remain in the profession or leave it.

Sociological evidence provides further depth to the statistical picture, highlighting the multiple factors that influence teacher retention and exit. Survey respondents and interviewees frequently echoed the concerns long noted by experts and the media: low pay, excessive pedagogical and bureaucratic workload, and burnout.

> The workload is extremely heavy because of the shortage of teachers. Everyone is aware of this, and it is a serious problem not only here but across the country. On average, our teachers carry 28–30 hours a week. The heaviest loads are in the Russian language, mathematics, and physical education. We cannot formally assign more than two full-time equivalents, so we record the hours beyond that limit only on paper, but in reality teachers do teach them. Of course, they lose out in terms of pay, since no additional compensation is provided for these hours. But what choice do we have?
>
> (Principal of a rural lyceum)

> In the past couple of years, I have clearly seen the impact of rising prices—on food, on fuel, on everything. The salaries of our teaching staff simply do not keep pace. Even though the government raises wages, the increases cannot match the growth of living costs.
>
> (Male teacher, urban school)

> Primary school teachers here often have to teach two classes. This is exhausting, almost unbearable work. They work in two shifts and come home very late in the evening, with no strength or energy left for their personal life.
>
> (Representative, pedagogical college)

However they also placed strong emphasis on personal and life-course circumstances, including family obligations (often linked to relocation) and health-related issues. The latter were closely connected to the cumulative effect of high emotional strain, physical exhaustion, and chronic fatigue. These findings resonate with quantitative evidence: in rural areas, one in four school principals reported teacher exits on medical grounds.

Marriage often means relocation, and that is one of the main reasons young teachers leave. I wouldn't say that salary is always their primary concern at the start.

(Female teacher, rural school)

A further theme that emerged prominently in the interviews was the perceived inadequacy of teacher preparation. Among the most frequently mentioned deficits were the ability to build constructive relationships with parents, to work effectively with students from "special" categories (including children with disabilities, migrant children, or children from socially disadvantaged families), and to adapt to increasingly diverse classrooms.

How can one organise the teaching and educational process when facing not just 25 pupils, but 25 very different individuals? These may include migrant children, who do not speak the language, students with special educational needs, and, at the other extreme, gifted children. Each of these groups requires a distinct approach, and the challenge is how to build effective interaction with all of them.

(Male representative, municipal education authority)

The psychological climate of the staff room also emerged as an important determinant of teacher retention.

To be honest, the atmosphere in female-dominated staffrooms can sometimes be quite difficult, and not every school is welcoming to young specialists. That is one reason they leave.

(Female student, pedagogical university)

The role of the administration and the union committee is critical for keeping relations friendly and supportive. Of course, personalities differ, as in any workplace, but much depends on the leadership's attitude.

(Female teacher, rural school)

Over my 23 years of work, I've seen many staffrooms and many types of relationships. Where there's a sense of family, solidarity, and mutual support, one doesn't want to leave. Yes, there are difficulties, but I know that I'm supported.

(Representative, pedagogical college)

The trajectories of teacher exits reflect this interplay of systemic and individual factors. Many teachers remain within the profession but seek improved conditions by moving to schools with higher salaries,

better infrastructure, or more favorable locations. Beyond the school system, career shifts often follow local opportunities: where manufacturing or entrepreneurial niches exist, especially in creative industries, younger teachers show readiness to leave education altogether.

Teachers often leave for tutoring centres. This is a major outflow.

(Female representative, regional education authority)

Many teachers resign from public schools and move into private education or tutoring as self-employed specialists. These are often highly qualified professionals, with the highest certification category and long experience. A frequent trigger is conflict with parents, whose expectations can be unrealistic; under such pressure, teachers choose to leave.

(Female school administrator, urban school)

Some teachers, particularly younger ones, shift into creative professions or entrepreneurship. They may develop personal projects or businesses, drawing on their talents — for example, design work or starting their own ventures.

(Female representative, municipal education authority, urban)

There are also unusual cases. For instance, some move into funeral services as masters of ceremonies. The skills teachers develop — working with people, speaking to an audience — prove useful even in such unexpected professions.

(Male representative, municipal education authority, mixed district)

Survey data also shed light on how teachers experience workload. The respondents emphasised that workload extends far beyond homeroom teaching to include lesson preparation, implementation of new educational standards, extracurricular and pastoral activities, and administrative reporting. This aligns with the regulatory expansion of the teacher's role over the past decade. Federal frameworks now codify not only subject teaching but also responsibilities of a homeroom teacher, mentoring, methodological guidance, and psycho-pedagogical support. The reformed national certification system reinforces this expanded conception by linking evaluation to competency-based criteria rather than tenure or honours. While such measures aim to professionalize the workforce, they also deepen the perception of overload. Teachers consistently describe bureaucratic requirements as excessive, and despite significant governmental attempts to reduce them, policymakers themselves acknowledge that reforms have not yet achieved the desired effect.

4.4. Regional inequalities in the teacher workforce: A shared BRICS challenge

While national-level statistics capture the overall scale and structure of the Russian teaching workforce, they mask substantial internal heterogeneity. The uneven distribution of teachers across regions adds a crucial dimension to understanding workforce dynamics. Territorial disparities influence not only the availability of staff but also the quality and stability of educational provision. This issue resonates strongly with broader BRICS context, where regional inequalities in teacher distribution and professional capacity represent a systemic challenge to educational equity and quality [Anchikov et al., 2025]. Examining Russia through this lens makes it possible to situate national developments within global discussions, with special emphasis on specific territorial cases, which combine strategic significance with particularly complex contextual conditions.

Regional differences add another layer of complexity, and it is crucial for understanding the state of teacher corps in Russia. Between 2016 and 2024, some regions lost up to 15–17% of their teachers, while others gained 15–20%.

The pupil-teacher ratio also demonstrates sharp regional disparities. In 2024, the gap between the regions with the highest and lowest ratios exceeded 12 points, ranging from just above 10 pupils per teacher to almost 23. These differences have remained relatively stable since 2016, when the spread was already substantial. Regional variation in growth rates proved much greater: some regions recorded increases of over 30% in the pupil-teacher ratio, whereas others showed almost no change or even a slight decline. It is demographic expansion of the school-age cohort, efforts to eliminate third shifts, and fiscal optimisation policies that account for these divergences. Projections by Federal Statistical Service suggest that the overall child population will decrease by more than six million by 2040, yet this decline will remain uneven across territories. As a result, certain regions will continue to experience rising pupil-teacher ratios, requiring targeted policy interventions to mitigate risks for educational quality.

Urban and rural schools show divergent patterns. The number of teachers in urban schools increased modestly by 1% between 2016 and 2024, but this growth fell far short of the rise in student enrolments. Rural schools experienced a decline of 6.3% in teacher numbers, continuing a long-term contraction that began in the 1990s with the closure of rural schools and the outflow of rural youth.

An important illustration of regional disparities is the balance between the youngest cohort (under 25) and the oldest cohort (over 60) (Fig. 3). Regions with a high share of older teachers combined with a very limited inflow of young staff (upper-left quadrant) face the greatest risks of workforce instability in the medium and long term. In 2024, nearly one-quarter of Russian regions fell into this category, highlighting the systemic challenge of renewing the teaching profession in parts of the country.

Fig. 3. **Share of teachers under 25 and over 60 in general education schools by region, %, 2024**
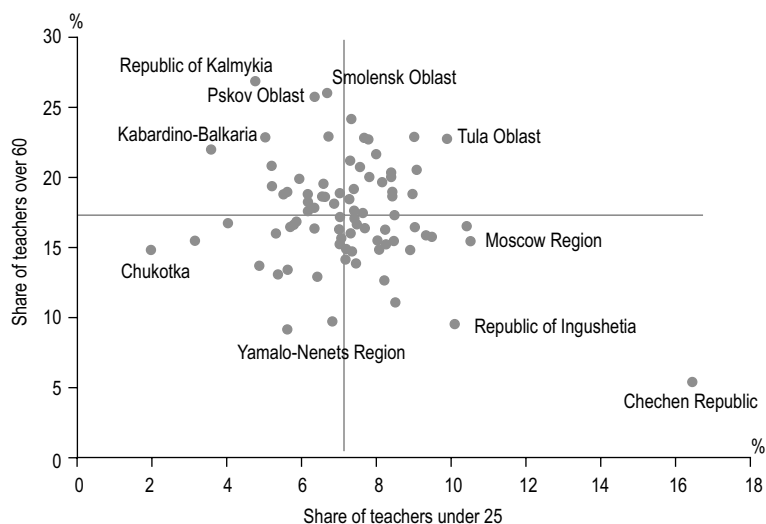
These differences reflect uneven demographic dynamics, fiscal optimisation policies, and region-specific educational strategies [Zair-Bek, Anchikov, 2022; Zair-Bek, Mertsalova, Anchikov, 2020].

For Russia, the Far East and the Arctic region are a specific instance. On the one hand, they embody the archetype of remote territories with complex socio-economic and natural contexts: vast distances, harsh climatic conditions, infrastructural underdevelopment, and sparse settlement patterns. On the other hand, they constitute a national development priority, supported by dedicated institutions and large-scale investment programs. This dual status makes them highly visible in both policy discourse and strategic planning.

The crucial question, however, concerns our specific focus: does the teaching workforce in the Far East and Arctic exhibit distinctive characteristics compared to that in the rest of Russia? Or, conversely, are the observed trends in these territories simply variations of the broader national patterns? Examining this question allows us to better understand whether Russia's most remote regions represent a unique challenge for teacher policy or rather an acute manifestation of systemic issues present nationwide.

Far East and Arctic zones occupy vast areas of the Russian Federation but are sparsely populated and subject to extreme natural conditions. Together, these territories cover over 60% of the country's landmass (40.6% in the Far East and 22% in the Arctic) yet are home to only 5.6% and 1.6% of the population, respectively. Harsh climatic factors, including permafrost, very low average annual temperatures, polar day-night cycles, and fragile tundra ecosystems, combine with underdeveloped infrastructure, long distances from industrial centres,

and low settlement density to create uniquely difficult living and working conditions.

Overall, in 13 out of the 18 regions of the Far East and Arctic the number of teachers decreased between 2016 and 2024. However, the dynamics of workload indicators present a more nuanced picture. In 2024, only four regions of the Far East and Arctic reported a pupil-teacher ratio above the national average, while in most territories this indicator remained lower than the latter. Moreover, the growth of the ratio since 2016 has proved less dramatic than the national trend: only two regions experienced increases exceeding the national average. A similar pattern appears in other dimensions such as the share of unfilled teaching load (excluding part-timers), age composition of the workforce, and teacher turnover. Roughly half of the Far Eastern and Arctic regions show values above the national level, while the other half demonstrate lower or more favourable dynamics. This relative stability contrasts with widespread perceptions of systemic crisis in the peripheries, underscoring the differentiated character of the challenges.

Schools in the Far East and Arctic operate within small and dispersed communities, where they face persistent difficulties in attracting and retaining staff. The combination of geographical remoteness, socio-economic vulnerability, and demographic decline undermines the long-term sustainability of local educational systems. From this perspective, one could expect to observe consistently depressed indicators of teacher availability and stability in these territories. However, the data tell a more nuanced story. At first glance, the Far Eastern and Arctic regions do not appear as a single, uniformly disadvantaged cluster in terms of the size and characteristics of their teaching workforce. Instead, they display considerable internal differentiation: while some regions suffer from acute shortages and high workloads, others perform at or even above the national average. The specificity of these zones, therefore, lies less in a shared structural crisis than in the heterogeneity of their conditions.

The observed disparities align more closely with general socio-economic determinants than with geography itself. Resource endowments, fiscal capacity, demographic and migration trends exert decisive influence on teacher workforce dynamics. In this sense, the Far East and Arctic reflect the same structural logics that shapes teacher availability across the rest of the country, rather than forming a distinct, geographically determined "periphery".

What stands out is that contrary to expectations of a uniformly adverse situation, the overall picture is not just acceptable but, in some cases, even favourable. This relative stability can be attributed to the particular financial policies applied to these territories.

Far East and Arctic have long been designated as priority zones of national development, supported by special fiscal regimes and compensation measures. One of the key instruments is the system of re-

Fig. 4. **Average nominal salaries of schoolteachers and their purchasing power across Russian regions[4], 2024.**
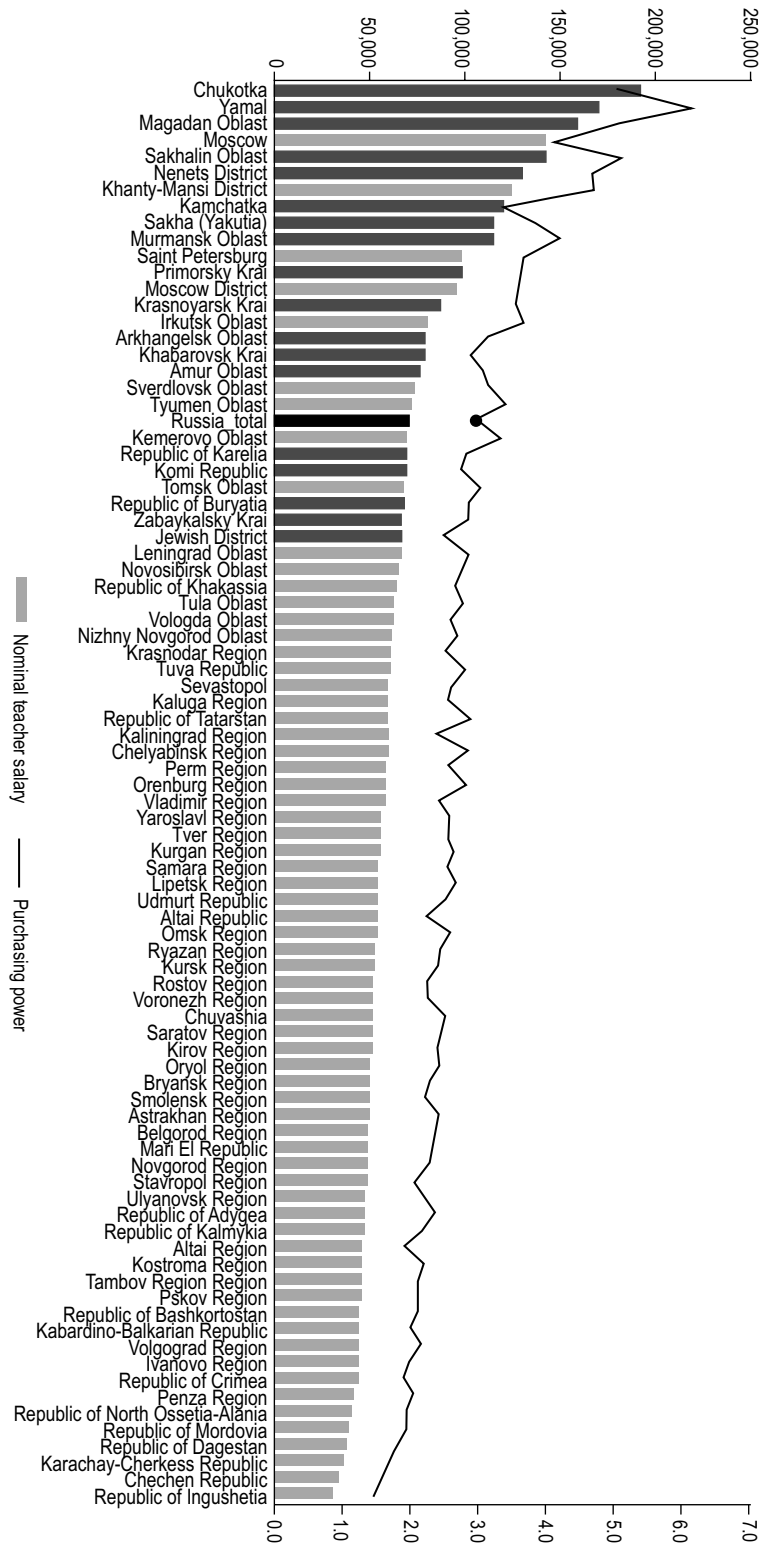
[4] The bars show average nominal monthly salaries (rubles); the line indicates purchasing power expressed as the number of consumer baskets affordable. Regions of the Far East and the Arctic are highlighted in a different color (purple).

gional ("northern") coefficients. These supplements increase base salaries by substantial margins, depending on latitude and remoteness. As a result, teacher salaries in these territories are among the highest in the country. In 2025, eight of the top 10 regions with the highest monthly wage of schoolteachers are those in the Far Eastern and Arctic zones. For example, the average teacher salary in Magadan district, Yamal, and Chukotka is 160-190 thousand rubles, well above the national average of around 71,400 rubles (Fig. 4).

Not only do these high figures compensate for adverse living conditions and elevated costs of goods and services, they also confer a purchasing power advantage relative to most Russian regions. Even accounting for higher consumer prices in the Far East and Arctic, the real disposable income of teachers — measured as the number of consumer baskets affordable — remains above Russian average (3.0) in the majority of zone regions.

It is, therefore, plausible that these financial measures contribute to both sustaining local residents in the profession and attracting teachers from other regions. Yet the extent of their impact remains an open question. In this sense, the Far East and Arctic provide an important case for further research: to what degree can targeted financial incentives mitigate the structural challenges of remote territories, and how effective are they in supporting not only teacher retention but also professional development and renewal?

5. Discussion This study has examined the state of the Russian teacher workforce between 2016 and 2024, situating national dynamics within broader international debates on teacher shortages, ageing, and attrition. By combining statistical evidence with sociological insights, we highlighted the composite pressures shaping the profession: declining or stagnating staff numbers alongside rising student cohorts, the ageing of the workforce, expanded professional responsibilities, and uneven remuneration.

Teacher shortages and rising workloads are not unique to Russia but reflect a global phenomenon. According to UNESCO, by 2030 every world macroregion will face growing demand for teachers, regardless of demographic or economic circumstances. These global trends show that education systems in both developed and developing contexts struggle to maintain a sufficient supply of qualified teachers.

The underlying causes of teacher shortages differ but often converge around three factors. First, many countries experience ageing of their teaching workforce. In Lithuania, for example, retirement outpaces the entry of younger teachers [OECD, 2025]. Second, attrition is driven by fatigue and dissatisfaction with working conditions. In Denmark, declining satisfaction with workload and institutional support contributes to high turnover [Ibid.]. Third, many systems fail to retain novice teachers: in several European countries,

a substantial share of new teachers leave the profession within the first five years [Ibid.]. Three patterns — ageing, dissatisfaction, and early-career attrition — interact differently across contexts, but they strongly resonate with the Russian case.

In Russia, given its scale and diverse socio-economic and cultural conditions, all three factors contribute to shortages. The teaching profession remains central to the functioning of the education system, but its demographic profile, working conditions, and career dynamics generate persistent vulnerabilities. What distinguishes Russia is not the presence of these problems but their specific interaction with institutional legacies and regional disparities. In central regions, large urban agglomerations, such as Moscow and St. Petersburg, attract both pupils' families and teachers with higher salaries, stronger educational infrastructure, and professional development opportunities. Metropolitan cities and their surrounding areas do not face declining student cohorts or acute teacher shortages, often replenishing their staff with teachers migrating from more remote regions. Conversely, peripheral areas remain unattractive for young teachers on economic and social grounds, resulting in more intense ageing of staff and increasing shortages even as student numbers decline.

Federal and regional policies seek to enhance the prestige of the profession. Most initiatives focus on material support: during the first three years of work, young teachers receive salary supplements, housing benefits, or access to subsidised accommodation. Legislative changes also allow pedagogy students to begin teaching before graduation. These measures have boosted enrolment in teacher training and the inflow of young teachers into schools. However, the support is short-term, while workloads for novices remain heavy and working conditions demanding. Surveys show that young teachers often feel disregarded by administrators, face dense timetables, and are tasked with extracurricular responsibilities, while also confronting parental pressure and lack of trust. As a result, retention remains low [Zair-Bek, Anchikov, 2022; Mertsalova et al., 2022; Zair-Bek, Mertsalova, Anchikov, 2020].

Another notable trend concerns exits among teachers in their effective mid-career (ages 35–50), driven by burnout and intensifying bureaucratic demands. Having emerged during the COVID-19 pandemic in 2021, this trend has gradually strengthened. Teachers in this age group perceive the expansion of duties — particularly in administrative, extracurricular, and methodological domains — without adequate compensation as misaligned with their qualifications and experience.

Governmental measures to support experienced teachers focus mainly on performance-based incentives, rewarding preparation of competition winners, exam outcomes, or methodological innovations. Yet such measures often benefit teachers in selective schools, who already have little intention of leaving. Many other teachers perceive salary systems as insufficient, non-transparent, and unfair.

At the same time, dissatisfaction with pay is not the sole or decisive driver of shortages. In contexts where schools have limited capacity for financial incentives, non-material factors become crucial: supportive leadership, collegiality, trust from students and parents, and professional autonomy. A favourable school climate mitigates attrition, whereas its deterioration, combined with professional fatigue, amplifies the structural drivers of teacher shortages—retirements among older staff and departures of younger teachers.

6. Limitations This study has several limitations that must be acknowledged. First, the sociological component relies on expert surveys and interviews with school administrators and stakeholders, which provides valuable managerial perspectives but does not capture teachers' voices directly. As a result, certain dimensions of everyday classroom practice and individual professional experiences remain underrepresented. Second, the survey sample, while geographically diverse, does not cover all Russian regions, limiting the generalisability of findings to the entire country. Third, the statistical data used are constrained by the availability of official reporting, with some indicators, such as teacher salaries after 2024, no longer publicly disclosed. Finally, the qualitative analysis, despite applying triangulation and systematic coding, inevitably reflects the interpretative lens of the researchers. These limitations suggest that the results should be seen as an empirically grounded but partial picture of the dynamics shaping the Russian teacher workforce.

7. Future research Expanding the scope of sociological inquiry to include rank-and-file teachers would help to capture more nuanced understandings of professional satisfaction, attrition, and career motivations. A particularly important direction would be a systematic study of teachers who have already left the profession. Such research could explore the reasons behind their exit, their subsequent career choices, their levels of satisfaction with the decision, and the conditions under which they might consider returning. Insights from this group would provide a deeper understanding of structural push and pull factors and help to design more effective retention and re-entry policies. Comparative studies across Russian regions could further disentangle the role of demographic, socio-economic, and policy factors in shaping teacher supply and demand. At the international level, embedding Russian data within broader BRICS or OECD comparative frameworks would clarify how national specificities interact with global patterns of teacher shortages, ageing, and attrition. Finally, deeper integration of education research with health, labour market, and migration studies may offer new insights into the systemic pressures influencing teacher careers and the sustainability of the profession.

8. Conclusion   These factors — low and "unfair" remuneration, excessive pedagogical and bureaucratic workload, ageing and declining health, family-related circumstances and relocation, adverse local living conditions, and burnout — combine to create both visible strains and adaptive responses within the system. Quantitative evidence reveals structural imbalances: a shrinking core of mid-career teachers, high pupil–teacher ratios, and uneven regional distribution. Qualitative and sociological findings complement this by exposing how these pressures are experienced at school level — through fatigue, emotional strain, and constrained professional agency — but also through resilience, collegial support, and local coping practices. Taken together, the mixed-method evidence shows a profession negotiating between institutional fragility and social indispensability.

This integrative approach underscores that Russia's teaching workforce, while embedded in global patterns of ageing, overload, and uneven distribution, is shaped by distinct governance legacies and territorial contrasts. Addressing these challenges requires policy measures that go beyond salary reform — toward systemic workload regulation, equitable staffing mechanisms, and improved health and social protection for educators. Strengthening professional development and leadership capacity could mitigate attrition and enhance resilience, aligning national reforms with the broader BRICS objective of reducing educational inequalities through investment in teachers.

Taken together, the findings underline both the progress and fragility of Russia's teacher workforce. Historically central to national education policy, teachers continue to be positioned as strategic actors in social and economic development. Yet sustaining this role requires not only financial incentives but also systemic measures to reduce overload, ensure equitable distribution, and strengthen training and leadership. Findings suggest that effective teacher policy must be linked not only to education reform but also to broader health and social policies, providing preventive care, occupational health monitoring, and adequate medical support. These challenges point to the need for stronger systems of teacher training and professional development, extending beyond subject expertise to encompass broader pedagogical and social competencies.

Addressing these challenges would contribute not only to national goals but also to the shared BRICS agenda of reducing educational inequalities through investment in teachers.

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Motivation and Change-Efficacy of Teachers in the Adoption of Literacy Interventions

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Abstract This paper examines factors influencing teacher readiness to adopt a literacy intervention, *Inkhulumo* (adapted Quality Talk), in a rural South African high school. Guided by the Active Implementation Framework and Weiner's Theory of Organisational Readiness for Change, the research focuses on the exploration and installation stages of implementation, emphasising the interplay between teacher motivation and change-efficacy. An integrative mixed-method design combined structured classroom observations, participatory sessions, interviews, and document analysis. Findings reveal that teacher motivation was driven by recognised student literacy needs, shared stakeholder acknowledgment, perceived intervention appropriateness, perceived academic and life benefits. Change-efficacy was initially strengthened by professional qualifications, teaching experience, prior collaborative projects, leadership support, and collegial planning, but fluctuated when practical challenges arose during installation. The results highlight that while strong motivation is necessary for adoption, sustaining implementation in challenged contexts requires reinforcing teacher efficacy through targeted professional development, peer collaboration, and ongoing leadership engagement. These findings contribute to informing intervention design and developing contextually relevant intervention strategies for improving literacy outcomes in LMICs.

1. Introduction Challenged educational contexts are characterised by systemic barriers that prevent equitable access to quality education. These barriers often occur in regions experiencing political instability, inadequate infrastructure, and limited educational resources [UNESCO, 2018]. In low- and middle-income countries (LMICs), such as in South Africa, these barriers are particularly acute in rural schools. Socioeconomic disparities exacerbate these barriers, resulting in underfunded schools, overcrowded classrooms, and a shortage of qualified teachers [Spaull, 2022]. Students in such educational environments frequently have limited access to technology-enhanced learning [Adeleye, Eden, Adeniyi, 2024]. Linguistic diversity and inconsistencies in policy implementation further reduce access to quality education, particularly where the language of instruction differs from the student's home language [Heugh, 2021]. As a result, educational outcomes remain low, with large proportions of students in these contexts remaining functionally illiterate [World Bank et al., 2022].

Evidence-based literacy interventions have demonstrated potential to improve students' foundational skills in such contexts in LMICs [Kim, Lee, Zuilkowski, 2020]. However, the gap between research and practice persists, with many teachers continuing to rely on rote learning strategies that do not adequately develop comprehension or higher-order thinking [Kim, Lee, Zuilkowski, 2020; Mlachila, Moeletsi, 2019]. The successful adoption and implementation of evidence-based literacy interventions often depend on the readiness of teachers and schools to integrate them into practice. Readiness, as described by Weiner [2009], is a shared psychological state consisting of two elements: motivation and change-efficacy.

This paper looks at the factors that influence teacher readiness in the adoption of Quality Talk, a structured approach to small-group, text-based discussion designed to improve comprehension [Croninger et al., 2017]. Quality Talk was culturally and contextually adapted for use in a rural, South African high school in partnership with local teachers and termed Inkhulumo (siSwati for 'talk'). The paper poses the following question: Which factors influence the adoption of a literacy intervention by teachers during pre-implementation (exploration and installation) stages in a challenged context such as rural South Africa?

While research has identified the importance of readiness for intervention adoption and sustainability [Domitrovich et al., 2015; Hunter, Bierman, 2021] a gap remains in understanding how teacher motivation and change-efficacy influence the adoption of literacy interventions in challenged contexts, such as rural South Africa. By addressing the research question, the paper aims to inform the design of implementation strategies that ensure evidence-based practices are not only adopted but also sustained in challenged educational contexts, thereby improving student outcomes.

Implementation science provides a conceptual framework for understanding how evidence-based practices (EBP) are integrated into educational settings [Humphrey et al., 2016; Nilsen, 2015]. In particular, this paper draws on the Active Implementation Framework, which views implementation as a dynamic, multi-phase process influenced by the characteristics of the intervention, the implementers, and the context. The implementation process consists of four stages: exploration, installation, initial implementation, and full implementation [Fixsen et al., 2005]. This paper focuses on the exploration and installation stages, critical stages in which implementation readiness is established [Domitrovich et al., 2008].

The exploration stage involves gathering relevant data and engaging with the key stakeholders. During this stage, stakeholders assess the need for an intervention, the fit or appropriateness of the intervention in addressing the need, and potential barriers and enablers for successful adoption and implementation [Fixsen et al., 2005]. While the installation stage focuses on how the intervention will be practically implemented [Fixsen, Blase, Van Dyke, 2019]. The key activities during this stage include creating the necessary infrastructure, developing capacities, and adapting the intervention for successful implementation [Hanson et al., 2016; Fixsen, Blase, Van Dyke, 2019]. Within the exploration and installation stages of implementation, teacher motivation establishes the initial commitment to adopt an intervention, while change-efficacy determines their confidence and capacity to translate that commitment into concrete instructional practices [Weiner, 2009].

Teacher motivation is central to the successful adoption of interventions. According to Weiner [2009], motivation reflects the belief among organisational members that a change is necessary, emphasising that collective recognition of the problem across stakeholders (teachers, school leaders, and students) fosters a shared sense of purpose, which in turn drives adoption. However, perceiving a need is insufficient unless the teacher believes the change is achievable, worthwhile, and beneficial to future student outcomes [Domitrovich et al., 2015; Merle et al., 2023]. Durlak and DuPre [2008] also include the teacher's assessment of the appropriateness of the intervention to address that need. Teachers are more likely to commit to interventions that align with their instructional goals [Domitrovich et al., 2015].

Change-efficacy refers to the collective belief that an intervention can be successfully implemented [Weiner, 2009]. Teacher change-efficacy is closely related to self-efficacy, which refers to teachers' confidence in their ability to implement an intervention successfully [Han, Weiss, 2005]. However, it is also a future-oriented belief about being able to implement the change in order to achieve a specific outcome [Tschannen-Moran, Hoy, 2001]. Change-efficacy, therefore, involves a perceived ability and support needed by the teachers to implement the intervention.

Teacher self-efficacy is shaped by formal educational background, qualifications and experience. Research consistently shows that teachers with content knowledge and understanding of linguistic processing show greater ability to integrate new instructional approaches [Dyssegaard, Egelund, Sommersel, 2017]. Furthermore, teachers who are committed to professional development are more likely to successfully implement the intervention [Ibid.].

In addition, prior experiences with interventions shape teachers' perceptions and openness to adopting new instructional approaches [Domitrovich et al., 2008]. Research suggests that teachers who have successfully implemented interventions in the past tend to have higher self-efficacy beliefs, which makes them more confident about adopting new interventions. Furthermore, positive early experiences of the intervention during initial implementation can increase the likelihood of sustained use [Lochman et al., 2015].

However, teacher change-efficacy is also shaped by collective change-efficacy, the perceived support available to implement an intervention successfully [Domitrovich et al., 2008]. This perceived implementation support for teachers implementing an intervention takes various forms: leadership, resource, collaboration and professional development. School leadership plays an important role in creating a positive school culture that is open to learning and supportive of change [Aarons et al., 2016]. Intervention implementation requires access to material, time, as well as financial and human resources [Murphy, 2015]. Collaborative support is present when teachers feel connected to and work together with colleagues [Johnson et al., 2017]. It occurs when teachers are able to contribute to the adaptation and implementation process [Ebersöhn, 2015]. Targeted professional development during intervention implementation has been shown to strengthen teacher self-efficacy [Conroy et al., 2019]. By providing context-specific training, ongoing support, and professional development, school authorities can address barriers to implementation and enhance teachers' confidence in adopting new instructional strategies.

2. Method

An integrative mixed-method research design was employed to investigate the implementation of *Inkhulumo* (adapted Quality Talk) in a high school in rural South Africa to improve English proficiency in Grade 8 and Grade 9 students. Both quantitative and qualitative data were collected to examine the overlapping but distinct factors influencing implementation. This approach facilitated well-validated conclusions enriched by complementary insights [Plano Clark, Ivankova, 2016]. By integrating data during both collection and analysis phases over a three-year period, the study achieved a comprehensive understanding of the complex social phenomena surrounding the implementation of evidence-based practices in challenged educational contexts.

2.1. Context and participants

The study took place in a rural high school in Mpumalanga, South Africa (Fig. 1). The site was purposefully selected as representative of a challenged educational environment, characterised by inadequate infrastructure, limited resources, and socioeconomic hardship. The school had no library and very few English textbooks, which students were not permitted to take home. English, taught as a First Additional Language, was neither the home language of students nor of teachers.

Fig. 1. **Rural area where the school is situated** (www.google.com/maps)

Participants, all of whom were siSwati-speaking Black Africans, included one Grade 8 teacher, one Grade 9 teacher (both female), the Head of Department (male), and 94 students. Of these students, 45 were in Grade 8 (female: $n = 27$, male: $n = 18$) and 49 in Grade 9 (female: $n = 24$, male: $n = 25$). Class sizes were large, with a student-teacher ratio of approximately 1:42 in Grade 8 and 1:47 in Grade 9. The teachers nominated student leaders to assist with the small-group discussion in each grade, with seven leaders in Grade 8 and six in Grade 9. Each teacher divided their class into mixed-ability discussion groups, with student leaders assigned to facilitate these groups.

Both teachers held a Higher Diploma in Education and were qualified to teach English as a First Additional Language in the Senior Phase. The Grade 8 teacher had 22 years of teaching experience (including three years in the Senior Phase), while the Grade 9 teacher had seven years of experience (including six in Senior Phase).

2.2. Implementation process and data collection

The *Inkhulumo*-implementation process began with a Participatory Rural Approach (PRA) session [Ebersöhn, 2015] to assess the fit or appropriateness of the intervention with local needs and to secure buy-in from teachers and other stakeholders. Following confirmation of alignment with the original Quality Talk principles, stakeholders agreed to collect baseline data, adapt the intervention, and implement it.

The data were collected from observations, interviews, and documents. Structured classroom observations on classroom interactions, teaching practices, and student engagement were conducted

during 12 school visits (48 hours in total). Observations during school visits, PRA sessions, and workshops (10 hours) were documented using field notes and photographs. Structured individual interviews were conducted with the teachers, student leaders, and the Head of Department (n = 16), as well as unstructured follow-up interviews with the teachers (n = 2). These were audio-recorded and transcribed verbatim. Various documents, including teacher manuals, policy documents, lesson plans, and student workbooks, were collected and analysed.

2.3. Data analysis

In analysing data, we adopted an integrative mixed-method approach. Qualitative data was analysed using a combination of inductive and deductive coding to identify patterns and themes described in literature and participants. Descriptive statistics were used to analyse student comprehension test results, while text analysis examined student performance. Data transformation techniques were employed, including 'qualitising' observational findings and 'quantitising' student leader interview responses. Teacher manuals, policy documents, and lesson plans were analysed to triangulate findings from observation and interview data. The integrated data were grouped into themes describing the intervention, teacher factors, and school context. This paper reports findings relevant to readiness, teacher motivation and change-efficacy, to implement the intervention.

2.4. Quality criteria

The study employed a combination of qualitative, quantitative, and mixed-method strategies to ensure scientific rigour. Quantitative criteria focused on validity, achieved through a comprehensive literature review and the use of multiple data sources [Maree, Pietersen, 2020]. Qualitative trustworthiness was supported by credibility, transferability, dependability, and confirmability [Clark, Ivankova, 2016]. Credibility was reinforced through member checking, peer debriefing, and prolonged engagement in the research site [Teddlie, Tashakkori, 2008]. Transferability was enhanced by detailed contextual descriptions. Dependability was addressed by providing an audit trail of the methodological process [Rule, John, 2011], while confirmability was supported by researcher reflexivity and data triangulation. Mixed-method quality was addressed through design coherence, inferential consistency, and inferential quality [O'Cathain, 2010], with theoretical grounding drawn from multiple disciplines [Teddlie, Tashakkori, 2008].

2.5. Ethical considerations

The study adhered to ethical standards in research, both procedural and through reporting standards [Cohen, Manion, Morrison, 2002]. Procedural ethics were ensured through consultation with The

Pennsylvania State University, the University of Pretoria, and the Mpumalanga Department of Basic Education. Informed consent was secured from teachers, parents of students, and school leadership, with participants fully briefed on the study's purpose and procedures. Anonymity and confidentiality were maintained, and all interviews and observations were conducted respectfully. Ethical reporting included the use of verified data, neutrality in interpretation, and mitigation of bias through reflective journaling and debriefing sessions. All data were stored on password-protected systems and archived with restricted access to protect participant confidentiality.

3. Results

The results focus on two key factors influencing teacher readiness to adopt the *Inkhulumo* intervention during the pre-implementation stages: motivation and change-efficacy.

3.1. Teacher motivation

Teachers collectively identified the development of English literacy as a critical need requiring intervention. Both Grade 8 and 9 teachers described significant challenges that their students faced with comprehension and writing, which negatively affected academic performance across all subjects. As the Grade 8 teacher explained:

> …half of the learners in that particular class they cannot write they cannot read and in that particular class you can see that those learners they are silence, they cannot say anything. Whether homework, no homework. Otherwise one will write the homework and give it to them. They copy. Even where they have copied you cannot read some of them (TINV-88).

This recognition extended beyond isolated language skills to include the broader educational implications of limited English proficiency. During professional development sessions, teachers from other subject areas corroborated these concerns, with the Science teacher noting:

> Students just do the basic questions to pass the tests and struggle with the questions that require long answers or essay type response (FN-52).

Quantitative data from comprehension tests corroborated these perceptions, for example, in one assessment, 95% of students answered factual questions correctly, yet only 9% responded successfully to questions requiring deeper analysis and interpretation (FN-16&17).

The need for implementing a literacy intervention was also recognised by Head of Department (HOD) and student leaders. The HOD

expressed concern about the lack of confidence in students and the limited participation of students during English lessons. Similarly, student leaders reported difficulties engaging peers in meaningful classroom discussions, with one stating:

> Eish, being a student-leader is difficult, you face many challenges in our members because some others can't talk, you need to convince them to talk and that is a hard job (SLINV-290). The Grade 9 teacher added that some students were so anxious about speaking in class that they would "miss school rather than talk in the class" (TINV-331). This shared recognition of students' literacy challenges among teachers, student leaders, and other stakeholders created a collective sense of urgency to address the literacy gap.

Teachers viewed the intervention to be well-aligned with addressing their identified need of improving English literacy among students. Implementing the intervention could benefit students by encouraging "*ownership of learning*", "*improving motivation*", and "*enhancing interpretive skills*" (Excerpt from PRA session on 18 July 2015). They also anticipated broader benefits, including improved academic performance, access to bursaries, and increased employment opportunities:

> By students improving their marks they would have access to bursaries. Improving their communication skills in English could also help them to secure better work opportunities (FN-1).

Teachers also acknowledged systemic obstacles, as highlighted by the Grade 9 teacher:

> We do have a lot of shortages of short of textbooks in our school. Uhh sometimes uhh our principal and our head of departments they go and borrow these textbooks from other schools. Sometimes in other subjects we do and in other we don't get them. We make copies (TINV-282).

3.2. Teacher change-efficacy

Biographical data confirmed that both teachers were qualified to teach English as a First Additional Language, holding Higher Diplomas in Education. The Grade 8 teacher had 22 years of experience (three in the Senior Phase) and the Grade 9 teacher had seven years (six in the Senior Phase). This professional background contributed to their initial confidence in being able to implement the intervention.

Their openness to *Inkhulumo* was also shaped by previous positive collaborations with the University of Pretoria on projects such as

the *Supportive Teachers Assets and Resilience (STAR)* and *Flourishing Learning Youth (FLY)* studies (FN-4). These relationships fostered trust and willingness to engage with the new intervention.

During PRA sessions, both teachers expressed confidence that the instructional changes required were manageable and consistent with curriculum expectations (DBE, 2011). The teachers noted that the implementation was "*doable and did not require that they learn additional competencies*" (FN-8).

Additionally, several support structures reinforced this confidence. School leadership initiated contact with the University of Pretoria and committed to teacher training for the intervention (FN-73). The collaboration between the Grade 8 and 9 teachers emerged as a significant factor in sustaining change-efficacy. Having worked together for over seven years, the teachers had developed a strong relationship, which was evident in the PRA session (FN-2). This collegial collaboration enabled joint planning, and the teachers worked together on adapting the intervention to their instructional practices (FN-12). The involvement of student leaders in training workshops provided additional collaborative support.

However, during the installation stage, teachers' change-efficacy fluctuated. Implementation took longer than anticipated, and both teachers reported being "*afraid, but we gradually adapting, bit by bit*" (TINV-71).

The results presented in Table 1 summarise the factors that shaped teacher motivation and change-efficacy during the pre-implementation stages. Teachers were motivated to implement the intervention based on the perceived needs, multi-stakeholder agreement, appropriateness of the intervention and anticipated benefits. Change-efficacy was influenced by the teachers' professional qualifications, teaching experience, previous intervention experience, support from school authorities, collaborative relationships, stakeholder involvement and implementation challenges.

Table 1. **Factors influencing motivation and change efficacy**

Factor	Indicator
Teacher Motivation	
Recognition of literacy needs	The teachers identified English literacy development as a critical need due to students' struggles with comprehension and writing, impacting academic performance
Multi-stakeholder agreement	The student leaders and other teachers reported difficulties engaging peers in discussions
Appropriateness of intervention	The intervention was deemed doable as it did not require additional competencies and was in line with the curriculum
Anticipated benefits	Improved academic performance and better employment opportunities

Factor	Indicator
Teacher Change-efficacy	
Teaching qualifications	Both teachers held Higher Diplomas in Education to teach English as a First Additional Language
Teaching experience	The Grade 8 teacher: 22 years total (3 years in the Senior Phase); The Grade 9 teacher: 7 years total (6 years in the Senior Phase)
Intervention experience	The teachers had prior positive experiences collaborating with the University of Pretoria on other research projects
Support from school authorities	The school authorities initiated interaction with the University of Pretoria and committed to teacher training for the intervention
Collaborative relationships	The Grade 8 and 9 teachers had worked together for over seven years, developed a strong relationship and collaborated on the implementation process
Stakeholder involvement	The student leaders were included in training workshops and provided input
Implementation challenges	The teachers became apprehensive during the installation stage about their ability to implement the intervention

4. Discussion

This study examined the factors influencing teachers' adoption of a literacy intervention during the pre-implementation stages (exploration and installation) in a challenged context such as rural South Africa. The findings highlight the interplay between teachers' motivation and change-efficacy in implementing evidence-based literacy interventions in low-resource settings. This discussion interprets the findings through the lens of implementation science, with particular attention to implications for intervention design and implementation strategies in LMICs.

Recognition of students' literacy needs emerged as a strong motivational driver for adopting the intervention. This is consistent with Harvey and Kitson's [2015] assertion that teachers' motivation increases when participants personally identify the need for change. In this study, both Grade 8 and Grade 9 teachers described how low literacy levels affected students' reading comprehension, writing, classroom participation, and academic performance across the curriculum.

Importantly, this perceived need extended beyond the individual teachers to include their colleagues, the HOD and student leaders, creating a shared understanding of the literacy challenges within the school. This collective recognition aligns with Weiner's [2009] finding that motivation is strengthened when the need for change is acknowledged across stakeholder groups. As Durlak and DuPre [2008] argue, such shared purpose reinforces commitment to implementation.

Teachers also perceived literacy improvement as within their control to change and directly relevant to student outcomes, both academic and beyond. They linked literacy to increased opportunities, such as access to bursaries and enhanced employment prospects.

This resonates with Hanson et al. [2016] emphasis on the perceived value of interventions for adoption and is particularly salient in LMIC contexts, where, as UNESCO [2024] notes, education is often seen as a pathway out of poverty.

The appropriateness further strengthened motivation to adopt the intervention. Teachers regarded *Inkhulumo* as well-aligned with addressing their identified needs, particularly for enhancing interpretive skills, independent engagement with texts and improved academic outcomes. This perception of appropriateness supports Fixsen et al.'s [2005] conclusion that alignment between intervention design and contextual needs is central to readiness during the exploration stage.

Initially, the teachers expressed high change-efficacy, viewing the required instructional adjustments as "doable". Their confidence was grounded in their qualifications, content knowledge, and teaching experience, factors identified by Dyssegaard, Egelund & Sommersel [2017] as enabling the integration of new instructional approaches.

The teachers' openness to adopting Inkhulumo supports Ebersöhn and Loots [2017] finding that teachers with positive previous intervention experiences tend to have higher self-efficacy beliefs, making them more confident about adopting future interventions.

Multiple support structures influenced teacher change-efficacy. The prioritising of literacy development and initiation of a collaboration with the University of Pretoria showed teachers that the implementation of *Inkhulumo* was supported by school authorities. This echoes findings by Leithwood [2021] and Pretorius & Spaull [2022] on the importance of creating a culture open to change and direct leadership engagement in change.

The collaborative support between the Grade 8 and 9 teachers in planning, adapting, and addressing the implementation challenges reflects Johnson et al.'s [2017] conclusion about the value of peer support in intervention adoption. The inclusion of student leaders in training workshops added another layer of stakeholder engagement, reinforcing the collaborative nature of the implementation. In contexts where external resources are scarce, fostering strong networks is particularly valuable for sustaining implementation [Versfeld, Graham, Ebersöhn, 2023].

However, change-efficacy is not constant. As Tschannen-Moran and Johnson [2011] note, fluctuations in change-efficacy are common during implementation. While professional expertise provided a strong foundation, it was insufficient on its own to sustain confidence when practical challenges emerged during the installation stage. This aligns with Lochman et al.'s [2015] observation that moving from conceptual understanding to practical application often reveals unanticipated difficulties that affect teacher confidence.

Furthermore, our findings confirm research on the importance of targeted professional development and continuous coaching in sustain-

ing teachers' confidence and effectiveness throughout the implementation process [Conroy et al., 2019]. These observations support studies indicating that intervention implementation requires specific skills and ongoing support beyond general pedagogical knowledge [Domitrovich et al., 2008]. This is particularly relevant in LMIC contexts, where teacher preparation may not have adequately addressed the specific competencies required for implementing evidence-based literacy practices.

Finally, consistent with Conroy et al. [2019] and Domitrovich et al. [2008], targeted professional development and ongoing coaching were essential in maintaining teacher motivation and change-efficacy. This is particularly relevant in LMIC contexts, where initial teacher preparation programmes and in-service professional development may not fully address the specific competencies required for implementing evidence-based literacy practices in challenged contexts [McLoughlin et al., 2020; Popova et al., 2021].

5. Limitations and future research

This paper provides valuable insights into factors influencing teachers' adoption of evidence-based literacy interventions in a challenged educational context. However, several limitations should be acknowledged. First, the single-school case study design constrains the generalisability of the findings to other settings. Nonetheless, the detailed description of contextual factors supports the potential for transferability. Second, the study focuses exclusively on the exploration and installation stages of implementation, examining how these stages influence teachers' motivation and change-efficacy. While this provides an in-depth perspective on early adoption, it offers only a partial view of the overall implementation process. Future research should extend the analysis to the initial and full implementation stages, enabling a more comprehensive understanding of how teacher motivation and change-efficacy evolve over time and influence the sustainability of literacy interventions.

6. Conclusion

This study advances understanding of how teachers adopt evidence-based literacy interventions in challenged educational contexts by examining the interplay between motivation and change-efficacy during the exploration and installation stages. The findings highlight that while recognition of literacy needs by teachers provides a strong foundation for intervention adoption, sustained implementation requires comprehensive support structures that address the practical challenges of implementation in resource-constrained settings.

By confirming the factors that influence teachers' motivation and change-efficacy to adopt intervention, this study contributes to more contextually relevant intervention strategies for improving literacy outcomes in LMICs. In the BRICS context, where rural and underserved schools often face systemic resource shortages, linguistic diversi-

ty, and large class sizes, the findings emphasise the importance of aligning interventions with locally identified needs, fostering collective stakeholder readiness, and ensuring sustained leadership, peer, and professional development support.

As the global education community continues to respond to the literacy crisis, strengthening teachers' adoption of evidence-based literacy interventions represents a critical pathway for improving learning outcomes in disadvantaged contexts. By operationalising principles from implementation science and Weiner's Theory of Organisational Readiness for Change in a rural South African setting, this study offers insights with broader applicability across the BRICS landscape, contributing to international efforts to bridge the gap between research and practice in education.

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Private-Public Partnership in TVET: An Overview of Current Practices in the BRICS Countries

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Abstract

The paper examines the role of Public-Private Partnerships (PPPs) in enhancing Technical and Vocational Education and Training (TVET) systems within the BRICS countries. By integrating the theory of skill formation regimes, we conduct case studies analysis of Russia, India, and China TVET specifically. These countries are navigating unique socio-economic challenges while striving to align TVET outcomes with labor market demands. Despite differing historical contexts and governance structures, all three countries share a growing reliance on PPPs as a strategy to modernize TVET.

Key findings highlight that PPPs address resource limitations, enhance curriculum relevance through industry involvement, and promote practical training opportunities, improving employability. Notable initiatives include *Professionalitet* in Russia, ITI transformation projects by Tata Technologies in India, and localized dual-system partnerships in China. These cases underscore the critical role of industry collaboration in bridging skill gaps and fostering workforce readiness.

The paper identifies essential conditions for effective PPPs. Finally, it discusses the potential for BRICS collaboration, emphasizing knowledge exchange, harmonized standards, and joint capacity-building initiatives to enhance TVET systems in emerging economies.

Effective Technical and Vocational Education and Training (TVET) systems are crucial for socio-economic development [Remington, Marques, 2020]. Research on the political economy of development emphasizes that enhancing workers' skills is a complex but necessary approach to overcoming developmental barriers [Doner, Schneider, 2016]. A shortage of skilled labor is a significant obstacle to growth, making skill development through TVET a priority area of reform [Remington, Marques, 2020]. Shaped by technological progress, demographic shifts, and labor market transformations, TVET institutions face continuous pressures to reform and adapt [Mayer, Solga, 2008]. Specifically, TVET holds an essential role in emerging economies [Allais, 2012], where rapid economic growth and structural transitions demand a workforce equipped with relevant skills [Remington, Yang, 2020].

In developing and transitional economies, public-private partnerships (PPPs) in TVET are essential for addressing challenges such as resource limitations, outdated curricula, and misalignment with labor market demands [Verger, Moschetti, 2017]. These partnerships enable companies to help shape curricula in order to meet specific industry needs while providing resources and hiring commitments in return [Newman, Winston, 2016]. However, creating such partnerships can be challenging as it requires aligning the varied goals and incentives of employers, educational institutions, and government bodies. At the same time, TVET systems often mirror a country's political-economic regime and institutional structures, embedding the interests of government, industry, and social actors in their design and operation. The governance of TVET in countries like Russia, China, and India is thus shaped by broader state policies, economic priorities, and institutional arrangements, creating systems that reflect each country's approach to human capital development [Busemeyer, Trampusch, 2012].

Although Russia, China, and India each approach TVET differently, their shared status as BRICS nations highlights areas for cooperation and mutual learning. Russia and China, for instance, share similarities in terms of government control over their TVET systems (though through different governance levels), which has facilitated rapid upskilling initiatives aligned with national industrial strategies. India, with its distinct reliance on a market-driven approach, presents a contrasting model that emphasizes private-sector involvement and regional adaptability. These variations offer opportunities for collaboration and cross-learning since the BRICS countries work toward mutually beneficial frameworks for skill development. Understanding these dynamics not only provides insight into the current state of TVET systems in BRICS countries but also underscores the role of public-private partnerships in advancing skills formation. As these countries face similar challenges and developmental goals, studying their TVET approaches can inform policies that enhance workforce readiness and regional economic cooperation.

Utilizing the concept of skill formation regimes [Busemeyer, Trampusch, 2012], we examine contemporary initiatives to integrate PPP into technical and vocational education and training in BRICS countries, considering the distinct socio-economic circumstances and institutional environments of these systems. This study is exploratory and examines individual cases from three BRICS nations, elucidating the fundamental issue in TVET research and establishing a foundation towards an extensive comparative analysis of the TVET systems in BRICS countries.

The structure of the paper is as follows: we begin by reviewing the literature on PPP in TVET and mapping the governance models and dimensions of PPPs in China, India, and Russia. Each of the three country sections covers a particular case of PPP that illustrates a specific TVET governance model. In conclusion, we discuss the observed variation in TVET governance models in different country settings and implications for BRICS cooperation on TVET.

1. Literature review
1.1. PPP in TVET as a backbone of skill formation system

PPPs have emerged as a key strategy to modernize TVET systems, improve training quality, and better align educational outcomes with labor market needs [International Labour Organization, 2019]. PPPs facilitate the incorporation of industry expertise into curriculum design, thereby ensuring that TVET programs are tailored to market demands and students acquire the competencies sought by employers. PPPs enable TVET institutions to offer practical training that mirrors real-world work environments. Through collaboration with the private sector, TVET programs can provide students with up-to-date training, thereby reducing the gap between theory and practice [McGrath, Powell, 2016]. This is particularly important in sectors that require specialized skills, such as advanced manufacturing, where partnerships with technology companies ensure that students are trained on the latest machinery and software.

PPPs play a crucial role in diversifying funding sources for TVET systems; hence their reliance on constrained public budgets is mitigated. Private enterprises frequently engage in co-investment initiatives within TVET institutions by financing training centers, offering scholarships, and providing financial assistance for curriculum development. A notable illustration of this collaboration can be seen in the partnerships between Siemens and Tata Motors with TVET institutions in India, where these companies contribute not only financial resources but also equipment, significantly enhancing the quality and breadth of technical education.

PPPs significantly enhance TVET by integrating industry input into curriculum development, while traditional TVET programs risk obsolescence and misalignment with market demands. In contrast, PPPs facilitate continuous curriculum updates that reflect techno-

logical advancements and evolving job roles [International Labour Organization, 2019]. In successful PPPs, private sector representatives serve on advisory boards, shape curricula, and provide specialized instructors, ensuring that students acquire both theoretical knowledge and practical skills with industry-standard tools. This collaboration markedly improves the employability of TVET graduates, equipping them to meet employer expectations [European Training Foundation, 2020].

Moreover, a key outcome of effective PPPs in TVET is the improvement of employability among graduates. A critical element of PPPs is provision of internships, apprenticeships, and on-the-job training, which enable students to acquire practical skills, establish professional networks, and facilitate a smooth transition to employment [International Labour Organization, 2019]. In that regard, PPPs ensure TVET graduates not only acquire technical competencies but also essential soft skills, such as communication, teamwork, and problem-solving, that are increasingly sought after in contemporary workplaces [World Bank, 2023].

1.2. An overview of TVET partnerships governance models

The success of PPP in TVET is deeply connected with the political and governance structures in which they operate. Governance models, particularly in terms of centralization versus decentralization, play a critical role in shaping how PPPs are implemented and managed within the TVET sector. Political regimes, whether centralized, decentralized, or corporatist, shape the governance of TVET and the role that PPPs can play. Additionally, different models of skill formation systems, such as those in liberal and coordinated market economies, affect the structure and effectiveness of PPPs in TVET [Estevez-Abe, Iversen, Soskice, 2001].

In *centralized* political regimes, national governments typically exert significant control over education systems, including TVET. In these contexts, the state plays a central role in establishing policies, curricula, and standards for vocational training. PPPs in centralized systems often require strong governmental oversight and clear policy frameworks to ensure that private sector engagement aligns with national educational goals [Remington, 2018]. While centralization provides uniformity and consistency across the system, it could limit flexibility and responsiveness to local labor market needs, which could in turn impede the effectiveness of PPPs. In contrast, *decentralized* political regimes, where regional (provincial) or local governments have more control over education, often enable more flexible and local-specific PPPs. Decentralization allows local authorities to collaborate with businesses and industries that are vital to the local economy. In this model, PPPs can better tailor TVET curricula and training programs to meet the needs of local industries, enhancing their relevance and ef-

fectiveness[1]. This system is deeply embedded in the country's economic structure and allows for a high degree of coordination between employers and TVET institutions [Busemeyer, Trampusch, 2012].

Theorizing on skill formation, P. A. Hall and D. Soskice distinguish between two principal approaches to workforce development dynamics [Hall, Soskice, 2001]: the *coordinated* model, where labor, business, and government collaborate through structured systems — such as Germany's dual education system, supported by intermediary organizations like business chambers and labor unions to negotiate training standards and share costs — and the *market-driven* model, exemplified by the United States, which relies on employers and individuals to respond to market signals with minimal state coordination, resulting in decentralized, often short-term training that fosters flexibility but can also lead to fragmentation and unequal access to quality opportunities [Thelen, 2004]; both models ultimately depend on robust institutional frameworks and civil society organizations to attune the interests of businesses, workers, and educational institutions toward shared objectives dynamics [Remington, Marques, 2020].

There are four primary models of partnerships in TVET (Fig. 1) based on the depth and breadth of cooperation between educational institutions, industry, and government or scope of participants and the depth of commitments made by partner organizations [Remington, 2018. P. 507]. The first one is the *solidaristic* model, which is common in countries with dual systems, and emphasizes extensive collaboration among firms, government, and educational institutions, with shared responsibility for training and curriculum aligned with professional standards. Key features include high commitment from firms and schools, strong regulatory support, and investment in transferable skills [Remington, 2017]. Secondly, there is the *consortial* model, which clusters firms within a specific industry to partner with local schools, often coordinated by a sector council to meet regional (provincial) workforce needs [Remington, 2018]. Thirdly, there is the *parental* mode, led by a dominant firm that drives training to meet its specific needs; this model involves close collaboration with schools and high dependence on the firm for resources. Government support ensures alignment with local economic goals [Ibid.]. Finally, the *liberal* model is typical in less coordinated systems; this model has limited collaboration, with firms relying on in-house training or hiring from the open market, leading to low standardization across sectors [Ibid.].

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[1] For instance, the German model shows how decentralized governance can foster successful PPPs. Regional chambers of commerce are heavily involved in certifying vocational programs, ensuring that training meets industry standards. Local businesses provide apprenticeships and financial resources to TVET institutions, making the training more aligned with real-world demands. This decentralized approach enables a high level of flexibility, allowing training programs to adapt quickly to regional economic needs [Busemeyer, Trampusch, 2012].

Fig. 1. **Dimensions of TVET partnerships**

High

Consortium model:
Sectoral association sets
occupational standards;
Aligns VET with industry needs
in multi-school consortia

Solidaristic model: Strong sectoral
organizations overseeing standards, VET;
Centralized cooperative bargaining
skill formation

Degree
of inter-firm
coordination

Liberal model:
Competitive market for labor;
Competitive market for VET;
Multiple bilateral school-firm
agreements

Parental model: dominant firm invests
in proprietary training (foreign investors;
defense industry)

Low

Low   High

Costliness of investment by partners

2. Methodology[2]   In this paper, we analyze current initiatives in PPPs in TVET in three BRICS countries. Each of these countries has a distinct governance model for skill formation, which shapes the structure and functioning of PPPs. We outline a landscape of the PPPs using two dimensions — the level of centralization in the PPP initiative, and the scope of the PPP initiatives (national, sub-national or regional, and local).

The two dimensions are selected for two reasons. Firstly, the level of centralization illustrates one of the basic dimensions of governance models in TVET, and we assume that the three TVET systems under the study, though sharing some commonalities (China and Russia in particular), have some peculiar differences. Secondly, at first glance, the choice for the scope of the PPP initiative might not look justified enough. For instance, Remington & Yang [2020] argue that "national policy instruments tend to be too weak to succeed in comprehensive reform of the system of TVET; and it is at the sub-national level where actual coordination among educational institutions and employers occurs". However, we see the scope of the illustrative case as another manifestation of a governance model.

Our case studies cover the following initiatives in the three countries (Fig. 2).

These cases were selected on the basis of two criteria: they have explicit partnership arrangements among educational institutions and employers and represent the variation of TVET governance models in each country setting. The selected case studies do not represent the full spectrum of PPP mechanisms across these countries. Rather, they serve as illustrative cases reflecting the dominant governance models and levels of initiative through which PPPs have most visibly materialized.

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[2] Perplexity.ai and ChatGPT were used for English proofreading with the following prompt: improve grammar and clarity suitable for an academic journal.

Fig. 2. **Cases of PPP in TVET covered in the paper**

In Russia, for example, while the focus is placed on state-led federal reforms, such as Professionalitet, several promising sub-national initiatives have demonstrated bottom-up experimentation in PPP governance and curriculum innovation. In China, although many partnerships are localized through provincial governments, the state has also launched national-level initiatives, such as the Modern Apprenticeship Pilot Program, coordinated by the Ministry of Education, which seeks to formalize industry engagement across multiple sectors. Similarly, India's NSDC-led programs dominate the national narrative, but a number of state-level skill missions provide decentralized models of PPP implementation with varying degrees of employer engagement. These include efforts to increase apprenticeships in India's registered enterprises, especially the large-scale ones. That caused a rise in the number of apprentices from a quarter of a million to over 600, 000 over the period from 2014 to 2023.

We take advantage of government policy documents and studies and also draw upon a series of unstructured expert interviews and discussions with educators, enterprise managers, and policy experts in order to develop the case studies.

For the empirical investigation in China, we conducted altogether 11 interviews with the following interviewees: two retired vocational school principals, four vocational school teachers, two human resource managers from enterprises, two training managers and one government official from the local bureau of education. The selection of the interviewees combines purposive sampling and snowball sampling, in order to get a systematic and comprehensive understanding.

To analyze the case of TVET in Russia, we primarily relied on administrative data provided by the Ministry of Education and other governmental agencies, especially for the examination of the TVET student body. In addition, policy documents, most notably the State

Programme for the Development of Education and the federal project "Professionalitet", served as key sources for understanding recent reforms and strategic priorities in the sector. This combined approach enabled a comprehensive analysis of both quantitative trends and policy developments in Russian TVET.

In the case of India, we relied on a combination of official data sources, policy reports, and publicly available documentation from private sector initiatives. Skills-related data sources include: the **Periodic Labour Force Surveys (PLFS)** conducted annually by the National Sample Survey Office (NSSO), which provide detailed labor market statistics, such as vocational training uptake and employment outcomes; **Annual Reports of the Ministry of Skill Development and Entrepreneurship (MSDE)**, which offer comprehensive accounts of program coverage, institutional development, and funding trends; press releases and corporate publications from a major private sector actor (i.e., Tata Technologies), who regularly disclose the scale and structure of their PPP engagements with state governments.

We begin by outlining some of the basic information about the TVET system, its institutional landscape, and major socio-economic context. Then we turn to case studies of public-private partnerships for TVET and conclude by drawing some inferences about the limitations of possible scaling of the covered practices in PPP.

3. Comparative institutional framework for PPPs in TVET: Foundations for case analysis

The institutional configurations of PPPs in the TVET systems of China, India, and Russia are deeply embedded in the broader logics of their political economies, governance traditions, and skill formation regimes. Drawing on the abovementioned theoretical literature on collective skill formation [Busemeyer, Trampusch, 2012], this section provides a comparative framework to understand how the governance of TVET and PPPs reflect underlying institutional structures and how these structures shape the roles of the state and private sector, funding mechanisms, curriculum standards, and coordination strategies. Although the systems diverge significantly in their historical development and institutional design, they also exhibit converging trends, particularly in response to global technological change and labor market transformation. These similarities and differences provide an analytical lens for the case studies that follow.

The dimensions outlined in the comparative Table 1, i.e., *governance model, role of the state and private sector, PPP typology, curriculum development, funding mechanisms, and coordination*, form an analytical framework through which the institutional architecture of TVET systems can be interpreted.

China's TVET governance combines central coordination with local flexibility. While central authorities set strategic priorities, local governments shape implementation. Private enterprises participate in work-

Table 1. **Landscape of PPPs in TVET across Russia, India, and China**

Dimensions	China	India	Russia
Governance Мояel	Decentralized with regional (local) government strong role in shaping TVET	Hibrid model — mix of state-led and market-driven approaches	State-centric, centralized model, strong government control over TVET (droft to hybrid model since 2022)
Role of the State	Strong central government coordination; Government defines key industrial sectors for skills development	Government acts as a facilitator, enabling private sector participation; Strong public investment	Government defines strategic sectors and priorities; High regulatory oversight of TVET standards
Role of Private Sector	Private companies collaborate with vocational institutions for targeted traning	Private sector takes a leading role in skill development through Sector Skill Councils (SSCs)	Private sector deeply collaborates mainly in sectors critical to national priorities
PPP Model	Consortial	Parental	Solidaristic (drift to consortial model since 2022)
Features of PPPs model	The consortial model enables aligment of training with regional development strategies and sector-specifics needs. In provinces with specific industrial focuses, sector councils and regional authorities coordinate training initiatives to meet local economic demands, especially in advanced manufacturinf and technology	In regions where large firms or government enterprises lead traning initiatives, anchor firms collaborate with educational institutions to tailor curriculum and skills development to meet specific organizational needs	Government agencies, industry, and vocational schools share responsibility for developing skills in key economic sectors; Government support and aligment with national labor standards are critical, yet this model is evolving to incorporate more industry input in response to market needs; A slow drift to consortial model with newly established regional and sectoral TVET clusters that promote collaboration between industries and TWET institutions
Curriculum Development and Standarts	Curriculum often co-designed by private enterprises and government	Sector Skill Councilsc play a leading role in developing competency standards	Government sets curriculum frameworks with limited private sector input (except for pilot TVET institutions under national project "Professionalitet" since 2022)
Funding Mechanisms	Predominantly government-funded, with private sector providing in-kind resources	Public-private co-financing models with private sector contrbuting to training costs	Predominantly government-funded (except for pilot TVET institutions under national project "Professionalitet" since 2022)
PPP Coordination and Management	Central and regional governments oversee partnerships with private companies	NSDC and SSCs coordinate PPPs	Coordination primarily by regional government ministries with federal ministry oversight

Source: [Mehrotra, 2014; Li, Huang, 2024; Remington, 2018; Remington, Marques, 2020; Remington, 2017; Guo, Lamb, 2010].

force training and, in some cases, influence curricula. The prevailing PPP model is consortial: sector councils and local governments collaborate with firms and providers to aliяяяgn training with regional needs. Curriculum design involves both public authorities and industry, and funding is mainly public, supplemented by in-kind firm contributions [Guo, Lamb, 2010].

India adopts a hybrid governance approach that blends state-led programs with market dynamics. The government acts as a facilitator, primarily through institutions like the National Skill Development Corporation (NSDC) and Sector Skill Councils (SSCs). PPPs often follow the parental model, where major firms lead training efforts with educational institutions. SSCs help define curriculum standards with employer input, though dominant sectors may disproportionately shape priorities. Funding is co-provided by public and private sources [Mehrotra, 2014; MSDE Expert Group, 2017].

Russia remains largely centralized, with the federal government overseeing curricula and standards. Historically, PPPs followed a solidaristic model with shared responsibilities between the state, schools, and employers, though regional autonomy and employer influence were limited. Since 2022, Russia has shifted toward a consortial model via the *Professionalitet* initiative, promoting regional clusters involving government, business, and colleges. While funding is still primarily public, experimental models introduce more flexible governance and collaboration [Dudyrev et al., 2022].

These cases illustrate both divergence and convergence. Governance styles differ as China emphasizes regionalized coordination, India relies on employer-led responsiveness, and Russia is cautiously decentralizing, but all countries use PPPs to address skill mismatches, technological change, and labor market needs. Across systems, PPPs support curriculum modernization and closer alignment with employment demands.

The dimensions explored here provide a comparative lens for understanding how PPPs are embedded in national systems of governance, funding, and coordination. They also allow us to trace institutional reforms, from India's employer-driven frameworks to Russia's cluster-based models.

The next section of the paper explores in greater detail how these PPP models materialize in practice, through case studies of recent TVET reforms in Russia, India, and China.

4. PPP in the Chinese TVET: A case of a town level TVET development

4.1. Background information

China's TVET (mainly at Levels 3 to 5, according to ISCED 2011) system has undergone significant changes in recent years. The table below summarizes the number of schools, enrollments, and total student population for secondary and higher vocational schools from 2019 to 2023.

In secondary vocational education, there was a steady decline across all metrics over the five-year period. The number of schools dropped from 10,100 in 2019 to 7,085 in 2023, which is a reduction of 29.85%. Enrollment decreased by 24.33%, from 6.00 million to 4.54 million. The total student population dropped by 17.65%, going from 15.76 to 12.98 million.

Conversely, higher vocational education expanded during this time (Table 2). The number of schools rose from 1,423 in 2019 to 1,547 in 2023, which is an 8.71% increase. Enrollments grew by 10.78%, from 5.01 to 5.55 million. Additionally, the total student population increased by 16.80%, reaching 14.39 million. This upward trend underscores the growing role of higher vocational education in aligning the workforce with the needs of a modern, skills-based economy.

In 2023, China had 33 vocational bachelor's institutions, enrolling 89,900 students, reflecting a notable 17.82% increase from the previous year.

Table 2. **The Number of Vocational Schools and Students from 2019 to 2023**

Year	Secondary Vocational Schools [Number]	Secondary Vocational Enrollment [Million]	Secondary Vocational Students [Million]	Higher Vocational Schools [Number]	Higher Vocational Enrollment [Million]	Higher Vocational Students [Million]
2019[3]	10100	6.00	15.76	1423	4.83	12.80
2020[4]	9896	6.44	16.63	1468	5.24	14.59
2021[5]	7294	4.88	13.11	1486	5.52	15.90
2022[6]	7201	4.85	13.39	1489	5.39	16.71
2023[7]	7085	4.54	12.98	1547	5.55	14.39

[3] 中华人民共和国教育部 (2020.05.20). 2019 年全国教育事业发展统计公报 [Ministry of Education of the People's Republic of China (2020-05-20). Statistical Bulletin on the Development of Education in China in 2019: http://www.moe.gov.cn/jyb_sjzl/sjzl_fztjgb/202005/t20200520_456751.html (accessed 03.09.2925).

[4] 中华人民共和国教育部 (2021.08.27). 2020 年全国教育事业发展统计公报 [Ministry of Education of the People's Republic of China (2021.08.27). Statistical Bulletin on the Development of Education in China in 2020: http://www.moe.gov.cn/jyb_sjzl/sjzl_fztjgb/202108/t20210827_555004.html (accessed 03.09.2925).

[5] 教育部网站 (2022.09.14). 2021 年全国教育事业发展统计公报. [Ministry of Education of the People's Republic of China (2022.09.14). Statistical Bulletin on the Development of Education in China in 2021: http://www.moe.gov.cn/jyb_sjzl/sjzl_fztjgb/202209/t20220914_660850.html (accessed 03.09.2925).

[6] 中华人民共和国教育部 (2023.07.05). 2022年全国教育事业发展统计公报 [Ministry of Education of the People's Republic of China (2023.07.05). Statistical Bulletin on the Development of Education in China in 2022: http://www.moe.gov.cn/jyb_sjzl/sjzl_fztjgb/202307/t20230705_1067278.html (accessed 03.09.2925).

[7] 中华人民共和国教育部 (2024.10.24). 2023 年全国教育事业发展统计公报. [Ministry of Education of the People's Republic of China (2024.10.24). Statistical Bulle-

Before the 1980s, China's vocational education focused primarily on elementary vocational training to address the shortage of operational skilled labor, meeting the demands of the agriculture-based economy. After China's Reform and Opening-Up in the 1980s through the early 21st century, the rapid growth of the national economy, industrial development, and building infrastructure required a large number of technical workers. This led to a rapid expansion of secondary vocational education during that period. In the early 21st century, with the establishment and perfection of a market economy, the development of modern technology industries led to a surge in demand for higher-level applied talents, thus promoting the growth of higher vocational education at the associate degree level. Since 2019, as the economy continued to develop, the demand for innovation-driven technical talents has increased, leading to the establishment of undergraduate-level vocational education.

Modern concept of vocational education is moving towards a multi-stakeholder co-governance model. The role of the government has shifted from being a sole manager to a coordinator, encouraging the participation of social organizations, enterprises, and other stakeholders in various aspects of vocational education. Typically, the government formulates laws and regulations to provide clear institutional support for the involvement of social organizations in vocational education governance, while also guiding and incentivizing policies to foster participation and innovation. Moreover, the government provides support and feedback in policy implementation and evaluation.

The rise of the digital economy has contributed to the emergence of new work and employment forms, exacerbating job polarization and job displacement, thus increasing the societal demand for highly skilled workers. Despite the continued development of vocational education in China, which has produced a large number of skilled workers, there remains a shortage of highly skilled personnel. In 2021, skilled workers accounted for 26.8% of the workforce, with highly skilled workers making up only approximately 30% of the skilled workforces. Compared to developed countries, China still lags in high-skill talent supply; for instance, 40% of Japan's industrial workforce are senior technicians, and in Germany, the figure is 50%. Additionally, there is a mismatch in the demand for and supply of proficient workforce across industries and regions. While manufacturing still absorbs a large portion of skilled workers, the demand for talent in the service sectors (such as information technology, healthcare, and logistics) has been growing due to economic restructuring in China. In 2022, 29.7% of vocational graduates worked in secondary industries, 67.7% did in tertiary industries, and less than 3% chose to work in the primary industry. Besides, the economically developed eastern coastal regions attract

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tin on the Development of Education in China in 2023: http://www.moe.gov.cn/jyb_sjzl/sjzl_fztjgb/202410/t20241024_1159002.html (accessed 03.09.2025).

more highly skilled workers, while central and western regions, as well as rural areas, experience relative shortages of skilled labor.

4.2. Case study of TVET evolution in Taicang county

Taicang, a county in Jiangsu Province near Shanghai, emerged as a key hub for German investment in China in the early 1990s, with hundreds of German-funded enterprises now based there. Its strong industrial base and favorable location have contributed to robust economic growth, placing it among China's top ten most developed counties[8].

In the 1990s–2000s, vocational education in Taicang was consolidated through merging of specialized schools into Taicang Secondary Vocational School, later complemented by a municipal tertiary vocational college. These institutions became central to developing skilled labor for the local economy. As demand from the German enterprises grew, they proposed adapting the German dual-system model locally. The municipal government supported this initiative, instructing the vocational school to collaborate with enterprises.

Initial negotiations revealed key differences in expectations: the German firms advocated for in-company training centers and early-stage apprentice stipends, while the schools preferred in-house education and delayed financial incentives. Eventually, compromises were reached: training centers were set up in the German companies, and stipends began to be paid during the internship phase. These steps enabled a gradual localization of the dual-training model.

A flagship example is the DAWT training center, jointly managed by German enterprises and the municipal government. Since 2001, it has provided structured three-year training across school, enterprise, and a specialized training center, guided by a jointly developed and annually updated curriculum. Over time, other firms also established training centers, and AHK vocational certifications gained partial recognition among schools and employers.

Nevertheless, the Taicang model diverges from the original German version. The schools adapted the dual-system principles to the local realities, improving facilities, expanding practical training hours, and integrating theory with practice. These efforts led to stronger student outcomes, greater recognition by employers and better performance in competitions.

Central, provincial, and local governments supported this transformation through sustained investments in teacher development, equipment, and curriculum reform. To attract investment, the local authorities emphasized regionally distinctive models, like localized dual training.

By 2023, many Chinese enterprises, particularly SMEs, were also engaged in school-enterprise cooperation. Unlike the rigid German

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[8] In China, County is a city, with administrative level lower than the city.

model, the Chinese version allows schools to tailor programs to firm needs, offering greater flexibility in design and scheduling. While such arrangements may increase coordination costs, they have been supported by additional public funding and institutional adaptation.

Despite its success, the Taicang model is difficult to replicate. Its unique industrial base, especially the concentration of German enterprises, provided rare conditions for school-enterprise cooperation. Many cities attempted to emulate it, including adoption of AHK certifications, but often lacked workplace-based learning and employer commitment necessary for success. Without similar foundations, replication efforts have yielded limited results.

5. PPP in the Indian TVET: A case of Tata Technologies skill-enhancement projects

5.1. Five pillars of TVET in India

Ten years ago, there was very little TVET available in India, except for Industrial Training Institutes (ITI), mostly government-financed and managed. The 11th Five Year Plan of India (2007–2012) was the first one ever to devote a separate chapter to Skill Development, followed by another one for the 12th Plan[9]. The challenge was to expand the system, while consistently improving quality of provisioning [Mehrotra, 2014]. India's TVET has evolved and grown rapidly in the last decade or so, though in an extremely ad hoc and unplanned manner, despite efforts to guide the process through first national skills policy[10] and then another[11].

Since about 2011, five pillars (instead of the two that existed earlier)[12] of skill education in India have emerged:

a. Vocational education in schools (only available at ISCED Level 3) and higher education (ISCED Levels 4, 5 and 6) (of the Ministry of Human Resource Development (MHRD), Government of India (GOI)), that emerged in late 2013;

b. Vocational education by National Skill Development Corporation's (NSDC) Private Training Partners (NSDC VTPs), which started in 2011; typically, short term training for three months, typically at ISCED Level 3 at best);

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[9] Santosh Mehrotra had the privilege to lead the team that wrote the 12th Plan chapter on Skill Development. However, after the 12th Plan, there has been none, since the Planning Commission was abolished at the end of 2014 by the new right-wing government and replaced with another, much weaker institution, with much fewer powers and no authority to allocate finance [Mehrotra, Guichard, 2020].

[10] Ministry of Labour and Employment, Government of India (2009) National Policy of Skill Development: http://labour.nic.in/policy/NationalSkillDevelopmentPolicyMar09.pdf (accessed 03.09.2025).

[11] Ministry of Skill Development, Government of India (2015) National Policy for Skill Development and Entrepreneurship: https://prezi.com/x7wr0s7e6wov/national-policy-for-skill-development-and-entrepreneurship/ (accessed 03.09.2025).

[12] The preexisting ones were ITIs and Apprenticeships. The former existed since the 1950; the latter from 1961 onwards.

c. Public and private Industrial Training Institutes (ITI) (of the Ministry of Skill Development & Entrepreneurship, MSDE, GOI), which significantly grew in number; typically, at ISCED Level 3;

d. The skill development schemes of 16 ministries, mostly started after the introduction of National Skills Policy in 2009, of the GOI; this is typically short term (like b. above);

e. Training in companies is run in two ways: 1) private companies train new recruits; 2) there is a nationwide Apprenticeship Training system. The latter has been applied since 1961 (under the Apprenticeship Act) and remained confined to the organized segment of economic activity, which accounts for only 15% of India's 466 million workforce. Moreover, only large enterprises (mainly those in public sector and some corporations) offer apprenticeships; *registered* micro-, small and medium enterprise (MSMEs), which barely account for 15% of all non-agricultural 66 million establishments in India, rarely do.

In other words, the vast majority of Indian youth who acquire vocational skills do so informally on the job, typically within the 85% of enterprises operating in the unorganized sector. As a result, only 2.3% of the workforce had received formal vocational training by 2011–2012, according to the National Sample Survey (Employment-Unemployment Survey, NSS, Ministry of Statistics). Despite the launch of the "Skill India" campaign, by 2017–2018, this figure had only risen marginally, to 2.4%[13].

In contrast to successful international models, where vocational education is largely employer-provided and demand-driven, India's TVET system remains predominantly state-led. While apprenticeship schemes involving industry exist and are partially subsidized by the Government of India, participation is limited. These arrangements primarily involve large public sector enterprises or major corporate actors, while small and medium-sized enterprises (SMEs), which make up the bulk of India's 66 million non-agricultural businesses, tend to avoid offering training. This issue will be explored further below; here, we turn to the public provision of TVET across the remaining four pillars of the system.

Until 2014, vocational education in India was limited to a small segment of senior secondary schools, with low enrollment and minimal labor market impact. In 2014, the National Skills Qualification Framework (NSQF) was introduced. The scheme aimed at integrating vocational options into general education, has been facing considerable implementation challenges. Only about one-sixth of government sec-

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[13] Ministry of Statistics and Programme Implementation (2019) Annual Report, Periodic Labour Force Survey (PLFS) 2017–2018: https://www.mospi.gov.in/sites/default/files/publication_reports/Annual%20Report%2C%20PLFS%202017-18_31052019.pdf (accessed 03.09.2025).

ondary schools offer vocational courses, often without meaningful industry participation or apprenticeship pathways, and these factors reduce the employability of graduates.

Unlike countries such as China, India does not offer vocational education as a separate stream at the secondary level. Instead, vocational subjects are simply added to the general curriculum, which dilutes their effectiveness and limits the quality and scale of skill acquisition. Moreover, industry involvement in school-based vocational education remains minimal, and opportunities for apprenticeships or internships are scarce.

At the tertiary level, universities and colleges have introduced Bachelor of Vocation (B.Voc) degrees, along with one- and two-year certificate and diploma programs. However, these too face challenges in aligning curricula with labor market demands, limiting their effectiveness in preparing graduates for skilled employment.

5.1.1. NSDC funded private vocational training providers

This is the second, and like VET in schools, relatively new pillar of TVET in India. In 2010, the government of India decided that because the economy had been growing at an unprecedented rate before the global economic crisis, India needed to quickly train young people who could enter the labor force after some short-term training. The implicit strategy was based on the understanding that school leavers, if provided with a maximum of three months training in a vocational field by private providers, would get employment. That goal proved to be a chimera. Notably, those companies were not employers, but private standalone training providers [Mehrotra, Guichard, 2020].

NSDC's second role was to incubate Sector Skill Councils, intended—following models in many Anglophone countries—to give employers a voice in training design and delivery. However, the model proved flawed on several counts, as detailed by an independent expert review [MSDE Expert Group, 2017][14].

5.1.2. ITI: Public and private

ITIs form the third (and as noted earlier the oldest) pillar, with both public and private institutions offering one- to three-year programs in trades. The number of private ITIs had grown sharply from under 2,000 to over 13,000 by 2023, but quality concerns arose due to insufficient regulatory oversight[15]. Most of the trades for which training was available were useful for manufacturing. These were the only institutions

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[14] Santosh Mehrotra was a member of the expert group and partly drafted the report.

[15] Standing Committee on Labour, Textiles and Skill Development of the Sixteenth Lok Sabha, Government of India (2017) *Functioning of National Skill Development Corporation National Skills Development Corporation:* https://eparlib.sansad.in/bitstream/123456789/762502/1/16_Labour_32.pdf (accessed 04.09.2025).

in the TVET system that provided a one-to three-year training, depending upon the occupation, not of very high quality, nor involving industry engagement [Mehrotra, 2014]. All other institutions tend to provide short-term training.

As the demand for trained young people increased with India achieving an unprecedented GDP growth rate, and non-agricultural jobs grew rapidly, the number of private ITIs went up. However, the number of private ITIs grew so rapidly that soared from under 2,000 to over 13,000 in 2023. When such rapid expansion takes place, it is inevitable that there will be a precipitous decline in quality[16].

5.1.3. Central government ministries offering training courses

Other than the three types of public and private institutions discussed above, the central government allowed at least 16 other line ministries to conduct vocational training. Most of the training that they offered was related to their line of work. The Ministry of Rural Development was offering the largest number of training programs; however, they were mostly short-term ones, each lasting a few months. In fact, all these ministries were conducting short-term training. The end result of this was that the entire skill development ecosystem remained highly fragmented, with practically no coherence between them. Practically no part of the system communicates with the other parts [Mehrotra, Guichard, 2020].

5.1.4. Apprenticeships: A new beginning?

Formal apprenticeships in India have existed since the introduction of the Apprentices Act in 1961, which covered engineering, non-engineering, and vocational trades. However, uptake remained low, with only 280,000 apprentices in 2014, largely due to bureaucratic complexity and strict compliance norms that discouraged participation, especially among MSMEs [Mehrotra, 2014].

A major policy shift occurred with the 2014 amendment to the Act and the 2016 National Apprenticeship Promotion Scheme (NAPS). The scheme introduced greater flexibility, allowing employers to offer optional courses, define apprenticeship duration (6–36 months), and determine curricula. Administrative procedures were simplified through an online portal, reducing transaction costs and improving coordination among stakeholders.

The system now accommodates a broader range of employers. Firms with four or more employees can host apprentices individually or collectively. A shift from rigid quotas to a flexible range (2.5–15% of the workforce) has made participation more feasible. The service sector has also been brought into the apprenticeship fold.

To scale implementation, the government has enabled Third-Party Aggregators (TPAs) to work with MSMEs and large firms. TPAs mo-

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[16] Ibid.

bilize candidates, deliver basic training, streamline paperwork, and promote awareness. Sector Skill Councils (SSCs) now hold delegated authority to oversee apprenticeships within their industries [Mehrotra, 2021].

The reforms have yielded promising results: over 1.1 million candidates and 70,000 companies are now registered on the apprenticeship portal, with annual uptake rising by 60% from a base of 250,000 [Mehrotra, 2014]. Nevertheless, challenges persist, including limited awareness, lack of progression pathways, weak credit integration, unclear certification value, and capacity gaps—issues where industry support remains essential.

5.2. Case study of Tata Holdings and the Industrial Training Institutes

The last few years have seen a newfound interest among some large corporations to assist Industrial Training Institutes (ITIs) in modernizing vocational education. Tata Holdings, one of India's largest conglomerates — with operations in manufacturing (steel, automobiles, consumer goods) and services (e.g., Tata Consultancy Services) — has taken the lead. In several states, ITI modernization projects have been funded by state governments but implemented and managed by Tata Technologies.

Tata Technologies has been actively upgrading ITIs across India, transforming them into advanced technology hubs (Centers of Excellence) for industry-relevant skills. These initiatives, each tailored to local needs, span several states (see Table 3).

Table 3. **Tata Technologies' initiatives in upgrading ITIs across India**

State	Number of ITIs covered	Agreement details
Telangana	65	Provision of long-term and short-term technical courses
Uttar Pradesh	150	ITIs as technology hubs, including skill centers for the large industries as well as micro-, small and medium enterprises
Maharastra	419 [and 53 vocational schools]	12% of the funding will be by the state government
Bihar	149	ITIs as technology & industrial hubs for the MSMEs
Odisha	20	Project in-line with the state governments 'Skilled in Odisha' program

Chhattisgarh state represents another case of Tata Technologies actively upgrading ITIs across India. On July 22, 2023, Chhattisgarh government and Tata Technologies agreed on a project worth about Rs 1188.36 crore for the modernization of 36 government ITIs in the state's 36 government ITIs. Under the agreement, Tata Technologies will train youth in six new trades, running 23 short-term courses in 36

ITIs in the state. Tata Technologies will set up state-of-the-art technical workshops and provide trainers for selected ITIs of the state.

Apart from this, Tata and its associate company will cooperate in providing placements in big companies for the youth of the state. Tata Technologies Limited will transform the 36 Government ITIs into Industry 4.0 Technology Hubs. Under the ITI Upgradation Project, young people will get opportunities to receive training in the following six innovative technical trades of world-class. There are three one-year courses: Artisan Using Advanced Tools, Industrial Robotics & Digital Manufacturing Technician, Manufacturing Process Control & Automation. The two-year courses include Advance CNC, Machining, Basic Designer & Virtual Verifier (Mechanical), and Mechanic Electric Vehicle. State-of-the-art technical workshops will be set up in each ITI selected by Tata Technologies Limited and two trainers will be appointed in each ITI. Tata Technologies Limited and its associate industries will provide support in the placement of trained youth. About 10,000 young people will benefit from the scheme every year[17].

While specific figures vary by state, Tata Technologies has implemented similar skill-enhancement projects across multiple Indian states, focusing on modernizing infrastructure, providing industry-relevant training, and aligning ITI curriculums with advanced manufacturing and other high-demand sectors. Each state's program is tailored to its industrial and employment needs, supporting sustainable job creation and skills development that aligns with local economic goals.

6. PPP in the Russian TVET: A top-down approach

6.1. Background information

Vocational education in Russia is a key source of skilled workers and mid-level specialists, accounting for 45% of the employed workforce [Anisimova et al., 2023]. Amid rising labor market demand, vocational qualifications have gained popularity among youth.

Russia's TVET system is predominantly school-based and includes 4,627 providers, of which only 13% are private. It does not offer higher vocational education; instead, it provides secondary vocational education covering ISCED Levels 3–5. Despite offering over 900 programs, just 12 attract half of all enrollments—mainly in engineering, ICT, healthcare, and teacher education. Students typically enter TVET after completing either Grade 9 (age 15–16) or Grade 11 (age 17–18), with 80% enrolling post-Grade 9. These institutions also provide general secondary education [Ibid.].

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[17] Tata Technologies announces termination of ITI upgrade project in Chhattisgarh worth Rs 1188.36 crore. Moneycontrol: https://www.moneycontrol.com/news/business/companies/tata-technologies-announces-termination-of-iti-upgrade-project-in-chattisgarh-worth-rs-1188-36-crore-12792730.html (accessed 06.09.2025).

More than half of 9th-grade graduates now choose TVET, drawn by practical training and early workforce entry. Some enroll after completing Grade 11. In 2022–2023, TVET enrollment reached 3.6 million students [Ibid.]. Since the mid-2010s, youth have increasingly shifted from higher education to vocational pathways [Maltseva, Shabalin, 2021; Konstantinovskiy, Popova, 2020]. In 2020, for the first time since the massification of higher education in the 2000s, the number of TVET graduates surpassed university graduates. Enrollment among 9th graders rose from 37% to 52%, and among 11th graders from 19% to 23% (see Table 4). While higher education coverage remains high, especially among younger cohorts, TVET is experiencing sustained growth, a trend expected to continue due to demographic dynamics [Anisimova et al., 2023; Maltseva, Shabalin, 2021].

Table 4. **Enrolment in TVET in Russia, 2015−2023**

Indicator / Year	2010	2015	2019	2020	2021	2022	2023
Enrolment in TVET [thousands]	1,209	976	1,042	1,114	1,077	1,152	1,219
Enrolment in higher education [bachelor and specialist programs] [thousands]	1,341	1,014	902	873	908	939	1,021
Proportion of 9th graders opting for TVET	40.8%	45.9%	44,8%	47.4%	47.9%	51.3%	51.9%
Proportion of 11th graders opting for TVET	19.0%	16.9%	19.4%	21.9%	20.0%	22.3%	22.6%

Source: Administrative data (statistics of the Ministry of Education of Russian Federation).

While the 2000s favored highly educated professionals, recent demographic decline and economic restructuring have created shortages of mid-skilled labor [Smirnykh, Emelina, 2021]. TVET graduates earn, on average, 30% more than those with only a secondary education, though still less than university graduates [Anisimova et al., 2023]. This wage premium, combined with rising blue-collar salaries amid labor shortages, has increased the appeal of TVET as a first postsecondary option [Kapeliushnikov, 2024].

For many, vocational education is also a pathway to higher education: nearly one-third of TVET graduates enroll in university, particularly in fields like social sciences and education [Anisimova et al., 2023]. In the absence of an institutionalized higher vocational track, over 600 universities now host TVET divisions, creating de facto upward mobility routes.

Quantitative growth in TVET has driven qualitative changes as well. The student body has become more diverse, attracting more youth from high-income families, though differences in parental education remain. Some institutions have become selective, attracting

high-achieving applicants, while others primarily serve at-risk students. This growing heterogeneity complicates efforts to standardize quality across the system.

A central policy challenge lies in balancing state priorities, which consist in supplying skilled workers to strategic industries amid demographic pressure, with family preferences for higher education, which is often seen as a route to non-manual, flexible careers.

6.2. TVET governance

While recent years have seen notable shifts in student demographics and increased enrollment in TVET, these trends are deeply intertwined with a decade of state-led modernization efforts, ambitious policy reforms, and evolving funding mechanisms. Over the past decade, Russia's approach to TVET has shifted from a state-centric model to a more dynamic system emphasizing public-private collaboration, performance-based funding, and alignment with labor market needs.

Since the early 2010s, the Russian government has prioritized the modernization of TVET to address both economic transformation and demographic challenges. The overarching goal has been to create a competency-based, flexible, and adaptive TVET system aligned with labor market needs and capable of supporting the country's shift toward a knowledge-based economy. In 2011, new competency-based TVET standards were adopted, emphasizing practical training, modern curricula, and qualified trainers. The State Program for the Development of Education (2013–2020)[18] and its subprograms have focused on aligning TVET with labor market requirements, decentralizing governance, and fostering strategic partnerships with employers. In addition, the development of the National Qualifications Framework institutionalized the assessment and recognition of professional qualifications, supporting lifelong learning and mobility within the workforce. Under the direction of the Federal Ministry of Education, major shifts have taken place in Russian TVET since the mid-2010s. These reforms aimed to enhance the quality of vocational education through the introduction of a demonstration exam as an instrument for assessing graduates' skills (based on the WorldSkills competitions methodology) and through updating the infrastructure of vocational colleges by establishing new workshops with advanced equipment.

The financing of Russian TVET has also undergone significant transformation, moving from a purely state-funded model to one that encourages multi-channel and performance-based funding. While over 80% of TVET funding still comes from the state, fiscal constraints have led to increased regional responsibility and experimentation with cost-sharing models involving enterprises and students. The federal government has incentivized regional innovation through com-

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[18] State Programme: Education Development, 2013-2020: http://government.ru/en/docs/3342/ (accessed 04.09.2025).

petitive grants, co-financing arrangements, and targeted support for best-practice models and dual education programs. Since 2018, amendments to the tax code (article 264 of Part Two of the Tax Code of the Russian Federation) have encouraged enterprises to invest in practice-oriented (dual) training by offering tax benefits, further integrating business into the TVET ecosystem.

6.3. National initiative "Professionalitet"

A major modernization initiative in Russian TVET is the federal project "Professionalitet", launched in 2022. This flagship reform addresses persistent gaps between vocational education and industry needs. Its core elements revolve around the creation of sectoral education-industry clusters, which unite TVET institutions and large employers to co-design curricula, modernize equipment, and ensure rapid graduate placement. As of 2024, 370 clusters operate nationwide, covering 24 sectors and involving 1,700 employers. Initially, clusters were created in key high- and medium-tech industries, but they now also encompass significant service sectors, such as teaching and the creative industries.

Clusters are formed through a competitive process: TVET colleges, in partnership with employers, submit applications, and the Federal Ministry of Education selects the participants. The regional ministry provides tactical management, while the Federal Ministry of Education offers strategic oversight. An industry association consisting of employers also participates in cluster management. The Federal Ministry of Education allocates 100 million rubles (USD 1.23 million) per TVET institution in a cluster, while the partnering enterprise contributes at least 50 million rubles (USD 0.62 million)[19]. In addition, grants may be awarded to vocational schools on a merit-based system to help them upgrade facilities and equipment. Alongside these funds, TVET colleges receive transfers according to enrollment plans created in collaboration with partner companies for state-funded places. Additionally, TVET schools in clusters can obtain funding for places financed by the partnering enterprise; as of 2023, these places enrolled 4,500 students.

The national initiative "Professionalitet" and the broader approach to transforming TVET are built on three pillars. The first pillar involves incorporating elements of the dual model to enhance the relevance of TVET training. This includes developing curricula and requirements for training equipment together with partnering enterprises, lengthening internships, increasing the proportion of practical content in the cur-

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[19] Based on the Central Bank of Russia exchange rate as of April 19, 2025 (1 USD = = 81.1371 RUB), this corresponds to approximately USD 1.23 million and USD 0.62 million, respectively. Source: Central Bank of Russia (2025, April 19). Official exchange rate of the ruble against foreign currencies: https://www.cbr.ru/eng/currency_base/daily/ (accessed 06.09.2025).

riculum up to 50 percent, and reskilling TVET teachers in the two newly established industrial parks.

The second pillar centers on strong career counseling and the promotion of middle-skilled occupations. The "Ambassadors of Professionalitet" program, which recruits outstanding TVET students to serve as ambassadors and provide career guidance at secondary schools through interactive and comprehensive career maps, is one of the key initiatives implemented by the Federal Ministry of Education under the "Professionalitet" initiative.

The third pillar is the adoption of a cooperative governance model for TVET-industry clusters. By encouraging systematic employer involvement in TVET decision-making at both tactical and strategic levels through industrial associations, this PPP governance approach introduces a novel element to an otherwise centralized, state-centric TVET model.

6.4. Scaling the practice: Prospects and limitations

The initiative "Professionalitet" is grounded in the experience of various vocational education systems, including the German dual model with a strong role of chambers and associations. However, it is difficult to scale this experience as a package solution since it draws on a consortial yet centralized model of TVET PPPs with greater reliance on the state and large enterprises in the context of demographic challenges and structural transformation of the economy. On the other hand, certain practices can be scaled up, especially in terms of the popularization of TVET. Given the unprecedented expansion of the system, Russia has unique experience in promoting middle-skilled professions and can share it. The development of new PPP management solutions in TVET, namely the model of cooperative management of an education-industry cluster, is another practice that might be expanded in TVET systems with significant government involvement in the sector.

7. Discussion

The analysis of PPPs in TVET across Russia, India, and China reveals both converging trends and persistent divergences shaped by each country's political economy and governance structures. All three countries are responding to the pressures of rapid industrialization, technological change, and labor market transformation by seeking to modernize their TVET systems and align them more closely with industry needs. Despite their distinct governance models, i. e. centralized in Russia [Remington, 2017], decentralized in China [Li, Huang, 2024], and hybrid in India [Mehrotra, 2014], a common thread is the increased involvement of industry actors in curriculum development, training delivery, and the overall governance of vocational education. This industry engagement is crucial for addressing the persistent mismatch between educational outcomes and labor market requirements,

as illustrated by the localized dual-system partnerships in China [Li, Huang, 2024], the industry-driven modernization of ITIs in India (notably by Tata Technologies) [Mehrotra, Guichard, 2020], and the sectoral cluster approach of Professionalitet initiative in Russia.

The case studies demonstrate that the effectiveness of PPPs in TVET is closely linked to a broader institutional context. In China, local adaptability and strong government coordination have enabled successful partnerships with both foreign and domestic enterprises though the replicability of such models is limited by regional disparities in industrial development. Indian experience highlights the benefits and challenges of a pluralistic system where both public and private actors contribute to skill formation whereas fragmentation and uneven quality remain issues. The recent reforms in Russia show a cautious shift from a state-centric to a more consortial model, with emergent industry clusters and increasing employer participation though the system remains highly centralized and reliant on public funding. Across all cases, the integration of industry expertise into curriculum design and the provision of practical training opportunities have been key to improving graduate employability and the responsiveness of TVET systems to economic shifts.

However, the analysis reveals several limitations and challenges. The successful adaptation of PPP models, such as the Reimbursable Industry Contribution (RIC)[20] used in Brazil and South Africa, faces significant hurdles in more centralized or state-dominated systems [Mehrotra, Ghosh, 2014]. These models typically require strong, autonomous business associations (which are quite commonly found in emerging market economies across the globe, including India) to manage funds and set priorities, conditions that are less prevalent in highly centralized governance environments. Yet this assumption may underestimate the broader adaptability of the model. RIC-like mechanisms have been successfully implemented in at least 62 countries across different political systems since 1942, suggesting that political regime type is not a definitive constraint. These schemes offer an internationally recognized method of structuring sustainable industry co-financing for skills development and have functioned effectively for decades in diverse governance contexts, including those within other BRICS countries.

Moreover, the scaling of localized best practices is often constrained by institutional inertia, uneven capacity among stakeholders, and regional disparities in economic development. Therefore, while international models offer valuable lessons, their transferability

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[20] RIC is a financing mechanism used in TVET systems. Under RIC, employers are required to contribute a fixed percentage of their payroll (commonly 1–2%) to a dedicated training fund. This contribution is reimbursed, fully or partially, when employers provide approved training to their employees, either in-house or through public/private training infrastructure

depends on careful adaptation to local governance realities and creation of institutional mechanisms that balance government oversight with meaningful industry engagement. Future research should further explore the conditions under which PPPs can be most effectively institutionalized in different political and economic contexts, and the ways these partnerships can be leveraged to promote inclusive and sustainable workforce development in the BRICS countries.

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Double Reduction Policy in Chinese Education: Promises, Outcomes, Perspectives

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Abstract   The educational system of China has traditionally been heavily focused on exams, placing a significant academic burden on students and financial pressure on their parents, while also increasing teachers' workload. The goal of the Double Reduction Policy (DRP) introduced in 2021 was to alleviate some of these societal tensions. Since this is a newly implemented policy, there has been no comprehensive evaluation of its short-term outcomes. Therefore, this study seeks to analyze the projected goals of the DRP, and the tensions in the implementation process from the perspective of the five major stakeholder categories — students and their parents, teachers and schools, local authorities, and private tutoring institutions, as well as evaluate short-term outcomes of the policy from the stakeholders' perspectives. The study also aims to propose strategies to address and balance these interests and concerns. The findings from a systematic literature review reveal a complex interplay of resulting benefits and challenges for internal and external stakeholders. The DPR has impacted students, parents, teachers, local authorities, and private tutoring institutions. While the policy has shown positive effects on student well-being and alleviated financial pressures for non-wealthy families, it has also intensified socioeconomic disparities and increased teacher workload. Furthermore, the deeply

ingrained cultural emphasis on academic achievement among parents has raised questions about the core values and long-term implications of the policy for access to and quality of education. These outcomes highlight the need for adjustments to align policy expectations with stakeholder needs.

China, as the world's most populous country, has seen a tight race among its young population for better job prospects and recourses, creating a tough academic environment and inevitably imposing high stress on students, their parents, and teachers [Jin, Sun, 2022; Xue, Li, 2023]. China's education system has long been exam-centered. This single-minded focus on examination scores as the standard of evaluation has put students and parents under immense pressure, neglecting students' holistic development and cultivation of innovative capabilities [Zhang, Bray, 2021]. Consequently, in recent years, with parents placing greater emphasis on their children's education, extracurricular training institutions have proliferated, forming a vast tutoring market. These institutions usually provide exam-oriented tutoring, intensifying students' extracurricular learning burden, and increasing financial pressure on families [Liu et al., 2024]. Gradually, the market of after-school training institutions has remarkably grown to about 87 billion yuan [Dai, 2023].

The reason why such institutions became popular in China is rooted in Confucian traditions. Chinese parents believe that success of their children can be achievable only through their participation in extra tutoring, endless homework, and more hours of study to keep up with peers [Chen et al., 2021]. China has been one of the leading countries in East Asia with the largest markets for shadow education [Lu et al., 2023]. The metaphorical term "shadow education" was coined by Stevenson and Becker [1992] to describe private supplementary education activities that occur outside a formal education system and aim to help students pass exams successfully and obtain better educational resources. The initially positive idea of helping students to gain success has turned out to aggravate economic pressures on low-income families and intensify inequality in society [Zhou, Su, Wang, 2017]; it also caused students' high academic stress and serious problems with their mental and physical development [Yan, 2022].

However, China is not the only country in the region to contribute to the long-term existence of shadow education by putting students under high-risk examination pressure [Lu et al., 2023]. Other Asian

education systems, including Japan, South Korea, Singapore, and Malaysia, also suffer from the dramatic growth of the shadow education industry and must provide timely policy response. For example, shadow education has been a challenge to public education in South Korea since the 1960s. As early as 1968, the South Korean government, aiming to rectify educational issues, implemented the system called "High School Equalization Policy", which exempted junior high school students from exams and allowed enrollment based on residential proximity. In 1973, the policy was extended to high schools. However, instead of improving the situation, the policy led to worsening the conditions of private tutoring. In 2000, the South Korean government went further and imposed a comprehensive ban on all forms of extracurricular tutoring and private academies [Lee, Lee, Jang, 2010]. However, the policy appeared to be ineffective. Subsequently, parents continued hiring teachers for one-one tutoring at higher prices as they believed that their children were unable to go to college without shadow education [Lee, Lee, Jang, 2010; Ji, 2022].

The widespread growth of shadow education worldwide has sparked concerns about the fairness and quality of education, frequently questioning the dominance of the formal education sector [Hamid, Khan, Islam, 2018]. As a result, governments around the world have started to regulate private tutoring within their educational frameworks. In this regard, China has introduced a series of policies since 1955, which have imposed detailed regulations on schools in terms of the quantity and quality of homework. However, students' learning burden kept getting heavier [Song, Yang, 2014]. In response to the excessive academic pressure on students, in July 2021, the General Office of the CPC Central Committee and the General Office of the State Council issued *the Opinions on Further Reducing the Burden of Homework on Students in Compulsory Education and the Burden of Out-of-School Training* (from now on referred to as the "Double Reduction" policy), which strives to facilitate the mitigation of academic stressors and decrease the scholastic workload to reduce the burden on students, create a system of high quality basic education, and further safeguard educational equity.

The "Double Reduction" Policy (DRP) is a relatively new government program with a strategic approach to both homework and extracurricular training in compulsory education. The major purposes of the DRP are as follows: improving school education and teaching quality, promoting the all-round development of students, providing after-school service to meet students' basic needs, and regulating behaviors of off-campus tutoring institutions[1]. Schools were required to

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[1] Ministry of Education (2021) Notification of the general office of the Ministry of education on the enrolment of secondary vocational schools in 2021: http://www.moe.gov.cn/srcsite/A07/moe_950/202104/t20210406_524618.html (accessed 28.08.2015).

switch from the purely exam-oriented approach to one that would enhance students' comprehensive literacy, focusing not only on the development of students' intelligence, but also on the cultivation of their personality and generic skills, such as critical thinking and creativity [Tian, Yuan, 2024]. The long-term goal was to transform the school evaluation system from test score based to a comprehensive quality evaluation, which would consider students' abilities, attitudes, and other dimensions, reflecting students' learning outcomes and development of their potential [Ibid.]. These measures were supposed to reduce the popularity of private tutoring.

Although the idea of lightening the academic burden and rampant commercialization pressure in the education sector looks promising for the main stakeholders, the short-term outcomes are contradictory. As recent research shows, many parents feel anxious about this policy as they worry that reducing the burden of schoolwork and off-campus training will affect their children's academic performance, which in turn will disadvantage their future studies and employment [Yu et al., 2022]. The DRP was expected to reduce the after-school burden for primary and secondary school students to a certain extent so that they would have more time to participate in sports and other free-time activities and comprehensively develop morality, intelligence, physical beauty, and laboriousness [Xue, Shi, 2022]. However, some researchers believe that the policy resulted in a deficiency of academic resources [Jia, Peng, 2022]. When students encounter academic challenges towards the end of the school day, there is an absence of supplementary teacher support. The extended time available for students after school may be advantageous for those with effective self-management skills yet detrimental for individuals lacking self-disciplinary abilities [Ibid.]. The DRP, which aims to reduce the amount of homework and after-school training for students enrolled in formal education, has had a major national impact by outlawing the after-school private tutoring sector, employing over 10 million people [Zhong, Park, 2023]. However, in turn, the elimination of after-school services has led to prolonged working hours for both elementary and secondary school teachers, consequently augmenting their workload [Zhu et al., 2023]. These interim findings suggest that the judgments about its effectiveness are not univocal and promises set by the Chinese government may fail to meet the expectations of the main stakeholders of this policy. Considering the DRP is a newly implemented policy and the existing research on this policy is currently at the level of theoretical analysis combined with some empirical evidence touching separate categories of stakeholders of this policy, more extensive exploration of possible paths for the policy is needed to understand the effects of this policy. Therefore, this study is aimed at analyzing the promises of the DRP and evaluating its short-term outcomes for the major stakeholders.

The study is based on two theoretical underpinnings. First, we rely on the concept of Educational Involution to describe the premises of the policy in the Chinese context. In academic literature, the concept of "education involution" refers to a situation in which an education system is extremely competitive and demanding and yet does not necessarily produce strong academic outcomes [Chen, Zhao, 2024]. It explains that an over-investment of efforts, time, and resources in education can lead to low returns and no quality improvement [Wang, Xiao, 2023]. In China, educational involution is a key driver of stress and inefficiency in the educational system, whereas the DRP has been proposed by the Chinese government as a direct response to that overburdened environment. Second, the study utilizes the Stakeholder theory [Donaldson, Preston, 1995; Reynolds, Schultz, Hekman, 2006] to identify the main stakeholders or parties affected by the DRP, describe their needs, interests and influences and the relationships with these stakeholders to estimate the short-term effects of the policy.

1. Theoretical underpinnings
1.1. Educational involution

The term "involution", coined by the German philosopher Immanuel Kant, is often used to describe things that repeat to evolve but become more complex [Hou, Pan, 2023]. With regards to "Education involution" in the Chinese context, it is used to describe competition for academic success of students urged by their parents. However, the outcome is the opposite as such competition leads to burnout without expected educational benefits. First, parents are obviously anxious and spend more on family education, resulting in an overburden of household expenditure and energy. Second, businesses enter the off-campus tutoring market, and exacerbate educational anxiety among parents [Zhang, 2021]. The whole education field demonstrates features of marketization, profit-pursuing, and competitiveness. Third, students' course load and academic pressure increase, but the quality of education does not obviously improve [Chen, Zhao, 2024]. The DRP seeks to address these issues by reducing the amount of homework and prohibiting certain types of off-campus tutoring. The policy tries to reset the educational system by reducing extraneous pressures, focusing more on quality learning and holistic development, and aiming for long-term benefits rather than merely increasing competition. By doing so, it aims to relieve the pressure that leads to involution and refocus students on a more balanced and meaningful learning experience and establish good education ecology [Zhang, 2021].

1.2. The stakeholder theory

The stakeholder theory postulates that companies should consider the interests and well-being of all parties affected by their actions. As they are interconnected with a variety of groups, decisions should be

made with consideration of how they impact each group [Reynolds, Schultz, Hekman, 2006; Stoner, Freeman, 1999]. According to Stoner and Freeman [1999], stakeholders can be classified into the following two categories: internal and external. Internal stakeholders are those who act within the organization, such as owners and employees. External stakeholders are those that interact directly with the organization, for example, customers or suppliers. The theory suggests that by considering the needs and concerns of all stakeholders, an organization can create long-term value and achieve sustainable success [Reynolds, Schultz, Hekman, 2006]. Although the stakeholder theory was created as a managerial theory and is mainly used in strategic management research and business practices, it has the potential to be included in educational research as well. The main reason for this is that many education institutions are now operating as quasi-commercial organizations and their success depends on their ability to adopt efficient management approaches. Therefore, stakeholders at different levels can influence the quality of education and foster students' development [Langrafe et al., 2020]. In an education system, students and their parents can play the role of external stakeholders, while teachers, local authorities, and private tutoring institutions are internal stakeholders. With regards to the DRP, it is important to understand the interests of students and their parents as well as those of teachers, local authorities, and private tutoring institutions to maximize the results of the policy.

Bringing the stakeholders theory in education and placing it in the context of the DRP, this study has got two broad aims. The first one is to highlight the interests and concerns of major stakeholders of this policy in the Chinese education system, i.e. students, their parents, teachers, local authorities, and private tutoring institutions. The second aim is to propose strategies for addressing and balancing these interests and concerns as well as evaluating the short-term outcomes of this policy and providing some recommendations for improving the policy.

2. Methodology   This research utilizes the systematic literature review approach, which is a comprehensive and structured method for identifying, evaluating, and synthesizing existing research on a specific topic or question. It typically includes clearly defined search criteria, rigorous screening and selection processes, and a systematic analysis of the findings from the selected studies. The goal is to provide an unbiased, comprehensive overview of the existing literature and to identify gaps, patterns, and areas for further research or development [Muka et al., 2020].

This study employs a structured systematic review by strictly following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [Moher et al., 2009]. PRISMA entails

four steps: identification, screening, eligibility, and inclusion. The flow diagram in Fig. 1 illustrates how these four steps were administered in this study. The second author performed the data search and selection process. The first author monitored the process and conducted quality appraisal by employing Remington's framework [Remington, 2020], which included examining the inclusion and exclusion criteria, methodological rigor, investigating any bias, and, ultimately, enhancing the reliability of the results.

2.1. Data search and selection

According to the workflow of PRISMA (Fig. 1), the second author searched scholar.google.com, Scopus and Web of Science Core database to identify peer-reviewed articles that examined the expectations and the short-term outcomes of the DRP in China. At this initial stage, we adopted a combination of the following keywords in the first identification process: "Double Reduction Policy" AND "Effects of the DRP" OR "Outcomes of the DRP" OR "Impacts of DRP" OR "Influences of DRP" AND "China". This search yielded a total of 105 articles. In addition, the second author also included another set of 11 articles from the references listed in the initially searched articles.

Fig. 1. **PRISMA flow diagram adapted from [Moher et al., 2009]**
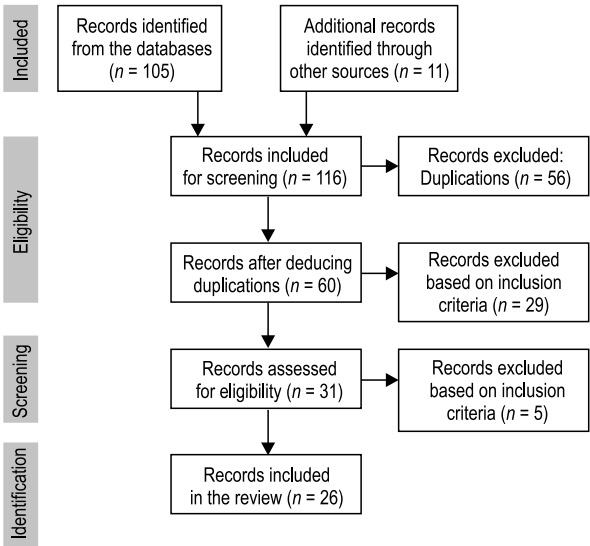
In the screening phase, the second author read the titles of the 116 articles to examine whether the identified papers were relevant to the research purpose of this study. Through this process, 56 duplications were identified and removed, resulting in 60 articles included in the second round of screening. The second author then used the following inclusion criteria, confirmed by the first author, to review the abstract of each article: (1) the studies focused on Chinese educa-

tional context; (2) the articles investigated the impacts of DRP on addressing the education involution for various stakeholders in the short-term; (3) the articles were written in English; (4) the journal had a formal peer-review process indexed in Scopus or Web of Science; (5) the article was published between 2021 and 2024. This process excluded 29 articles from the analysis. In the eligibility check, the second author scrutinized the text of the remaining 31 articles based on the inclusion criteria and further removed 5 articles. Eventually, 26 articles were eligible for the systematic review. A member checking process was conducted by the first author to ensure the accuracy of the process.

2.2. Data analysis

The second author analyzed the 26 selected articles. She initially categorized these articles into five distinct groups based on the stakeholder theory [Donaldson, Preston, 1995; Reynolds, Schultz, Hekman, 2006]: students; parents; teachers and schools; local authorities; private tutoring institutions because the DRP has significantly impacted these stakeholders during its implementation. Thus, this categorization allowed for an in-depth exploration of the specific impacts of the DRP on each stakeholder group. Within each group, the analysis was further carried out using the thematic synthesis method proposed by Lucas et al. [2007]. This method is particularly effective in identifying common elements and features within a dataset, enabling researchers to generate themes that can capture the core patterns of the data. Accordingly, thematic synthesis enabled the second author to produce a context-specific interpretation of the short-term influences of DRP in the given context and extract themes that can reflect the impacts of the DRP on different stakeholders. These themes not only reveal the specific impacts of DRP policies in China but also provide a theoretical basis for subsequent research. Since thematic synthesis is effective in identifying common themes, which may unintentionally omit heterogeneity across different studies [Lucas et al., 2007], the textual narrative method was employed to complement the weaknesses of thematic synthesis. The capacity of textual narrative to illuminate diversities has garnered widespread acknowledgement [Ibid.]. This method enabled us to conduct a more thorough examination of how the DRP has reshaped the educational landscape in China, while also capturing the distinct features within each stakeholder group. During the data analysis stage, the two authors had several meetings to discuss the initial themes and confirm the finalized ones.

3. DRP and stakeholders: Prospects and short-term effects
3.1. The DRP impact on students

The DRP has introduced substantial changes to children's academic experience, mental health, and leisure activities. While the policy implies benefits for students, such as reduced academic pressure and

enhanced mental well-being, there are some challenges tied to socioeconomic disparities and personal skills of students, for example, the management of increased free time, which questions the effectiveness of the policy.

The DRP stipulates that elementary school Grades 1 and 2 should refrain from assigning written homework, as this can be effectively integrated into school consolidation exercises. Additionally, for elementary school Grades 3 to 6, the average completion time for written homework should be less than 60 minutes, while for junior high school, that should be less than 90 minutes[2]. As the results of existing studies show, the reduction in academic workload implied by the DPR correlates with measurable improvements in adolescent mental health. Wang et al. [2024] observed a significant decline in depressive symptoms (from 12.1% to 9.2%) and anxiety (from 8.9% to 6.2%) among adolescents. The contributing factors include less homework, more extracurricular activities, enhanced parental interaction, and improved sleep patterns. However, risk factors persist, especially for female students, those exposed to adverse life events, and individuals affected by the lingering social constraints of the COVID-19 pandemic [Wang et al., 2024].

While the DRP encourages parental engagement in children's education, its effectiveness varies significantly across socioeconomic backgrounds. Zhong and Park [2023], along with Jiang and Wang [2021], note that children in suburban and rural areas, particularly those of migrants, face distinct challenges. For these "left-behind" children, limited parental availability and lower educational resources hinder consistent academic support, especially as they progress into junior and senior high school. Researchers highlight that family socioeconomic status also affects students' access to after-school tutoring support. Students from affluent, urban backgrounds often access academic tutoring earlier than those from rural or lower-income households. As students progress through the educational system, the gap narrows, but the differences in access to quality tutoring persist [Xue, Shi, 2022]. These disparities highlight the socioeconomic divide in the benefits children receive from reduced academic pressures [Jiang, Wang, 2021; Xue, Shi, 2022; Zhong, Park, 2023].

The policy may result in a deficiency of academic resources. When students encounter academic challenges towards the end of a school day, there is an absence of supplementary teacher support. Those challenges are especially pronounced in test preparation, where a lack of extra help can cause students to lose focus on their studies and have a negative impact on test results. Students accustomed to

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[2] Ministry of Education (2021) Notification of the general office of the Ministry of education on the enrolment of secondary vocational schools in 2021: http://www.moe.gov.cn/srcsite/A07/moe_950/202104/t20210406_524618.html (accessed 28.08.2015).

scheduled classes may need more preparation for independent living. Before the DRP policy was introduced, students had a rigid schedule that did not allow them to relax or indulge in games. Nevertheless, extended time available after school may be advantageous for students with effective self-management skills, yet detrimental for those lacking them. The latter category may allocate excessive time to other activities or video games detrimental to their well-being [Yan, 2022].

Despite the initial intention of alleviating stress and pressure on students, the policy inadvertently exacerbates the challenges students face, mainly when the progress of their peers is not readily apparent. For instance, before the introduction of DPR, numerous students used to enroll in remedial classes alongside their classmates to ensure they remained on an equal footing academically. However, the transition to independent study at home may engender concerns about lagging behind in the course, which contributes to increased complexity. Not only does this outcome amplify academic pressures, but it also potentially impedes innovative thinking, further intensifying stress levels among students. This phenomenon introduces an added layer of complexity to the educational landscape, potentially intensifying challenges for students in fulfilling their academic responsibilities [Zhao, 2024]. Furthermore, the pressure on students to engage in extracurricular activities outside the classroom has increased [Liu et al., 2024; Yang et al., 2024], and these activities may demand more time and energy. Therefore, despite the original intention to reduce academic stress, the actual effect of the policy may be augmentation of the overall burden on students in both academic and social realms.

3.2. The DRP impact on parents

The DRP has had a transformative yet complex impact on Chinese parents, targeting both the financial and psychological burdens linked to competitive educational practices in China [Zhang, 2021]. While the policy primarily aims to reduce household expenditures on private tutoring and alleviate parental anxiety, recent research illustrates nuanced outcomes, reflecting the challenges in shifting deeply rooted educational priorities and parental attitudes towards education in the context of the DRP.

Economically, the DRP is expected to lessen household financial burdens by reducing reliance on costly extracurricular "shadow education" [Zhong, Park, 2023]. This aligns with government initiatives to support population growth through the three-child policy and promote equity and quality of education [Ibid.]. However, the traditional preferences for exam-oriented instruction persist, with many parents viewing high academic achievement as crucial for securing admission to prestigious schools, a pathway broadly regarded as vital for social mobility and future success. Consequently, despite regulato-

ry limits on private tutoring, parents often continue to seek alternative academic support, through unofficial channels, for example, hiring private tutors to deliver one-on-one tutoring, with the purpose of enhancing children's in-school academic performance [Zhang, 2021; Zhao, 2024].

The DRP has also created other side effects that intensified families' economic burdens on education. For example, Xue and Li [2023] argue that the DRP can potentially increase inter-school disparities and education quality gaps because many parents prefer high-quality schools to pre-DRP era ones as they want their children to receive better education and learning support, and this will lead to an increase in school district housing prices. Furthermore, the tightened market demand for private tutoring creates extra burden for low-income and multi-child families, placing them as a disadvantaged group in academic competition compared with wealthy and one-child families [Zhang Zhuang, Liu, 2021].

While the DRP aims to reduce parental anxiety [Yu et al., 2022; Zhong, Park, 2023], empirical research findings suggest that it has actually intensified that. The research by Jin and Sun [2022] reveals that, despite the decrease in access to private tutoring, parents report higher levels of concern as their children's academic progress is becoming less obvious to them. This concern is particularly acute among well-educated and wealthier families, where parents are more attuned to the competitive academic landscape and fear their children may lag without supplementary resources [Chen et al., 2022; Lu, Zhou, Wei, 2022; Zhao, 2024]. This reinforced parental anxiety causes increased household educational expenditures in private tutoring in order to counteract perceived risks to children's academic performance, which contradicts the objectives of the DRP [Jin, Sun, 2022].

With off-campus tutoring declining, schools have become central in academic support through after-school programs and personalized learning services [Xue, Li, 2023]. This shift allows schools to cater to diverse student needs; however, it also challenges parents who previously relied on private tutoring as a form of academic reinforcement. Parents demonstrate three major concerns in this regard. Firstly, they are worried about the quality of after-school services, and fear losing control over academic progress through the group-oriented and non-individualized approach [Jin, Sun, 2022]. Secondly, school-based after-school support emphasizes foundational education and children's balanced development, while parents often seek exam-focused skills to address testing and admissions pressures, leading to a trust gap and driving parents to pursue additional educational resources [Zhang, 2021]. Finally, the school-led after-school programs also disrupt education consumption habits of Chinese parents, who have to switch from the previous strong reliance on private tutoring to the new model, resulting in adaption challenge [Xue, Li, 2023].

3.3. The DRP impact on teachers and schools

The DRP has introduced transformative shifts in the roles and responsibilities of schools and teachers, reorienting educational support towards in-school services, thereby diminishing students' dependency on private tutoring. This realignment has broadened the function of schools and increased the requirements for teachers, which has been underscored by recent studies on the policy's implications [Xue, Li, 2023; Zhong, Park, 2023].

The DRP has stimulated significant shifts in the role of Chinese schools as education providers. Schools have evolved from institutions focused primarily on academic instruction into comprehensive service providers tasked with addressing diverse educational and social needs. Schools now encompass subject teaching, academic support, after-school care, and a variety of enrichment programs, aiming to alleviate academic pressures on students and reduce parental reliance on external tutoring [Xue, Li, 2023; Zhang, 2021; Zhong, Park, 2023]. By offering extensive after-school programming, schools have helped reduce household education costs, ease parental concerns, and foster a balanced learning environment, which aligns with the DRP's broader objectives. This shift has re-centered educational support within schools, positioning them as key agents in addressing societal concerns around educational equity and holistic development [Xue, Li, 2023; Zhang, 2021; Zhong, Park, 2023].

However, with the new roles taken by schools, teachers now bear the additional task of designing differentiated assignments and facilitating after-school activities that cater to diverse student needs. As noted by some researchers [Liu, 2022; Wang, Fan, 2023; Xie, Qian, 2024; Yang, Wen, 2022], teachers are tasked with creating individualized lesson plans and assignments that accommodate varied academic abilities while still adhering to the DRP guidelines that prohibit ability-based tracking. This layered instructional approach requires teachers to maintain high academic standards without contributing to student stress, which expands teachers' workload and responsibilities, particularly as they manage both academic and extracurricular tasks in their continuously extended workdays.

The DRP's focus on reducing homework burdens has shifted expectations from quantity to quality, demanding that teachers carefully design assignments that support learning without overwhelming students [Ding, Zhang, 2024]. Xie and Qian [2024] highlight that teachers now face challenges in balancing workload and evaluation quality due to limited time and resources, often struggling to align the DRP expectations with curriculum standards.

The DRP demands for reduced homework and better education have placed significant physical and emotional strain on teachers, who report heightened stress from prolonged hours dedicated to after-school services, lesson planning, supervision, and continuous communication with parents [Wang, Fan, 2023]. This intensified

workload, especially challenging for those with caregiving responsibilities, coupled with stagnant compensation and limited societal recognition, has led to reduced job satisfaction and a pervasive sense of undervaluation [Liu, 2022; Wang, Luo, Yang, 2022; Wang, Fan, 2023]. Many teachers complain about inadequate structural support and resources to manage these expanded roles, leaving them overextended, frustrated, and demotivated. This imbalance poses a challenge to the long-term success of the DRP, as teacher morale and motivation are crucial for sustainable implementation of the policy.

The evaluation of the short-term impact of the DRP on schools and teachers points to broadening the role of schools and heightening the demands placed on teachers, reshaping schools into service-oriented educational systems and significantly increasing teachers' responsibilities, causing difficulties in work-life balance, personal well-being, and lower job satisfaction.

3.4. The DRP impact on local authorities

The DRP has placed significant responsibilities on local authorities in China, positioning them as key players in implementing and adapting this wide-reaching educational reform. While the DRP aims to mitigate academic pressures and educational inequality, the nuances of its implementation across various regions have exposed challenges related to resources, governance, and equity. The DRP has led to substantial regional differences in how the policy is implemented. Economically developed areas, such as Shanghai and Beijing, have been able to introduce comprehensive after-school support and adjust academic requirements, such as reducing English examination burdens in primary education [Zhong, Park, 2023]. For example, Shanghai's "5+2 model" provides two hours of after-school service on weekdays[3], while Beijing's rotation of school leaders and teachers aims to equalize educational resources across schools [Yang et al., 2024]. However, in less-developed regions, e.g., rural or suburban, authorities are often limited to providing free online learning resources to bridge gaps, which may not adequately meet the educational needs of students [Xue, Li, 2023]. These discrepancies emphasize stronger reliance on school-based resources, which can further exacerbate the existing disparities in availability and quality of education in different regions.

The shift away from private tutoring produced within the DPR has inadvertently intensified socioeconomic disparities in access to education and its quality [Ibid.]. High-income families in urban areas can continue accessing private educational resources, while lower-income and rural families have become more dependent on local public edu-

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[3] Shanghai Education Committee (2021) Notification on Shanghai primary and secondary school curriculum plan for school year 2021 and its description: https://www.shyp.gov.cn/shypq/yqyw-wb-jyjzl-jyyw-kcjxzb/20211013/393955/122f433ee82d6d5d9cdb7da4a5f7b87c.pdf (accessed 28.08.2025).

cation, where resources and teaching quality may be insufficient. This dynamic has placed additional pressure on local authorities to address the above disparities while working within their financial and structural limitations. In many regions, the need for high-quality after-school programs and infrastructure has forced local governments to reallocate resources and prioritize certain areas, often leaving rural schools under-resourced [Ibid.].

The DRP is a significant element in China's "common prosperity" agenda, which seeks to reduce educational inequalities by centralizing control and expanding public school resources[4]. Local governments are required to comply with policies that limit private spending on education, reduce foreign educational influences, and shift the focus toward Chinese cultural education. In some cases, private schools are converted to public schools, thereby reducing tuition fees and broadening accessibility. The intent is to counterbalance the advantage held by high-income families, but local authorities lack resources required to effectively manage this transition and ensure that public schools can absorb additional students while maintaining quality [Yuan, 2022; Zhong, Park, 2023].

The DRP focus on strengthening public school education has led to intensified competition for high-quality schools, particularly in affluent areas. Families who can afford to move to school districts with reputable public schools are increasingly doing so, driving up local housing prices and unintentionally linking educational access to residential locations. This trend has posed challenges for local authorities, who must navigate the growing socioeconomic divide while managing the pressure on popular school districts and ensuring equitable access to quality education [Xue, Li, 2023].

Local authorities have faced increased operational demands as they work to align the DRP with the existing educational frameworks. For instance, some regions have introduced time limits on students' Internet use to prevent online gaming addiction, while others have developed new curriculum guidelines to comply with the DRP standards[5]. In regions with limited infrastructure, these requirements present challenges, as local authorities must enforce policies that require additional resources and oversight. The need to implement these policies effectively has demonstrated the disparity in regional capacity and resources, with wealthier areas better able to meet extensive requirements of the policy.

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[4] Ministry of Education (2021) Notification of the general office of the Ministry of education on the enrolment of secondary vocational schools in 2021: http://www.moe.gov.cn/srcsite/A07/moe_950/202104/t20210406_524618.html (accessed 28.08.2015).

[5] China's National Press and Publication Administration (2021) Notification on preventing minors from indulging in online games: https://www.nppa.gov.cn/nppa/contents/279/98792.shtml (accessed 28.08.2015).

In summary, the impact of DRP on local authorities is multifaceted, with regional disparities in resources and infrastructure shaping the effectiveness of its implementation. While the policy promotes educational equity and matches the national goals of "common prosperity", its success depends largely on local governments' ability to adapt and distribute resources effectively.

3.5. The DRP impact on private tutoring institutions

The DRP has had profound implications for China's private tutoring industry, compelling it to adapt significantly to a highly regulated educational landscape. Designed to reduce academic pressure on students and ease financial burdens on families, the DRP enforces stringent controls on private tutoring institutions, particularly those offering academic-focused programs.

These restrictions prohibit non-licensed institutions from offering academic training, mandate qualification standards for tutors, and enforce content supervision to ensure agreement with socialist educational values [Lu, Zhou, Wei, 2022; Xue, Li, 2023]. It also imposes regulations to limit the operating hours for academic tutoring, prohibiting tutoring sessions on holidays and evenings, and restricting the advertising of tutoring services. Additionally, foreign teachers are barred from participation, and tutoring institutions are prohibited from providing overseas courses. These measures are intended to redirect the focus of out-of-school education towards a more ideologically controlled and nationally aligned system.

Regulatory control showed positive short-term outcomes in line with the objectives of the policy. For example, recent empirical research findings indicate that since the introduction of the policy, the demand for academic tutoring has been decreasing significantly, especially in core subjects like Chinese, Math, and English [Liu et al., 2024; Yang et al., 2024]. However, this short-term influence can be temporal and debatable due to several reasons.

Survey data indicates that, despite these policy controls, approximately 87% of parents express continued interest in external academic support, with 37% willing to pursue one-on-one tutoring as an alternative to group classes, underscoring the persistent demand for supplemental academic services, driven by parental expectations for academic success and making the industry go "underground" [Xue, Li, 2023; Zhang, 2021; Zhao, 2024]. This shift has introduced new dynamics into the tutoring market, creating a viable niche for institutions to survive in the shrinking market. Liu et al. [2024] argue that due to this trend most Chinese families, including those from lower social layers, hire college students or live-in nannies, to fulfill their academic expectations because they believe that despite being costly, this investment is essential.

The DRP has forced private tutoring institutions to pivot from academic-focused tutoring to non-academic areas, such as arts or

sports, and general skills development, particularly to cater to high-income families seeking better social and cultural capital for their children [Liu et al., 2024]. This shift represents a strategic adaptation, allowing institutions to circumvent restrictions on academic subjects while meeting the evolving market demands. For example, the leading institutions like New Oriental and TAL Education, previously centered on test preparation, have diversified into adult education and non-academic courses, capturing a new segment of consumers interested in broader developmental opportunities. This transition is not only a survival strategy for these institutions, but it also reflects the emerging trend where high-income families substitute academic support with diverse extracurricular activities [Zhong, Park, 2023; Liu et al., 2024].

The DRP has directly impacted tutors by reducing work hours, income stability, and overall employment opportunities within the sector [Yang et al., 2024]. In response, some tutors have shifted to industries outside education, while others have turned to informal or private tutoring arrangements to maintain income despite policy restrictions. Additionally, some tutors choose the "underground" methods to continue offering academic support, often organizing small, private sessions, or rebranding their services to evade policy scrutiny. Yang et al. [2024] highlights regional disparities in policy implementation: developed regions, such as Beijing and Guangdong, have enacted comprehensive support measures, including reemployment assistance and retraining opportunities for displaced tutors. In contrast, inland regions offer comparatively limited support, compounding the financial and employment challenges faced by tutors. These disparities highlight the need for regionally tailored support systems, as tutors in less supported areas face greater barriers to adapting their careers within the DRP framework.

The analysis of the DRP confirmed that it has effectively reshaped the private tutoring landscape in China, enforcing regulatory constraints that have reoriented the sector towards non-academic development and personalized tutoring formats. The persistence of high parental expectations and resilience of parental demand for academic support reflect the strength of academic-oriented cultural values in China. This indicates that strict formal regulation may inadvertently push tutoring institutions and tutors toward informal, less-regulated operations. The growth of informal tutoring highlights the ongoing challenge policymakers face in balancing regulatory controls with the persistent cultural and societal pressures for supplemental academic services [Yang et al., 2024].

4. Discussion The analysis of the promises and the short-term outcomes of the DRP on internal and external stakeholders of this policy suggests that while the DRP strives to foster a more equitable, mentally healthy, and less

financially burdensome educational environment, its implementation poses challenges, which undermines success of short-term outcomes of the DRP for most of its stakeholders. When considering primary external stakeholders, namely students, it is important to acknowledge that while the DRP has had a positive impact on children by reducing academic stress and improving mental health, its benefits are influenced by the following factors: family socioeconomic status, resource availability, and students' ability to manage their time effectively [Jiang, Wang, 2021; Zhao, 2024; Zhong, Park, 2023]. While the policy offers children a more balanced lifestyle by reducing amount of homework, the management of increased free time requires structured guidance so that potential risks could be mitigated. As many researchers stated, the success of DPR in supporting holistic child development will depend on addressing these disparities and fostering responsible use of leisure time [Zhong, Park, 2023; Wang et al., 2024; Xue, Shi, 2022; Yan, 2022; Jiang, Wang, 2021].

With regards to the second main category of external stakeholders, parents, the analysis shows that although financial pressures have eased for some families, deeply ingrained cultural emphasis on academic achievement remains influential in parental decision-making; therefore, the value of the DRP is questioned. The prevailing belief of Chinese families is that success in high-stakes examinations equates to victory in life, and this causes parents to invest more in their children's education. Nevertheless, the prohibition of cram schools has hindered access to additional education for children from ordinary families, while affluent parents continue to involve private tutors in their children's instruction [Xue, Li, 2023]. This finding suggests that the short-term impact of the DRP is favorable for non-wealthy families. However, it remains uncertain what the long-term implications of the DRP will be for these families when their children have to compete for opportunities in higher education alongside those from affluent families.

The short-term effects for the largest category of internal stakeholders — teachers and schools — have turned to be quite opposite compared to the promises of the DRP. Teachers had to take all responsibility for students' mental health, parental expenses and worries and make sure that they are cultivating a well-rounded learning environment that aligns with the broader goals of the DRP. Apparently, the reduction in students' workload has led to a significant increase in teachers' workload as they have to manage both academic and extracurricular tasks, with their working days continuously lengthening. Therefore, support and additional resources should be provided for teachers, accommodating the needs and well-being of those charged with the implementation of the policy [Xue, Li, 2023; Zhong, Park, 2023; Liu, 2022; Xie, Qian, 2024; Wang, Fan, 2023].

After implementation of the DRP, socioeconomic disparities in educational access and quality have intensified and become ob-

vious for the local authorities. The DRP has amplified the visibility of pre-existing inequalities, particularly between urban and rural areas, highlighting the need for ongoing support and region-specific strategies to achieve the intended outcomes [Zhong, Park, 2023; Xue, Li, 2023; Yuan, 2022].

With regards to private tutoring institutions, they suffered the most in the initial phase of the DRP. However, in the later stages, they managed to adjust themselves to the requirements of the policy and reoriented the sector towards non-academic development and personalized tutoring formats. The main reason is the value system of Chinese families, with high parental expectations and resilience of parental demand for academic excellence of their children, and this will not let private tutoring institutions disappear in the near future.

The shortcomings of the DRP are partially explained by Chinese cultural values rooted in Confucian traditions, which place high value on education as a means for social mobility [Chen et al., 2021]. Chinese cultural heritage contributes to the phenomenon of "educational involution," wherein intense academic pressures persist without corresponding educational advancement and students' are involved in constant academic race to get an opportunity to advance their socioeconomic status. Despite positive intensions of the DRP, Chinese parents keep experiencing considerable anxiety, particularly concerning their children's learning attitudes and prospects of university or college admission, which further intensifies educational involution [Yu et al., 2022]. This anxiety illustrates the conflict between the policy goals and parents' aspiration to maintain competitive advantages, compelling some of them to seek additional educational resources despite the constraints the DPR imposes on "shadow education" [Ibid.]. Such actions involuntarily sustain the cycle of educational intensification, undermining the policymakers' objective to alleviate undue academic pressure.

To eliminate these shortcomings, as the stakeholder theory proposes [Donaldson, Preston, 1995; Reynolds, Schultz, Hekman, 2006], it is important to balance the interests of all stakeholders: students, parents, teachers, tutoring institutions, and local authorities. They all should work together on achieving the mutual goal and learn to trust each other. Analyzing the similar case in South Korea, we can see that there, the DRP was not successful either as it could not solve the fundamental social problems of the country, nor did it consider the needs of society; however, it blindly suppressed training institutions [Lee, Lee, Jang, 2010].

To effectively balance the interests of all stakeholders and ensure the success of DRP, a multifaceted approach is essential. For students, the policy aims to reduce academic burdens and promote holistic development by limiting homework and regulating off-campus tutoring [Xue, Li, 2023]. This requires schools to enhance the quality of

in-class teaching and provide diverse after-school services that would cater to students' individual needs [Ibid.]. For parents, it is crucial to address their educational anxiety by engaging in transparent communication about goals and outcomes of the policy, as well as by providing resources to support their children's learning at home [Yu et al., 2022]. As teachers play a pivotal role in implementing the DRP, their workload should be managed, and professional development opportunities should be offered to improve instructional quality and reduce reliance on off-campus tutoring [Liu, 2022]. Besides, tutoring institutions should adapt to the new regulatory environment by shifting their focus from academic tutoring to non-academic, interest-based programs, in accordance with the objectives of the policy [Liu et al., 2024]. In addition, local authorities should ensure equitable distribution of educational resources across urban and rural areas and provide support for teachers and schools to improve the quality of education [Xue, Li, 2023]. By addressing the concerns and needs of each stakeholder group, the DRP can achieve its goal of creating a more equitable and sustainable educational system.

5. Conclusion

In conclusion, the short-term outcomes of the DRP reveal a complex interplay of burdens and challenges for internal and external stakeholders, impacting students, parents, teachers, local authorities, and private tutoring institutions. The policy has caused beneficial changes in student well-being and relief of financial pressures for non-wealthy families and shown the ability of private tutoring institutions to adapt to new requirements. On the other hand, it has also intensified socioeconomic disparities and increased teacher workload, necessitating adjustments to balance interests of multiple stakeholders. Additionally, the deeply ingrained cultural emphasis on academic achievement among parents has raised questions about the value of the policy and its long-term implications for educational access and quality, emphasizing the need for ongoing support and region-specific strategies.

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Measuring Teacher Resilience in the Global South

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Abstract
This study explores how a social connectedness intervention can inform knowledge on teacher resilience within the Global South, using the case of South African primary school teachers working in under-resourced settings. The primary objective of our research was to examine how an arts-based social connectedness intervention can inform knowledge on teacher resilience, particularly in contexts characterised by systemic inequality and adversity. The intervention, known as the *Isithebe* intervention, is grounded in the Relationship-Resourced Resilience (RRR) theory, which posits that resilience is enabled through interpersonal relationships and communal support. A quantitative approach was employed, using two structured questionnaires administered at two distinct time points: pre-intervention and post-intervention. Quantitative measurement included culturally adapted versions of the ENTRÉE teacher resilience and REPSSI social connectedness subscales, selected to capture shifts in key domains of teacher resilience and social connectedness while respecting local linguistic and literacy contexts. Results demonstrated significant improvements in both *teacher resilience* and *social connectedness*, particularly in trust and emotional regulation, suggesting that context-sensitive, culturally grounded interventions can effectively support teacher well-being. Rather than focusing on scale validation, the study contributes to the emerging body of research on relational resilience strategies in low- and middle-income countries and illustrates the utility of arts-based, community-centred interventions in strengthening teacher support systems.

The socio-economic landscape of South Africa presents complex and enduring challenges that directly impact teachers' motivation, well-being, and resilience. Although South Africa is classified as an upper-middle-income country, it remains one of the most unequal societies in the world, with a high Gini index and entrenched disparities that reflect structural inequality[1] [World Bank, 2018]. Education is a critical vehicle for addressing these inequities by equipping learners with the skills necessary to poverty. However, the education system remains under-resourced, shaped by the enduring legacy of apartheid and widespread socio-economic hardship [Francis, Webster, 2019]. Teachers in public schools, particularly in impoverished, peri-urban communities, contend with multiple systemic challenges, including overcrowded classrooms, poor infrastructure, disciplinary difficulties, extended workloads, and low learner achievement [Ebersöhn, Loots, 2017; OECD, 2019].

These circumstances necessitate contextually grounded interventions that are responsive to the lived realities of teachers in the Global South. Much of the research on *teacher resilience* has been generated in high-income contexts, such as Australia, Canada, Europe, and the United States [Beltman, Mansfield, Price, 2011; Gu, Day, 2013; Wosnitza et al., 2018]. Early studies in these regions focused on individual coping mechanisms to manage occupational stress, yet contemporary research increasingly conceptualises resilience as a dynamic, relational, and systemic process [Day, Gu, 2013; Ungar, 2012]. This evolving view is particularly salient in resource-constrained environments, where external support structures, such as collegial networks, effective leadership, and community engagement, play a vital role in enabling teachers to adapt positively [Coetzee, 2013; Mansfield, Beltman, Price, 2018; Ebersöhn, 2012; 2013; 2015; 2019].

Consequently, this study aims not simply to adapt measurement tools, but to respond to a broader research question: How can a social connectedness intervention with teachers in peri-urban primary schools in a challenged educational context inform knowledge on teacher resilience? In addressing this question, the study contributes to the body of knowledge on how social support mechanisms, particularly those rooted in local cultural values, can foster resilience among educators in the Global South. While adapted measurement tools were used to track changes, they served primarily as instruments to explore and capture contextually situated insights, not as standalone contributions to psychometric scale development.

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[1] OECD: Income inequality: https://data.oecd.org/inequality/income-inequality.htm (accessed 07.09.2025).

The *Isithebe* social connectedness intervention

This study introduces the *Isithebe* social connectedness intervention as a culturally grounded response to the relational dimensions of teacher resilience, in alignment with the Relationship-Resourced Resilience (RRR) theory [Ebersöhn, 2013; 2019; 2021]. Rooted in Afrocentric epistemologies and the African philosophy of Ubuntu, which prioritise communal support and collective well-being [Koopman, Koopman, 2023], the intervention centres on strengthening interpersonal relationships among teachers. Informed by systemic models of resilience [Ungar, 2012], the intervention supports the idea that resilience is enabled not only by individual traits but also by social ecologies, including peer support and shared problem-solving [Ebersöhn, Loots, 2017].

Rather than aiming to validate new instruments, the primary goal of the study was to explore how a low-cost, culturally embedded intervention could enhance social connectedness, thereby advancing understanding of teacher resilience in a high-adversity context. The measurement tools common for this type of exploration — the *teacher resilience* questionnaire and the REPSSI *social connectedness* questionnaire — were adapted for cultural relevance. The *teacher resilience* questionnaire focuses on motivation, emotional regulation, and contextual competence, while the *social connectedness* questionnaire draws on OPHI's framework to assess internal indicators of belonging, trust, and relatedness [Bandeira, Mazibuko, 2017; Zavaleta, Samuel, Mills, 2014]. These tools were used not as the focal point of the study, but as means of generating empirical insight into how relational interventions impact resilience in the Global South.

The *Isithebe* intervention is symbolically named after the *isiZulu* word for a woven mat used in communal gatherings, reinforcing its focus on connection, mutual support, and community building. It is structured around a practical manual guiding monthly teacher gatherings, incorporating arts-based reflective activities designed to facilitate trust, empathy, and shared experience. A preparatory six-hour training session was conducted to introduce participants to the intervention toolkit and create a baseline of relational rapport [Ebersöhn et al., 2020]. These sessions established a safe and collaborative space for teachers to reflect on their lived experiences and co-create strategies for managing adversity.

By grounding the intervention in local culture and relational theory and using culturally relevant measurement tools to capture change, the study offers a novel contribution to resilience research in the Global South. The intervention serves as a prototype for future scalable approaches aimed at building supportive educational ecosystems in resource-constrained settings.

Sampling

The study employed purposive sampling to select six public primary schools in the Nelson Mandela Metropole, chosen based on their so-

cio-economic challenges, and convenience sampling to recruit participating teachers from these schools. The schools were selected to reflect resource constraints typical of the Global South, characterised by high learner-to-teacher ratios and limited access to basic services. The teachers were recruited based on availability and willingness to participate, with selection criteria focusing on their ability to commit to the intervention. This approach ensured the inclusion of teachers who could engage meaningfully in the intervention, aligning with our research objectives[2].

Teacher participation and demographics

Thirty-six teachers participated in the initial pre-intervention data collection, with varying attendance throughout the intervention phases. A total of 22 teachers completed both pre- and post-intervention questionnaires, providing a robust sample for analysis. The average participant age was 49.46, mirroring national and international trends of an ageing teaching workforce [Versfeld, 2022]. The educational qualifications in the sample were consistent with national patterns, with most teachers holding a Diploma in Education and the rest having a Bachelor of Education degree.

Fig. 1. **Teacher attendance: Intervention implementation**
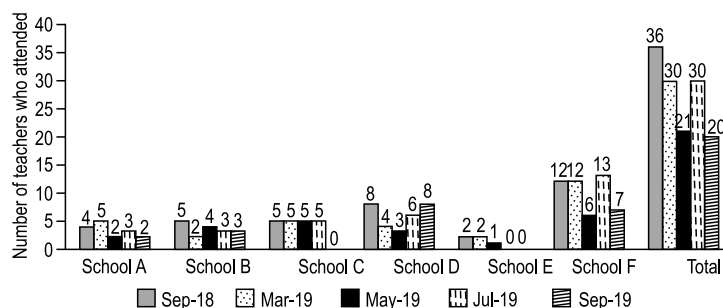
Out of the 36 teachers at the pre-intervention data collection, 30 participated in the intervention training, 21 did in the first teacher-researcher meeting, and 30 in the second. For the post-intervention, "20 teachers attended, of which 15 had been present at the pre-intervention. Seven teachers sent post-test questionnaires via email, constituting 22 completed pre- and post-test questionnaires.

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[2] The studies involving humans were approved by the Faculty Committee for Research and Ethics at UP. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individuals for the publication of any potentially identifiable images or data included in this article.

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Two teachers who were present at the pre-intervention data collection did not participate in the intervention, and five teachers who participated in the intervention were not present at the pre-intervention" [Versfeld, 2022. P. 100]. Figure 1 provides an overview of teacher attendance throughout the intervention.

Methodology

A quantitative approach was employed, using two structured questionnaires administered at two distinct time points: pre-intervention and post-intervention. Each questionnaire was designed to measure two key constructs, namely *teacher resilience* and *social connectedness*, using standardised scales to capture changes over time. This approach enabled a clear comparison of data collected before and after the intervention to assess its impact on these constructs.

The *teacher resilience* questionnaire included items drawn from several established scales, such as the FIT-Choice scale [Watt, Richardson, 2007], the ENTRÉE project [Peixoto et al., 2018], the BriTE (Building Resilience in Teacher Education) project [Mansfield, Beltman, Price, 2018], the FIRE (First-year Initial Teacher Education Resilience) project at the University of Pretoria [Coetzee, 2013], and an asset-based framework developed by Morgan [2011]. The second instrument used to assess *social connectedness* incorporated items from the Oxford Poverty and Human Development Initiative (OPHI) [Zavaleta, Samuel, Mills, 2017] and the REPSSI (Regional Psychosocial Support Initiative) scales [REPSSI, 2016]. While several scales defined the overall instrument design, the study focused specifically on the ENTRÉE and REPSSI scales due to their relevance to the intervention objectives and their established reliability in measuring *teacher resilience* and *social connectedness* within the context of the study.

Although a mixed-methods approach was used to produce the overall research design, this article focuses exclusively on the quantitative dimension, specifically to explore how existing measurement instruments can be adapted and applied in culturally and contextually diverse Global South settings. The aim was not to present the qualitative findings but rather to investigate how quantitative measurement tools, such as the ENTRÉE *teacher resilience* and REPSSI *social connectedness* subscales, can be sensitively adjusted and implemented in under-resourced educational environments.

The ENTRÉE teacher resilience questionnaire

The ENTRÉE instrument comprises eight scales that measure various domains of *teacher resilience* (TR). In this study, the *teacher resilience* questionnaire included items from seven of these scales: teacher professionalism (TR-Prof), teacher emotion (TR-Emot), teacher motivation (TR-Mot), sense of coherence (TR-Soc), self-efficacy (Resilience), teacher efficacy (TeachEff), and contextual factors [Ebersöhn

et al., 2020]. The participants completed this questionnaire both pre- and post-intervention to capture changes in these domains over the course of the intervention. The responses were recorded using the 7-point Likert scale: (i) Level of agreement, ranging from "Do not agree at all" (1) to "Strongly agree" (7), and (ii) Confidence levels, from "Absolutely Not Confident" (1) to "Strongly Confident" (7).

Each domain in the ENTRÉE instrument measures a specific aspect of resilience. For instance, TR-Prof assesses teachers' professional goals, commitment, organisational skills, and teaching competencies. TR-Emot focuses on elements crucial for resilience, such as enjoyment, humour, and emotional regulation [Ibid.]. TR-Mot includes aspects like optimism and intrinsic motivation [Peixoto et al., 2018], while TR-Soc refers to coping mechanisms for navigating challenges [Ibid.]. Self-efficacy relates to the capacity to recover from adversity, while TeachEff addresses confidence in classroom behaviour and effectiveness [Ibid.]. The contextual factors section evaluates the external and internal protective resources teachers utilise to adapt and overcome job challenges, including heavy workload, staffing issues, and disciplinary problems [Ebersöhn et al., 2020; Coetzee, 2013].

The REPSSI social connectedness questionnaire

The REPSSI *social connectedness* questionnaire, guided by OPHI's operational definition of social connectedness, was used to assess both external and internal dimensions of *social connectedness* and social isolation [Bandeira, Mazibuko, 2017]. The participants completed the questionnaire pre- and post-intervention to measure changes in their levels of *social connectedness*. This instrument draws on OPHI's framework, which highlights the significance of healthy relationships, respect, and freedom from humiliation, particularly in resource-limited environments. The questionnaire includes items based on research into social capital, social cohesion, and social exclusion, alongside psychological theories of loneliness [Zavaleta et al., 2014]. For this study, the external indicators measured aspects such as the frequency of social interactions, support from social networks, reciprocity, and volunteerism. The internal indicators assessed contentment with social relationships, the need for relatedness, feelings of belonging, loneliness, and trust. Specific items were selected and adapted to measure internal *social connectedness*, categorised into sub-dimensions such as "Building Relationships", "Need for Relatedness", "Belonging vs Loneliness/Isolation", and "Trust".

While the conceptual foundation of the REPSSI *social connectedness* questionnaire is appropriate for use in Global South contexts [Versfeld, 2022], its technical psychometric properties are still under development, as the instrument lacks a published technical manual and does not yet provide formal reliability or validity coefficients. However, for the purposes of this exploratory study, internal consistency of the

adapted internal *social connectedness* subscales was tested and found to be acceptable, with Cronbach's alpha values ranging from 0.683 to 0.710. This level of reliability aligns with thresholds considered acceptable for exploratory social science research [Daud et al., 2018], and justifies using the tool within this specific intervention context.

The quantitative analysis focused on the 22 teachers who completed the ENTRÉE *teacher resilience* scale at both pre- and post-intervention time points, allowing for matched comparisons of change over time. 14 responses were excluded from the analysis due to missing post-intervention data, thereby ensuring consistency and accuracy in the statistical comparisons. As is common in school-based intervention research, participant retention was affected by systemic and logistical constraints [Zimmerman, 2018]. Although 36 teachers completed baseline measures, only 22 submitted post-intervention assessments, with attrition likely due to professional demands, transport difficulties, or scheduling conflicts—barriers frequently reported in similar studies [Ebersöhn, 2019].

To assess the reliability of both instruments, Cronbach's alpha was used, and values above 0.6 were considered acceptable [Daud et al., 2018]. Construct validity was evaluated through Spearman correlation coefficients. Convergent validity was supported where items within the same subscale showed stronger inter-item correlations, while discriminant validity was indicated by weaker correlations between items across different subscales. Although detailed correlation matrices are not shown due to space constraints, the observed pattern supported construct validity for both the ENTRÉE and REPSSI instruments, with Cronbach's alpha ranging from 0.636 to 0.893 (ENTRÉE) and from 0.683 to 0.710 (REPSSI).

Table 1 Provides a description and example items for both quantitative measures used in the current study.

Table 1. **Description and example items for the quantitative instruments**

Subscale	Description	Example item
Adapted ENTRÉE measure		
TR-Prof	Comprises organisational and teaching abilities, professional objectives and dedication	"I am well organised in my school work"
TR-Emot	Encompasses key elements essential for resilience, such as emotional regulation, humour and enjoyment	"After reflection, I can usually find the funny side of challenging school situations"
TR-Mot	Merges optimism and intrinsic motivation	"It's important to me that I put in effort to do my job well"
TR-Soc	Describes the coping strategies teachers utilise to understand and navigate challenging circumstances	"In my work, I can look at a situation in a number of ways to find a solution"

Subscale	Description	Example item
TeachEff	Evaluates the beliefs of educators regarding their behaviour and capabilities in the field of education	"My objective is to help children focus on learning tasks and avoid distractions"
Resilience	Describes teachers' capacity to bounce back when confronted with difficulties and a set of skills that are employed to manage adversity	"Not getting disheartened is essential for me even when children's circumstances make it difficult"
Contextual factors	Assesses the factors that maintain teachers in their profession, including the ability to instill hope in learners, demonstrate empathy, maintain a positive attitude, and take inspiration from their spirituality	"I want to be a teacher who instils hope in learners even in the face of many obstacles"
Adapted REPSSI SC measure		
Building relationships	Evaluates the perceived ability to form and maintain connections with others	"I am skilled in building relationships for the community"
Social support	Relatedness with a variety of members of one's community	"I get along well with people I come into contact with"
Social isolation	Questions regarding loneliness as opposed to a sense of belonging	"I feel that no one really knows me"
Trust	Measures the extent to which others in the community are perceived to be trustworthy	"Are there people in your community worth trusting"

Quantitative results

Figure 2 presents the mean scale scores for *teacher resilience* pre- and post-intervention and indicates initial high pre-intervention *teacher resilience* levels for in-service teachers from the six primary schools challenged by severe deprivation[3]. Thus, the pre-intervention scores for *teacher resilience* of the teachers in the sample were high across all seven scales.

Fig. 2. **Teacher resilience pre- and post-intervention: mean scale score comparison**

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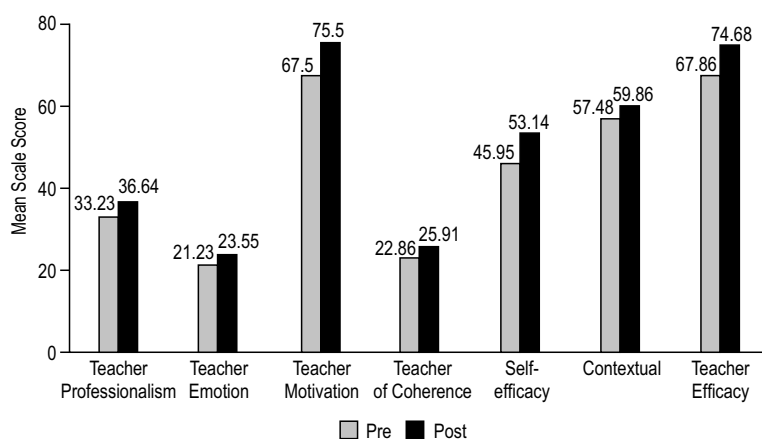
[3] The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

The pre- and post-intervention *teacher resilience* responses were compared using the Wilcoxon Signed-Rank Test (WSR) test for the 22 participants who completed the questionnaire at both time points (see Table 2).

Table 2. **Results of WSR tests for teacher resilience**

n = 22	Mean (SD)		WSR test	
Scale	Pre	Post	Test statistic	*p*-Value
Teacher professionalism	33.23 (3.518)	36.65 (3.619)	−3.510	.001*
Teacher emotion	21.23 (2.581)	23.55 (3.622)	−2.136	.033*
Teacher motivation	67.50 (6.906)	75.50 (6.731)	−3.281	.001*
Teacher sense of cohesion	22.86 (2.678)	25.91 (1.659)	−3.699	.001*
Self-efficacy	55.95 (5.925)	53.15 (7.778)	−3.056	.002*
Contextual	57.58 (10.352)	59.86 (6.552)	−1.165	.255
Teacher efficacy	67.86 (7.530)	75.68 (12.255)	−2.777	.005*

* Statistically significant ($p < 0.05$).

From Table 2, the *p*-values of the WSR test for all scales except for the contextual one are less than 0.05, indicating a significant difference between the pre- and post-test scores for these scales. To investigate which score (the pre- or post-test) was higher, the means are considered, and for all scales with a significant difference, the scores of the post-test score are higher, except for the self-efficacy scale, where it is lower.

Figure 3, presenting the composite scale scores for social connectedness pre- and post-intervention scores, indicated initial high pre-intervention *social connectedness* levels for in-service teachers from the six primary schools challenged by severe deprivation. Thus, the pre-intervention scores for *social connectedness* of the teachers in the sample were high across all four scales: building relationships, social support, social isolation, and trust.

The pre- and post-intervention *social connectedness* responses were compared using the WSR test for the 22 participants who completed the questionnaire at both time points (see Table 3).

Table 3 shows significant differences between the SC pre- and the post-test for the overall score as well as the Trust scale, where both scores are significantly higher for post-intervention. The significant differences between the social connectedness pre- and the post-test for the overall score and total Scale 4 (Trust) are apparent in figure 3, showing the mean scores. This confirms the findings from the WSR test that for total Scales 1, 2 and 3, there are no significant diffe-

Fig. 3. **Social connectedness pre- and post-intervention: mean scale scores comparison**
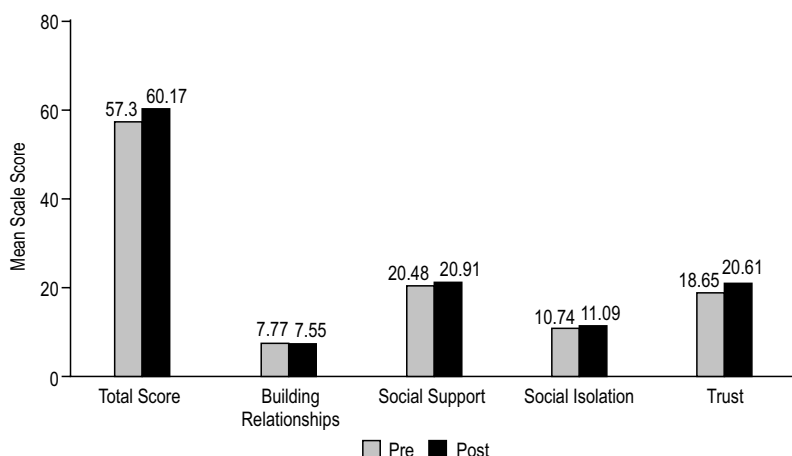
rences in pre- and post-test SC results. The pre- and post-test mean scores are the total scores of the items they comprise for the *social connectedness* measure. Figure 3 displays the mean scores of pre- and post-test *social connectedness* scale scores.

Table 3. **Results of WSR tests for social connectedness**

	Mean (SD)		WSR test	
n = 22	Pre	Post	Test statistic	*p*-Value
Total score	57.30 (3.350)	60.17 (3.243)	−3.377	.001*
Building Relationships	7.77 (0.528)	7.55 (1.405)	−0.425	.671
Need for Relatedness	20.48 (1.275)	20.91 (1.443)	−1.092	.275
Belonging vs Loneliness (social isolation)	10.74 (1.096)	11.09 (1.125)	−1.248	.212
Trust	18.65 (1.748)	20.61 (1.971)	−3.137	.002*

* Statistically significant ($p < 0.05$)

Discussion: Measuring teacher resilience and social connectedness in Africa

The current study significantly advances the understanding of quantitative measurement within the African context, focusing particularly on *teacher resilience*. The integration of the *Isithebe* intervention, which is rooted in Afrocentric principles, effectively addresses the socio-cultural, economic, and infrastructural challenges that are prevalent in the Global South [De Gouveia, Ebersöhn, 2019]. Such challenges have historically constrained the applicability and efficacy of conventional research tools (often designed in the Global North) in capturing the nuanced realities of African settings [Ebersöhn,

2019; Theron, 2016]. This highlights a critical need for culturally sensitive methodologies that incorporate local knowledge systems and community practices, ensuring that data collection methods resonate with participants' lived experiences and contextual realities [Gu, Day, 2013; Mansfield, Beltman, Price, 2018; Ungar, 2012].

One of the most pressing issues when conducting research in the Global South is making sure that measurement tools are both culturally sensitive and contextually relevant. Standardised instruments, typically developed within Western contexts, may fail to resonate with African participants due to substantial differences in cultural norms, languages, and socio-economic conditions [De Gouveia, Ebersöhn, 2019]. This inconsistency can lead to misinterpretations, potentially resulting in inaccurate data and undermining the validity of research findings. In Africa, the diversity of languages and dialects, alongside varying literacy levels, makes the translation and adaptation of survey instruments essential for accurate data collection [Cohen, Manion, Morrison, 2018; Salimi, Bozorgpour, 2012]. Additionally, socio-economic realities, such as limited access to technology and infrastructure, further complicate the implementation of conventional research methodologies, necessitating innovative, contextually appropriate solutions [Francis, Webster, 2019].

The current study effectively overcame these challenges by adopting a culturally sensitive and contextually relevant approach to measuring TR. The *Isithebe* intervention illustrates how integrating local cultural practices and values, such as the Ubuntu philosophy, can enhance the relevance and effectiveness of research tools. By adapting the ENTRÉE and REPSSI subscales to reflect local literacy levels and incorporating Afrocentric concepts of community and interconnectedness, the study ensured that the instruments were both accessible and meaningful to the participants [Ebersöhn et al., 2020; Bandeira, Mazibuko, 2017]. This approach underscores the importance of collaboration with local researchers and stakeholders, which is crucial for developing culturally appropriate terminologies and concepts, thereby fostering a sense of ownership and trust among participants [Theron, 2016; Ebersöhn, 2019].

The inclusion of local educators in the design and implementation phases of the *Isithebe* intervention was a critical factor in its success as it built rapport and trust essential for meaningful data collection and effective intervention outcomes [Gu, Day, 2013]. This aligns with broader insights that emphasise the value of participatory research methods, which not only enhance the accuracy and relevance of the findings but also empower local communities by involving them directly in the research process [Busza, 2004; Plano Clark, Ivankova, 2016].

Due to the small of the study sample, methodological flexibility was essential, leading to the adoption of non-parametric statistical methods, such as the WSR test. These methods are particularly appro-

priate for handling the non-normal distribution of data typically present in small, heterogeneous samples, as is often the case in African educational contexts [Gravetter, Forzano, 2018]. By employing statistical techniques that accommodate the inherent variability and unique characteristics of the data, the study avoids the risks associated with assuming a normal distribution, which may not be applicable in diverse and complex settings, such as those found in South African schools. This methodological adaptability is crucial for guaranteeing the accuracy and reliability of research findings in the Global South [Ebersöhn et al., 2020].

Findings from the current study underscore the need for ongoing innovation in the development and application of quantitative research methods in Africa. Future research should continue to refine measurement tools to reflect the continent's diverse cultural, linguistic, and socio-economic contexts. Culturally sensitive and contextually relevant methodologies not only generate more accurate and meaningful data but also inform policy and practice, ultimately supporting educators and improving educational outcomes in Africa [Theron, 2016; Mansfield, Beltman, Price, 2018].

Moreover, this study highlights the potential of low-cost, scalable interventions that utilise existing social and cultural resources to foster resilience. In resource-constrained settings, leveraging local cultural values and community networks can be a powerful strategy for supporting educators and, by extension, the entire educational system [Mlachila, Moeletsi, 2019]. The success of the *Isithebe* intervention demonstrates that meaningful teacher support and development can be achieved without the need for extensive external resources, which are often limited in the Global South.

By adapting existing tools and incorporating local cultural practices, this research has successfully navigated many of the challenges associated with quantitative research in Africa. The study provides a robust model for future research, illustrating that when local cultural and contextual realities are integrated into research design, it is possible to gather meaningful, actionable data that can shapepolicy and practice to support TR and enhance educational quality in challenging environments [Ebersöhn et al., 2020; De Gouveia, Ebersöhn, 2019; Theron, 2016]. This research not only contributes to the academic understanding of teacher resilience but also offers practical insights into designing educational interventions that meet the specific needs of teachers in the Global South, thereby supporting sustainable development and improving educational outcomes

Limitations   The limitations of this study include several methodological and contextual issues, such as the reliability concerns associated with the REPSSI *social connectedness* questionnaire, a small sample size,

the absence of a control group, demographic constraints, the potential for overly optimistic reporting, and possible language comprehension challenges.

Although both questionnaires used in the current research showed acceptable reliability ($\alpha > 0.6$), the REPSSI questionnaire presented some challenges concerning reliability. Notably, Scale 6 of the REPSSI questionnaire contained only a single item, which precluded meaningful statistical analysis. Furthermore, numerous responses to the external *social connectedness* items in the REPSSI questionnaire were invalid, as participants provided qualitative descriptions (e.g., "More than one" or "More than I can count") rather than numerical values. These inconsistencies prevented statistical analysis of these questions, thus excluding a discussion on external *social connectedness* domains from the study [Bandeira, Mazibuko, 2017].

The REPSSI questionnaire lacks a published technical manual, nor does it include documented reliability or validity coefficients. However, it was piloted in 2017 as part of a SC study involving care workers in challenging environments in Swaziland, establishing a foundational framework for future research [Ibid.]. Since the above study and ours were conducted in similarly resource-constrained settings, there is a degree of transferability between the two, offering opportunities for comparative analysis to assess the reliability and validity of the SC scale. Nonetheless, the lack of established reliability and validity for the REPSSI questionnaire requires careful interpretation of the findings to ensure the rigour of the research is upheld.

The sample size ($n = 22$) is also a significant limitation, as it is inadequate for robust internal validity analysis; meaningful factor analysis typically requires a sample of at least 100 participants [Gravetter, Forzano, 2018]. Additionally, logistical challenges and personal or professional responsibilities resulted in fluctuating attendance at various stages of data collection. While 36 teachers participated in the pre-intervention phase, attendance varied significantly during subsequent phases, with only 22 teachers completing both pre- and post-intervention questionnaires. This variation in attendance could be attributed to such factors as personal commitments, the demanding nature of teachers' professional responsibilities, logistical difficulties in reaching *Isithebe* meetings, and health-related absences [Zimmerman, 2018].

The lack of a control group further limits the findings. While intervention design principles initially proposed that at least one school opt out of the intervention phase to serve as a control group, all schools participated in the intervention, resulting in a lack of comparison group. This absence restricts the ability to draw causal inferences regarding the impact of the intervention, limiting both in-case analysis and the generalisability of the findings [Gravetter, Forzano, 2018]. Consequently, the external validity of the study is constrained. This point, combined with the fact that non-probability purposive and

convenience sampling were used, limits the generalisability of the results to public, peri-urban primary school teachers from Quintile 3 schools in resource-constrained urban areas of the Nelson Mandela Municipality, EC, South Africa. The demographic profile, predominantly female and over the age of 40, further limits the applicability of findings to other contexts and populations.

While the generalisability of the study is restricted, the transferability of its insights is valuable for understanding, measuring, and describing the impact of social connectedness on teacher resilience in primary schools within highly specific challenging contexts. The results can be compared to similar settings, such as peri-urban primary schools in resource-constrained environments, but are not applicable to male teachers, high school or pre-primary teachers, or those working in well-resourced schools or different cultural and ethnic backgrounds.

The high baseline scores for *teacher resilience* and *social connectedness* observed in both pre- and post-intervention assessments may be indicative of culturally salient epistemologies aligned with interdependent worldviews, such as those rooted in Afrocentric Indigenous Knowledge Systems. However, these high scores may also be influenced by the Dunning-Kruger effect, a cognitive bias where individuals with limited ability overestimate their competence [Dunning, 2011]. Previous studies have highlighted challenges in working with teacher questionnaire data, citing evidence of overly optimistic reporting and statistically implausible responses [Zimmerman, 2018]. Such responses could reflect misunderstandings of questionnaire items or a tendency towards social desirability, where teachers aim to present themselves positively.

Recommendations

This study highlights the essential role that social connectedness and supportive relationships play in enhancing teacher resilience across various domains. Contemporary research on resilience underscores the dynamic relationship between individual traits and external ecological factors that contribute to resilience-building. While personal characteristics, such as motivation and emotional regulation, are crucial, they are significantly strengthened by interpersonal protective resources within broader ecological contexts. Interventions like *Isithebe* offer a vital opportunity to bring attention to and enhance these interpersonal protective resources, especially in high-risk, resource-constrained environments. Social connectedness, in particular, emerged as a pivotal protective resource, enabling teachers to cope with the severe chronic challenges they face regarding their well-being and job performance in such deprived settings. Consequently, it is recommended that similar interventions be introduced in other challenging environments to bolster teacher well-being and resilience.

Moreover, fostering school communities that nurture trust, connection, and a sense of belonging among teachers and students is likely to improve teacher resilience. Creating an environment where teachers feel valued and supported can mitigate the negative impact of stressors, enhancing their ability to cope with adversity. Therefore, developing social cohesion within schools can be instrumental in reinforcing teachers' capacity to handle the demands of their profession effectively.

The limited sample size of 36 (pre-intervention) and 22 (post-intervention) is a constraint of the current study. Future research should aim to involve larger samples, so that more robust evidence of the benefits of social connectedness interventions in resource-challenged environments could be provided. Expanding the participant pool would improve the generalisability of the findings and offer a clearer understanding of intervention effectiveness. Additionally, as the current research predominantly included female participants, future studies should seek to include more male teachers to achieve a more comprehensive and balanced perspective on teacher resilience across genders.

Furthermore, it is recommended that future research involve schools from various socio-economic quintiles to explore the potential influence of socio-economic status on social connectedness and resilience among teachers. A comparative analysis of schools from different socio-economic backgrounds could provide valuable insights into how resource availability impacts teacher well-being and coping strategies. Replicating this study in diverse geographic locations, such as other provinces in South Africa or rural schools, would also be beneficial. This would help establish the external validity of the findings and deepen the understanding of how contextual factors, such as rural versus urban settings, affect outcomes.

In terms of the REPSSI questionnaire, there is a need for further refinement and validation. It is recommended that future studies conduct factor analyses using larger samples to better establish the construct validity of the questionnaire and guide its future revisions. This would increase potential accuracy of measurement when assessing social connectedness across different contexts. Additionally, the inclusion of questions on external social connectedness, which were excluded from this study due to inconsistent responses, should be revisited. Revising these questions and incorporating them into future research would offer a more comprehensive understanding of social connectedness as it pertains to teacher resilience.

By addressing these recommendations, future research could provide more nuanced insights into the impact of social connectedness interventions and help refine tools like the REPSSI questionnaire for broader application. This would ultimately contribute to the development of more effective interventions aimed at enhancing teacher

resilience in challenging environments [Bandeira, Mazibuko, 2017]. To improve the sustainability of the *Isithebe* intervention, teachers should be empowered to implement social connectedness initiatives independently, making them champions of these projects without the need for external researcher intervention. Establishing a routine of deliberate social connectedness activities among teachers, beyond formal school meetings, can enhance relationship-building and support structures. The *Isithebe* intervention should continue to integrate Indigenous Knowledge Systems, recognising the value of relationships and social connectedness for well-being, particularly in challenged environments.

Conclusion The current study highlights the importance of culturally sensitive and contextually relevant quantitative methodologies in understanding teacher resilience in the Global South. By implementing the *Isithebe* intervention, which leverages Afrocentric principles and arts-based activities, the research successfully enhanced teacher resilience and social connectedness among South African primary school educators. The significant improvements in resilience and trust underscore the potential of integrating local cultural practices into educational interventions to support teacher well-being. The findings demonstrate the effectiveness of non-parametric statistical methods, such as the WSR test, in handling the complexities of data from heterogeneous, small-sample educational settings.

The current study advocates for ongoing innovation in developing research tools that reflect the diverse cultural, linguistic, and socio-economic contexts found across the Global South. By addressing the socio-cultural and economic disparities inherent in such regions, future research can continue to build on these findings, ultimately contributing to improved educational outcomes and sustainable development.

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Special Teachers for Special Students: Training Educators for Gifted Students in Regular Classrooms in Brazil

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Abstract   The article addresses training educators for gifted/talented (G/T) children in regular classrooms in Brazil, which might be of interest to teachers of special education as well as researchers into most humanities and social sciences. Retrospective research proves the peculiarity of the region as an example of intense collaboration of special education and inclusion, implying the maximum inclusion of various groups of students, including gifted ones, into the comprehensive school system. We draw on international research in this area as well as papers by domestic scholars showing great interest in G/T issues in the recent decades. Brazilian researchers dwell on the definition of giftedness, policies, and educational programs for the development of giftedness as a reasonable basis for successful teacher training for the gifted. They also speculate on mental health of G/T students, emphasizing an exceptional importance of family and school environment for the genesis of a gifted individual. In terms of G/T teacher training, we analyze the general challenges and available best practices to present a range of opportunities for improving G/T educators training and improvement in Brazil and worldwide on the federal and local levels, where special attention is paid to the development of gifted child education within comprehensive schools.

Current trends in global school education in developed and developing countries place many demands on school leavers as those responsible for the future of our planet, advocating admission, inclusion, and equity in society. Consequently, schools face the need to nurture the potential of each and every child within the framework of a regular school system. The educational policy of the Federative Republic of Brazil is no exception in this regard, uniting all categories of students, including gifted children, 'under the wing' of a comprehensive school.

A retrospective analysis takes us back to 1971, when the government of the FRB adopted *The First Educational Policy (Primeira Política Educativa)* [Wjuniski, 2012] and voiced the concept of 'gifted children' and their special educational needs [Popova, 2018]. The policy was implemented within the framework of *The Sectoral Plan for Education and Culture (Culture Plano Setorial de Educação e Cultura*). In this document, an official definition of giftedness was first drafted [Wechsler, Fleith, 2017]. This plan gave rise to various programs for gifted children, implemented under the auspices of the Brazilian government and various non-governmental organizations. As a result, based on *The National Education Policy Act* (*Lei de Política Educacional Nacional,* 1994), the *Ministry of Education* of the country (*Ministério da Educação*) created *The National Policy on Special Education (Política Nacional de Educação Especial)*. In it, the term 'high ability' was declared to be synonymous with the term 'giftedness'[1] [Delou et al., 2014; Hashizume, 2020].

The definition of 'gifted / highly capable children' was gradually expanded to include all students who demonstrated high achievements and potential in any of the following areas: general intellectual abilities; special academic abilities; creative or productive thinking; leadership abilities; music; fine arts and performing arts; psychomotor abilities [Aksenova, 2007; Pomortseva, 2010; Tentes, Fleith, 2014; Rakhmatullina, 2019; Mori et al., 2021], in line with the definitions by American and European scholars of the previous century. Similar views are aired in current academic discussions, where the ideas of the maximum inclusion of various groups of students, including gifted ones, in the general education school system are becoming increasingly relevant [Aksenova, 2007; Alencar, Fleith, Arancibia, 2009; Seredina, Pomortseva, Morozova, 2016; Popova, 2018; Rakhmatullina, 2019; Yamin, McCluskey, 2021; Klyuchko, Lyablina, Gavrilova, 2023; Gali, 2023].

These ideas receive support at the state level and are considered a part of the strategy for preserving national legacy and cultural diversity. Over the past decades, there has been witnessed an increase in the representation of research in this area. Thus, identification and nomination for gifted programs, conditions for effective learning and mental

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[1] Núcleos de atividades de altas habilidades/superdotação [High Abilities / Gifted Children]. Brasilia: Secretaria de Educação Especial, 2024: http://portal.mec.gov.br (accessed 30.09.2025).

development of gifted students within the framework of a comprehensive school, training educators to work with gifted children in Europe, the USA, Australia, and Southeast Asia have attracted interest from Russian researchers, such as E.A. Aksenova, G.F. Gali, O.I. Klyuchko, E.V. Markelov, E.A. Omelchenko, A.V. Pereverzev, A.Yu. Seredina, A.A. Rakhmatullina, S.N. Tsvetkova et al. [Aksenova, 2007; Seredina, Pomortseva, Morozova, 2016; Popova, 2018; Rakhmatullina, 2019; Klyuchko, Lyablina, Gavrilova, 2023; Gali, 2023]. Research shows the undoubted interest of scholars in general issues of political, economic, and cultural development of this large region of South America and a member of the BRICS. However, the Russian society finds most recent information about Brazil rather revealing. However, the provisions for efficient G/T teacher training within the school education system have not been largely discussed hitherto, which indicates the relevance of the chosen research topic.

Background A careful insight into the issue over the past decades has shown a significant increase in the interest of Brazilian researchers in giftedness [Delou et al., 2014; Campos, França, Marquezini, 2012; Wechsler, Fleith, 2017; Martins, Pedro, Ogeda, 2016; Moreira, Moreira, Soares, 2018; Aversi-Ferrera, Dias-Vieira, 2021]. Presumably, popularization is happening thanks to a number of educational associations in the country: *the Brazilian Council on Giftedness (ConBraSD), the Brazilian Association of School and Educational Psychology (ABRAPEE), the University Center of Brazil — (UniCEUB) / Faculty of Education and Health (FACES)* and others, which aim to inform teachers and the general public about the problems and needs of special education[2].

Literature analysis suggests that Brazilian G/T educators may face a number of issues in terms of identifying and nurturing a unique potential within a regular school.

The first one is educational inclusion. In particular, S.N. Freitas and R.G. Camargo summarize a number of studies on the relationship between high ability/giftedness and learning difficulties [Freitas, Camargo, 2008]. They share the viewpoint of the recognized authority on giftedness, the American researcher J. Renzulli, that people with high ability/giftedness demonstrate high intellectual abilities and creativity and are greatly involved in the activities they perform [Renzulli, 2003]. These characteristics may or may not benefit the individual, so this article also discusses the learning difficulties caused by the lack of recognition of high ability/giftedness by teachers and classmates. The research was configured as a case study carried out on a student who attended a 5-year primary school, diagnosed as 'twice-excep-

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[2] Núcleos de atividades de altas habilidades/superdotação [High Abilities / Gifted Children]. Brasilia: Secretaria de Educação Especial, 2024: http://portal.mec.gov.br (accessed 30.09.2025).

tional' with high ability/giftedness and learning difficulties. Among the main findings is that the quality of interaction between the student and people in his class, an important factor for inclusion, was sufficient, which prompted significant development of the student's potential in this healthy environment. In addition, it points to the importance of regular inclusion training and collaboration sessions for teachers.

From the perspective of inclusive education, special education becomes part of the educational offer of regular schools, contributing to the response to the special educational needs of students with disabilities, general developmental disorders, and high abilities/giftedness. In these and other cases related to specific functional disorders, special education works in conjunction with regular education, providing guidance on how to respond to special educational needs of these students [Freitas, Camargo, 2008].

Within the broader context of the state-maintained educational institution, special education aims to respond to the particularities of these students in the educational process and provide support networks, continuous training, identification of resources, services, and the development of collaborative practices [Siqueira, Ramos, 2020].

Thus, the prospects of successful teaching gifted students with learning disabilities within a comprehensive school framework lie in integrating a more in-depth study of G/T topics, including the study of best practices that these peculiarities imply in terms of modification of teaching strategies. Special education specialists can work together with other school professionals to ensure complete implementation of these demands. Here we should speak about a special education teacher who acts as a guide to special educational needs of G/T students in class. However, this specialist can, by paying attention to the characteristics of students, also provide guidance in other areas that have a strong influence on their learning outcomes and mental health, such as the quality of interaction and participation, as stated in the above-mentioned policy [Hashizume, 2020].

In this way, special education programs in schools should promote learning by eliminating barriers that hinder participation, communication, and access to information for G/T students with special educational needs. By accumulating this knowledge, it is possible to organize discussions with G/T educators, sharing ideas on how to access their students and stimulate their interaction in the classroom.

In these discussions, teachers and special educators should encourage each other to think about how they can share and act together with their colleagues, extending these relationships beyond those related to learning and perhaps even making them socio-affective, determining the equal importance of these relationships for the development of a G/T student [Freitas, Camargo, 2008; Moreira, Moreira, Soares, 2018].

Another area of research interest is the influence of gender stereotypes on the development of gifted female researchers. Studies have

revealed a positive role of women's talent and professional success in relation to motherhood, which is quite expected in a masculine-dominant Brazilian society, but is a negative factor in the marital subsystem. This discovery points to emotional involvement and passion for work and career, but also to mental overload, that becomes its inevitable consequence. The tense conditions of carrying out scientific work in Brazil also act as constraints and sources of internal and social conflict in combining career and family life, associated with gender stereotypes both in the division of family and household responsibilities and in overcoming prejudices in the professional environment [Alencar, Fleith, Arancibia, 2009; Aversi-Ferreira, Dias-Vieira, 2021].

In this regard, according to recent research, the reluctance of some gifted girls and women to be considered as such seems indicative. The results of a longitudinal study showed that the formation of a positive identity of a gifted woman is realized mainly through the exchange of opinions with gifted peers and active open discussion of giftedness issues [Tentes, Fleith, 2014].

Obviously, manifestations of gender behavior stereotypes rooted in the peculiarities of family upbringing and education in Brazil are important for G/T teachers, who deal with families on a daily basis. A study by J.F. Chagas and D. de S. Fleith as cited by V.T. Tentes and D. de S. Fleith, describes the characteristics of the family as a basis for the development of gifted adolescents. The results were surprisingly predictable: more than half of the gifted teenagers were born and raised into two-parent families, where the spouses were officially married and prioritized education and development of their children's talents. Family dynamics included a wide range of daily and leisure activities, prioritization of studies, emphasis on active holiday-making with travel, visiting relatives, watching TV shows and movies together, and similar activities. The parents of these teenagers positively assessed their role in communication matters, organization of studies, as well as the acknowledgement of psychological problems of their gifted children and the desire to assist in resolving them [Tentes, Fleith, 2014].

Evolving G/T teachers into the social challenges of their high-potential students, Brazilian researchers could not ignore the issues of school bullying. Respondents of M.M. Dalost and E.M. Alencar were 118 students aged 10 to 20, mostly teenagers. The overwhelming majority of survey participants acknowledged that bullying of peers is a widespread practice in schools, with gifted students surprisingly acting as witnesses, victims and aggressors. Gifted students who experienced the status of bullying victims described their state as 'shame and fear'; aggressors, on the contrary, felt support from the peer group [Wechsler, Fleith, 2017].

The issues of correct teacher diagnostics of giftedness in school are raised by V.T. Tentes and D. de S. Fleith, who compared the potential of gifted 'A-students' with unsuccessful gifted students on a

number of aspects. Psychometric tests of non-verbal intelligence, verbal and imaginative creative thinking, academic achievement tests as well as scales of personal, academic and motivational characteristics, learning styles, self-esteem and parental attitudes revealed a significant predominance (2:1) of the potential of gifted 'poor' students over high-achieving students in all parameters, except for family and parental attitudes, where no significant differences were found [Tentes, Fleith, 2014].

With regard to teacher training, let us turn to the study by R.V. da K. Siqueira and R. da K.V. Ramos, based on the teaching experience of a specialized educational service focused on students with high abilities/giftedness. The aim is to acknowledge through the teacher's narrative the educational practices developed by Special Education specialists that have contributed to the development and empowerment of G/T students with learning disabilities, with a view to their inclusion. The qualitative methodology is based on the (auto)biographical method through semi-structured interviews. The results show that by narrating their professional experiences and paths taken by G/T students with learning disabilities, the teacher can reflect on their practice, an action that allows them to be aware of what he/she is doing and what he/she can do to improve the effectiveness of learning process for these students. The described narrative allows us to recognize the importance of specialized care centers with qualified professionals for the development of special education students, often inaccessible in regular classes, as well as for the acceptance of their differences and characteristics, to ensure the realization of their individual and social rights [Siqueira, Ramos, 2020].

Addressing the challenges faced by teachers when applying gifted education principles in schools, Brazilian scientists and methodologists are actively lobbying for the technology of 'accelerated' learning. Despite the positive assessment of the technology by children themselves and their parents, both comprehensive school staff and special education teachers take a negative view on the program. Among the counterarguments, there are likely organizational difficulties and adaptation problems faced by 'accelerated' students in high school due to emotional immaturity, as well as the preconception that by 'skipping' a grade in a particular school subject, gifted students will certainly face additional difficulties in the other disciplines. At present, there is no empirical evidence to support these concerns, and academic acceleration is a promising alternative for the education of gifted students, despite the traditional opposition to this practice from school teaching staff [Tentes, Fleith, 2014].

A collective monograph by the Faculty of Education and Health (*FACES*) of the University Center of Brazil (*UniCEUB*) presents the results of a study on gifted children in mathematics, making a valuable contribution to training G/T educators.

It was qualitative research drawn on a semi-structured interview. The latter involved four teachers of a private school located in *Lago Sul, Brasilia, Federal District*. The categories chosen for the work were characteristics of gifted children, procedures, best practices, advantages, disadvantages, and advice. The main findings include inadequacy of the child in dealing with classmates and participating in class activities; imbalance between his/her intellectual ability and general academic performance; a lack of a specific procedure to meet the needs of gifted children. In terms of the effect of having these children in the classroom, the participants noted more advantages than shortcomings. The teachers raised concerns about not having special material for G/T students and the importance of maintaining their motivation. The characteristics of giftedness noted by the participants were restlessness, curiosity, quick-thinking, and impatience with routine. In terms of classroom procedures, only one of the respondents teachers these children in her classroom; three of them use some procedures and one does not. Subject 'acceleration' is implemented by two of the responders. In terms of learning assessment, all the respondents agreed that their G/T students' grades are the highest, but at the same time, their overall performance is not very good. The respondents noted more advantages than disadvantages of having these gifted children in the classroom. The advantages are the help and encouragement they provide to their peers, while the disadvantages included the difficulty in preventing other children from copying them, and the need to complete various exercises and tests. The results of this study were important for the reflection and practice of a future teacher-specialist working with gifted students. The main conclusions of the study are that giftedness, or high abilities, often do not receive due attention from teachers who are busy with other special educational needs and consider them less important, contrary to Chapter V, Article 59 *'On Special Education'* of *The General Education Law* [Alencastro, 2009].

Teachers' misconceptions about G/T learners are clearly illustrated by a study into math giftedness, which revealed that a child who is able to solve problems faster, better and more originally than other students in the class is perceived by most teachers as a useful 'teacher's assistant', who should help classmates lacking this ability. Empirical studies show that the unique educational abilities and needs of these students in a school where content is highly valued are ultimately neglected because they pass exams well and easily master this content. However, there are municipalities that provide these students with access to special educational services [Ibid.]. As *the National Policy on Special Education* clearly states, "Specialized educational assistance identifies, develops and organizes accessible educational resources that eliminate barriers to the full participation of students, taking into account their specific needs" [Dourado, 2007; Hashizume, 2020].

However, in practice, Brazilian researchers note numerous bureaucratic complications, a striking lack of awareness among teachers and school administrators about how to deal with G/T students in the classroom, as well as the absence of social projects within the school community that could contribute to the development of gifted children. This situation means that these students do not receive the attention they need, parents cannot easily have them nominated for special programs, which thus contributes to low self-esteem and abandonment as a common reality for G/T students [Alencastro, 2009; Martins, Pedro, Ogeda, 2016; Siqueira, Ramos, 2020].

his historical and scholarly context sets the stage for examining policy and programs for G/T educator training in Brazil.

Policy and Program Context

At the beginning of the 21st century, the State policy of the Federative Republic of Brazil with regard to educating gifted children was manifested in the initiative of *the Ministry of Education* to determine *Public Education Policies for Children with High Abilities* within the framework of Full Inclusion Policy *(Política Nacional de Educação Especial na Perspectiva da Educação Inclusiva).*

The objective of the document approved by the National Senate is to guide education systems to promote access, participation, and learning for students with disabilities, global developmental disorders and high abilities/giftedness in regular schools, ensuring the following conditions: cross-cutting of special education from early childhood education to higher education; specialized educational services (*AEE*); continuity of schooling at the highest levels of education; continuing teacher training; accessibility in urban planning, architecture, furniture, transportation, communities and information centers [Griboski, 2009].

To determine intersectoral coordination in the implementation of public policies, *Centers for Work with Gifted/Highly Capable Children (NAAH/S)* were opened in 26 states of the country and in the Federal District of Brazil, which were supposed to successfully combine three components: work with gifted students, their teachers, and families. The centers conduct events to identify and develop various aspects of giftedness, and also educate and support families of gifted children through conferences and seminars[3]. The theoretical and methodological foundations of the centers' activities were formulated in a 4-volume publication, mandatory for use in each state. Thus, for the first time in the history of the country, an attempt was made to create a special educational system focused on gifted children unique individual needs.

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[3] Núcleos de atividades de altas habilidades/superdotação [High Abilities / Gifted Children]. Brasilia: Secretaria de Educação Especial, 2024: http://portal.mec.gov.br (accessed 30.09.2025).

Within the framework of *the National Policy on Special Inclusive Education (*2008), the official definition of giftedness, which is still accepted today, appeared and that is "high potential in one or more of the following areas: intellectual ability, academic ability, leadership ability, kinesthetic and artistic ability, creativity, learning ability and problem solving ability" [Alencar, Fleith, Arancibia, 2009; Delou et al., 2014; Wechsler, Fleith, 2017].

Despite the breadth of the definition, empirical studies show that the percentage of students involved in gifted programs is much lower than expected. Questions are also raised about the procedure for diagnosing giftedness, which, with rare exceptions, is identical throughout the country. It is a combination of recommendations from teachers and parents, a teacher's reference based on observation of the 'potentially gifted' student's behavior, academic performance (school grades, standardized test results, etc.), psychological assessment (IQ or other general indicator of special or creative abilities), and an assessment of the student's portfolio.

A careful retrospective analysis of the research problem presented by C. Delou et al. suggests that the debate on the definition of giftedness reveals the incompleteness or absence of appropriate education among teachers regarding giftedness since most special education courses for teachers are focused on people with mental or physical disabilities. For example, a study of kindergarten teachers showed that they had superficial ideas about giftedness. They emphasized that, in their opinion, these children have remarkable intellectual abilities but lack socio-emotional skills [Delou et al., 2014]. The same difficulties in defining giftedness were observed among primary school teachers working in private and public schools since these students were considered to have superior academic performance and knowledge, but also exhibit adjustment and emotional problems. Another study involving 20 Brazilian primary school teachers from Grades 6 to 9 found that they had not received any professional development training in the field of giftedness, which may affect their perceptions of gifted children and their classroom practices.

Prejudiced attitudes towards the terms 'high ability' and 'gifted' appear a major problem among teachers. Indeed, teachers rejected these terms as confusing and having a negative connotation in the media, whereas the concepts of talent was considered easier to understand and more applicable to the school environment. Even among college education deans, the concept of giftedness is still unreliable, as 50% of deans said they were not familiar with the phenomenon and said they did not recognize these abilities among their students [Delou et al., 2014].

The idea is proved by the results of the research on teacher's misconceptions of G/T student in both private and public schools around the country, conducted by R. Rodrigues Maia-Pinto and D. de Souza Fleith [2012]. Questionnaires were administered to 41 teachers from

private and public schools in Brasilia. Sadly enough, the teachers demonstrated a superficial or fragmented idea about the concept of giftedness. The answers presented by teachers were separated into different categories (*above-average ability or performance, ease of learning, above-average knowledge, development above that of the age group, maladjustment and behavioral problems, superior intellectual abilit*y), which together, with the exception of maladjustment and behavioral problems, could come very close to an adequate definition of giftedness, but which, viewed separately, may be mutually exclusive. A large proportion of public school and private school teachers (48% and 32%, respectively) associated gifted students with those who have above-average ability or performance. This concept can be easily included in the definition presented by J. Renzulli, and is incorporated in the General Guidelines for Educational Assistance to Students with High Abilities/Giftedness and Talents to satisfy the advanced learning needs of their high-potential students. Thus, additional training in the subject taught, mastering the content of the program that goes beyond the basic training of a secondary school teacher is essential [Alencastro, 2009; Pomortseva, 2010; Mori et al., 2021; Gasinets, Kapuza, Dobryakova, 2022].

Evidently, the lack of proper teacher training in recognizing giftedness is a major obstacle to identifying these children in schools and in society on the whole. The prevailing opinion is that these children are already excellent academic performers and do not require special attention, which is a major barrier to implementation of specific educational programs aimed at these students [Alencastro, 2009; Yusupova, 2023]. The need to change this attitude among teachers and inform society about the needs of gifted children is a concern for Brazilian researchers.

Having established the scholarly and policy context, we proceed to examine practical training initiatives in Brazil. This issue is thoroughly discussed in the next part of the paper.

Findings and Discussion

It is obvious that the theoretical basis for the multifactorial definition of 'giftedness', the need for longitudinal dynamic diagnostics and individualization of gifted children education within the framework of a comprehensive school in the Federative Republic of Brazil is based on the research of American psychologists and educators (J. Renzulli, S. Rees, etc.), describing how to create a system of talent search and development in a country [Seredina, Pomortseva, Morozova, 2016]. At the same time, research and programs are built which consider the regional and national component and allow us to identify the following conditions for revealing the unique potential of gifted children.

First, it is vitally important for the Brazilian society to finally recognize the value and unique educational needs of gifted children as a

condition for successful socio-economic development of the country in the future. This should eventually lead to proper training of specialists working with gifted children. It is to begin at the bachelor's level and continue throughout the teacher's career within an appropriate system of advanced training, where giftedness becomes an integrated part of the 'Special Education' section.

The current G/T teacher training and professional and personal upgrade scheme implies strengthening partnerships with universities, government organizations and NGOs in order to popularize the idea of identifying and educating gifted youth as an integral component of the development of Brazilian society. Thus qualified educators will be able to actively implement various options for 'accelerated' completion of the curriculum as an effective form of gifted education within the framework of a comprehensive school, on condition that the principles and procedures for their implementation are developed and provided for the teachers, family and gifted child himself/herself.

However, it is impossible to imagine coherent education of G/T students without professional consulting work with families in order to educate parents on issues of gifted development and behavior, offering an opportunity to share their experiences and discuss forms and methods of supporting the academic and mental development of gifted children in a family context.

Finally, it is crucial to take into account that along with the development of academic abilities and talents of gifted individuals it is crucial to pay special attention to the affective side of the gifted individual's personality as a condition for dynamic development of giftedness and talent 'throughout life'.

Therefore, we continue to discuss the best practices of implementing the theoretical provisions described above in the practice of general education schools in Brazil, most of which operate at the expense of the state budget in various forms:

 Consider the example of The Brazilian Council for Giftedness and High Ability — *ConBraSD* (*Conselho Brasileiro para Superdotação*, 2016), an important professional association, which was founded in 2003 to direct identification of gifted people and provision of related services to them in Brazil. The main objectives of *ConBraSD* are (a) to promote recognition by society of situations and problems related to gifted people; (b) to collaborate with public and private institutions responsible for the development and promotion of public policies for gifted people; (c) to provide scientific information on giftedness; (d) to promote education and training for identification of gifted people and provision of services for them and their families. So far, *ConBraSD* has organized seven conferences throughout the country. International and national experts have been invited as keynote speakers. In this way, these events aim to disseminate Brazilian programs and research results related to giftedness. The City of São Paulo also offers

teachers training in the identification and placement of gifted children at the Center for Specialized Support to Teachers (*CAPE*). This center was established in 2012 and offers educational materials in addition to strategies aimed at stimulating high-ability students to achieve in a regular classroom. Information on federal and state policies is also provided for teachers so that they can nominate students for various opportunities to accelerate learning [Delou, 2014].

Each of the above organizations performs a number of tasks to achieve three objectives to accord with the general policy of the Ministry of Education (*Ministério da Educação*) regarding G/T teacher training and improvement, echoing the global trend in teacher training for the gifted [Pomortseva, 2010]:

Objective 1. Exchange information on the most effective programs, forms, and methods of working with gifted and talented students.

Here, the main task of the centers for professional development and information centers is to provide access to Internet sources on the problem and to bring to the attention of all participants in the learning process (administration, teachers, parents, and students) any useful information about the program by means of the Internet.

A perfect example is *The Construction of Educational Practices for Students with High Abilities/Giftedness* project. The proposal for specialized educational services for students with high abilities/giftedness (*Portuguese Atendimento Educacional Especializado AEE*) is based on the philosophical principles that underpin inclusive education and aims to train teachers and education professionals to identify students with high abilities/giftedness, providing opportunities for the construction of the learning process and expanding services, with a view to fully developing the potential of these students [Mirelle Melo Ferreira Duarte, 2020].

To support plans in this area and contribute to their implementation, *the Special Education Secretariat of the Ministry of Education* (*SEESP*) invited specialists to prepare this set of four volumes of didactic-pedagogical books containing information that assists in the practices of serving students with high abilities/giftedness, as well as guidance for teachers and families.

A number of traditional tasks are set for the state universities. Given the difficulties that the domestic higher education system is experiencing, we are interested in encouraging universities to sponsor the work of various conferences, workshops and 'working groups' on giftedness issues.

Objective 2. Finding and publishing information confirming that continuous teacher development optimizes the process of nurturing gifted and talented students.

The main burden for implementing this goal falls on the state universities, which, among other tasks, are in the first place set to develop a teaching methodology for identifying the social-emotional needs

of the most capable students; organize conferences and seminars to discuss the most effective programs of the past year; coordinate the activities of university and district professional development programs [Seredina, Pomortseva, Morozova, 2016].

In particular, a revealing paper was provided by the government of the southern Brazilian state of *Rio Grande do Sul* as part of the educational project *"New Possibilities in Justice, Citizenship and Human Rights. Accessibility and Inclusion"* (*Novas Possibilidades em Justiça, Cidadania e Direitos Humanos. Acessibilidade e Inclusão)* as a project managing and formulating state policy for people with disabilities and people with high abilities in the state of Rio Grande do Sul (Law 13,604/11). Thus the government of Rio Grande do Sul is responsible for promoting, through community participation, the decentralization and universalization of actions that guarantee equal opportunities, as well as access to constitutional rights and citizenship for people with disabilities and people with high abilities.

Through training, permanent forums, thematic forums, consultations, services, research, *FADERS Accessibility and Inclusion* seeks to formulate public policies and guarantee rights in the 497 municipalities of Rio Grande do Sul on a regional basis [Mirelle Melo Ferreira Duarte, 2020].

Objective 3. Systematically calculating the effectiveness ratio of the programs for gifted students and professional training/retraining programs for teaching staff.

In this case, all participants in this process make a certain contribution to achieving the goal: universities develop evaluation criteria, advanced training centers collect information and assess the impact of advanced training programs on the effectiveness of special programs for gifted students, information centers communicate the results of the assessment to specialists and the public [Mori et al., 2021].

In our opinion, the following university programs approved by Brazilian *MEC* (Brazilian Ministry of Education and Culture) most successfully illustrate how to achieve these objective (see Table 1).

As can be seen from the table, the top four training courses are quite similar in the name, target audience and the workload offered. It is clear that the distance education option implemented by *PUC* and *NOVOESTE* can hardly compete with the profound 18-month offline and blended courses by *Sapens* and *UNESP*. Predictably, *Sapens* suggests "Introduction to Scientific Research", which demonstrates a considerate approach to the learning process and appears more suitable for students preparing for a career in G/T education rather than comprehensive school teachers. To traditional off-line classes *UNESP* adds the Moodle Virtual Learning Environment (*UNESP AVA*), which offers activities developed in each of the course disciplines, two synchronous activities (thematic seminars) via Google Meet conferences, and two Integrative Projects. This blended option sounds appealing for

Table 1. **Training educators for gifted students in universities of Brazil**

Course name	Course load	Duration	Target audience	Contents
Sapens / Genus Instituto *Specialization in High Abilities/Giftedness* https://instituto.sapiens-psi.com.br/pos-graduacao-altas-habilidades	500 hrs	18 months off-line course	Undergraduate and post graduate students	Modules: From concept to theories and theorists Socioemotional, intellectual, and learning characteristics of people with high abilities/giftedness From referral to care Practices for assisting people with AH/GD
Universidade Estadual de São Paulo (UNESP) *Specialization in Special Education / Emphasis on High Abilities or Giftedness* https://www.ibilce.unesp.br/#!/pos-graduacao/ especializacao/educacao-especial---altas-habilidades-ou-superdotacao/	400 hrs	18 months (blended education)	Teachers and other professionals in basic education with a Bachelor's Degree	Disciplines: Public policies: Special and inclusive education Contextualizing AH/GD scientific work methodology Instruments for identifying AH/GD behaviors The gifted person in their asynchronous development: Skillful management for/with the student with AH/GD in the regular classroom Individualized teaching plan for the student with AH/GD Collaborative teaching between the regular class teacher and the AEE teachers
Faculdade NOVOESTE *Giftedness and High Abilities* https://novoeste.edu.br/pos-graduacao-ead-em-altas-habilidades-e-superdotacao	420 hrs	6 months (distance education)	Professionals who work directly in providing care to people with AH/GD	Disciplines: The relationship between family, society, and school: Diverse contexts and their contribution to the development of people with high ability/giftedness National precepts for high ability/giftedness and specialized care Identification of people with high abilities/giftedness: paths and perspectives The psychometric contribution from formal tests in the process of identifying people with high ability/giftedness *et al*
PUC Paraná (Pontifical Catholic University) *High Abilities/Giftedness and Talent Development* https://estudenapuc.pucpr.br/pos-graduacao/cursos/ altas-habilidadessuper dotacao-e-desenvolvimento-de-alentos-toledo/	420 hrs	7 months (distance education)	Parents, educators, psychologists, pedagogues, school administrators, professionals in related fields	Disciplines: Curriculum proposal for assisting children, adolescents, young people, and adults with High Abilities and Giftedness. Acceleration Educational practices: Intervention proposals Educational proposals in different countries: Overview High abilities/giftedness and executive functions Educational practice: Identifying high abilities and giftedness *et al*

younger audiences as well as for current teachers, who are unable to leave their school class for a long time, thus extending the number of potential attendants. However, the *PUC* course involves G/T students' parents as the chief identifiers and continuous guides of the G/T children.

Contest analysis suggests that more or less in-depth theoretical base combined with a considerable number of practice hours offered in every course allows G/T educators to gain knowledge and skills in multiple related fields: from the rights of people with high abilities to innovative and practical pedagogical strategies that encourage autonomy, creativity, and the potential of each individual, providing personalized and effective care. Upon completing the courses, educators are able to create and implement innovative pedagogical projects, manage inclusive educational processes, and facilitate talent development in a variety of areas.

Under these conditions, the teacher becomes a catalyst for the development of projects and ideas, a personal adviser for individual students, a person to whom one can turn in case of need, helping to move away from the "eternally imposed order based on the inviolability of subjects ... to a situation in which both teacher and student are free to opt for the sphere of common interests and problems that they can explore together" [Seredina, Pomortseva, Morozova, 2016].

With this idea in mind, in recent decades, various educational programs in Brazil have attempted to identify and support the potential of children with the highest abilities. Given the national and regional specifics, most programs are focused on children from families with low socio-economic and cultural status.

Conclusion   Research shows that the current stage of the development of G/T education system in Brazil has revealed an increased interest in understanding giftedness with its various aspects, which are becoming the focus of attention of researchers from universities throughout the country. Of particular importance is the fact that research community is interested in establishing partnerships with educational institutions and the results of these studies are becoming available to school teaching staff and families of gifted students.

Despite widely recognized achievements in the field of programs and services for gifted children in Brazil, especially in the last two decades, a number of key issues need to be addressed in order to promote the development of gifted children in a regular classroom. Among them are those that we prioritize following in the steps of most advanced Brazilian educators and researchers.

The paramount priority is training G/T educators at university beginning from bachelor's courses with careful provisions for continuous education throughout the teacher's career within an appropriate sys-

tem of advanced training, where giftedness becomes an integral part of the 'Special Education' section. While programs like *Instituto Focar as Sapens, UNESP, NOVOESTE, PUC* show promise, their limited scope underscores the need for national scaling. This can be achieved only via strengthening partnerships with universities, government agencies, and NGOs to popularize the idea of identifying and training gifted youth as an essential component of the development of Brazilian society. Equally, a pilot national curriculum for G/T training might be tested in several municipalities by 2026.

In comprehensive schools, active implementation of various options for 'accelerated' completion of the curriculum is required as an effective form of teaching gifted children, providing teachers, families, and gifted children themselves with clear principles and procedures.

Proper G/T teaching-learning in a comprehensive school is possible only through professional consulting with the family in order to educate parents on issues of gifted development and behavior, offering an opportunity to share their experience and discuss forms and methods of supporting the academic and mental development of a gifted child in a family context.

The projected successful system of G/T identification and development should be based on the idea that along with the development of academic abilities and talents of gifted students, special attention is to be paid to the metal heath of the gifted individual as a condition for the dynamic genesis of giftedness and talent 'throughout life'.

All the above factors may eventually foster/accelerate/promote? recognition by the Brazilian society of the value and unique educational needs of gifted children as a condition for successful socio-economic development of the country in the future.

Having attempted to reveal the historical background and current state of the problem of G/T educator training and improvement in Brazil, this paper in no way attempts to present a complete account of the issue. Further studies into G/T inclusion programs as well as continuous search for effective best practices of G/T teacher and student education within comprehensive schools in the FRB seem quite relevant and timely to secure successful identification and nurture of the country's ablest student population at home and worldwide.

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Academic Track Choices, Educational Achievements and Social Inequality in India

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Abstract   Expansion of educational opportunities has the potential to overcome social and economic inequalities. Educational achievements might be used as a social policy tool to reduce socio-economic inequalities by improving labor market outcomes. However, the benefits derived depend on academic choices an individual makes and the social group he or she belongs to. Children from marginalized social groups choose different academic tracks than those from privileged ones, which accounts for further differences in labor market outcomes. The present study examines whether social background defines educational achievements in India. The findings reveal that students with marginalized background have significantly lower test scores at all three tested educational levels (high school, bachelor and MBA). Social background remains the strongest predictor for educational achievements even after controlling for academic track choices and previous performance of the students. Using the social transformation theory, the study further concludes that differences in achievement scores by socio-economic background could be reduced by aspirational marginalized students; however, those cannot be erased completely.

1. Introduction Unequal access to resources maintains inequalities [Atkinson, 2015; Deshpande, 2011; Lin, 2000], especially between privileged and marginalized social groups [Loveless, Whitefield, 2011]. Following sustainable development goal SDG10 on Reduced inequalities, governments introduced various solutions to lessen socio-economic inequalities [Desai, Kulkarni, 2008; Stiglitz, 2012]. One of the possible solutions is improvement in educational achievements that enhances individuals' economic and social prospects [Qazi et al., 2018; Yirmiyahu, Rubin, Malul, 2017] and improves their further labor market outcomes [Lin, Lutter, Ruhm, 2018; Zax, Rees, 2002]. However, if inequality in educational achievements exists across social groups at different stages of students' academic paths, marginalized social groups will attain poor labor market outcomes [Gregorio, Lee, 2002; Reimer, Pollak, 2009]. It may also cause an increase of inequality in the future, leading to more socio-economic disparities [DeJaeghere, 2020; Heckman, 2011; Thorbecke, Charumilind, 2002]. Therefore, reducing inequalities in educational achievements among social groups accounts for a decrease in socio-economic disparities [Lin Lutter, Ruhm, 2018; Zax, Rees, 2002].

Reducing inequality in educational achievement does not mean that all students should get the same grades; it means that the variance in the grades between social groups should not be too high. In other words, it means that the average academic performance should vary within rather than across social groups, especially after control for academic track selection, school quality, parental education, and other extraneous variables.

Previous studies demonstrated that a significant factor of lower education achievements is unequal access to resources, which may appear due to poor household economic position, limited parental education, or poor school quality in the marginalized groups [Alcott, Rose, 2017; Autor et al., 2016; Banerjee et al., 2007; Burns, Garcia, 2017]. At the same time, the literature reveals that academic track selection contributes heavily to the rise of inequalities in academic achievements [Härkönen, Sirniö, 2020]. Privileged social groups prefer academic tracks with better prospects in terms of wages, employment, and occupational status [Reimer, Noelke, Kucel, 2008], while marginalized social groups prefer vocational tracks or conventional occupations [Metz, Fouad, Ihle-Helledy, 2008; Trow, 1973]. For instance, graduates of humanities have lower labor market outcomes than graduates of natural sciences [Arcidiacono, 2004; Hango et al., 2021; Prescod et al., 2018].

Researchers point out that equal opportunities for track selection provided for students irrespective of their socioeconomic background during the schooling years could be fruitful in reducing inequalities in the future [Blossfeld, Blossfeld, Blossfeld, 2015; Breen et al., 2009; Härkönen, Sirniö, 2020]. However, this may also increase the risk of poor academic achievements and course dropouts [Birkelund, 2020].

In general, the role of educational achievements in reducing inequalities is understudied [Birkelund, 2020; Dollmann, Weißmann, 2020; Sianou-Kyrgiou, Tsiplakides, 2011]. For instance, the existing literature does not give a clear answer whether differences in educational achievements shrink when we control for academic track selection and other extraneous variables. The present study fills this gap with the help of longitudinal data from India.

Our research contributes to the existing literature in two ways. Firstly, it answers whether controlling for academic track selection and college types can reduce differences in educational achievements across social groups. Secondly, it considers whether academic performance differences between socio-economic groups decrease or increase during high school, bachelor's, and MBA education levels, thereby potentially enabling policymakers to make better policy interventions.

The article consists of the following sections. Section 2 highlights the main literature findings regarding educational achievements and social mobility. Section 3 presents data description and methodological strategy. Section 4 discusses the findings of the current study. Finally, Section 5 provides conclusions and implications.

2. Literature review and study background

The human capital theory argues that labor market outcomes are directly proportional to the schooling years [Becker, 2009; Schultz, 1961]. Additional schooling years can reduce inequalities by providing opportunities for upward mobility [Breen, 2010; Breen et al., 2009] and improving the individual's economic standings within a social group [Chadha, Nandwani, 2018; Hannum, Buchmann, 2005; Jeffrey, Jeffery, Jeffery, 2004]. The reduced inequalities may further improve health [Jürges, Reinhold, Salm, 2011] and life satisfaction [Karabchuk, Soboleva, 2020; Lambert, Karabchuk, Joshanloo, 2022], especially among marginalized groups.

However, there is a contradiction of the above-mentioned argument disclosed by the previous empirical studies [Becker, Hecken, 2008; Hannum, Buchmann, 2005; Shavit, Blossfeld, 1993; Shavit, 2007]. Researchers find that despite increased schooling years, marginalized societal groups hardly change their educational strategies and tend to prefer vocational tracks [Reimer, Pollak, 2009; Trow, 1973] meaning that marginalized groups may stay in their own poverty loops by choice. Primarily, they opt for a vocational track due to certain individual and household characteristics, such as parental education level, academic performance, and personal interests [Fouad et al., 2008; Schindler, Reimer, 2011; Triventi, 2011]. Moreover, an individual's social background and academic abilities have an increased influence on the selection of tracks and majors at tertiary level [Black, Cortes, Lincove, 2020].

A theoretical explanation of such behavior could be the Rational choice theory. It argues that individuals rationally choose the available educational opportunities by considering various economic and social aspects [Breen, Goldthorpe, 1997; Davies, Heinesen, Holm, 2002; Salikutluk, 2016; Smith, 2017], including the associated risk or fear of downward mobility due to poor academic achievements [Breen, Goldthorpe, 1997; Stocké, 2007]. At the higher level of academic tracks, the doubt of success among students from marginalized social groups increases [Hango et al., 2021; Lopes, 2017]. Even if their selected academic tracks are similar to those chosen by students from privileged social groups, they may drop out in between due to their poor academic performance [Tjaden, Hunkler, 2017]. Hence, they choose vocational tracks that have lesser risk but also fewer benefits [Birkelund, 2020], which accentuates the inequality in labor market outcomes between privileged and marginalized social groups [Lopes, 2017; Reimer, Noelke, Kucel, 2008].

The differential approach of selecting academic tracks will prevail until the point where privileged segments have reached saturation, and students from marginalized social groups become aspirational to achieve more [Becker, Mayer, 2019]. These aspirational students will try to move up the social ladder by modifying their ascribed social status with the achieved one [Foladare, 1969; Kaufman, 2003; Linton, 1936], resulting in social transformation via aspirational behavior of marginalized social groups [Foladare, 1969; Kaufman, 2003; Becker, Mayer, 2019].

Social transformation theory explains the way marginalized students feel motivated and aspirational in the hope that educational achievement can improve their existing socio-economic conditions [Foladare, 1969; Kaufman, 2003; Becker, Mayer, 2019]. The theory offers a robust framework for understanding how aspirations toward education and a better economic position can elevate students with marginalized backgrounds. It challenges traditional deficit-based models and promotes a pedagogy of hope, agency, and empowerment. Therefore, to reduce inequalities in labor market outcomes, it seems reasonable to improve opportunities for academic track selection among social groups.

On the other hand, recent studies also showed that aspirational students might reduce the inequalities significantly, but it is not possible to erase them completely [Neidhöfer, Serrano, Gasparini, 2018; Blossfeld, Blossfeld, Blossfeld, 2015; Becker, Mayer 2019]. The present study tests this idea using longitudinal empirical data from India, the country with one of the highest levels of socio-economic inequalities between societal groups.

In India, educational and cultural environments differ from those in Western societies as Indian social practices are influenced by religion, caste, and ethnicity [Bhatnagar, Sinha, 2018; Meade, Singh, 1973; Borooah, 2012; Deshpande, 2011]. Religion, caste, and ethnic identities

determine an individual's belonging to a closed group at his or her birth, which facilitates and strengthens socio-economic inequalities and limits social mobility [Dirks, 2011].

According to historical texts, Hindus were classified into four Varnas (social groups): Brahmins, Kshatriyas, Vaisyas, and Shudras[1] [Borooah, 2012]. These Varnas were considered crucial for determining an individual's social position and later on became a foundation for affirmative action policies [Deshpande, 2011]. As per the national datasets, these Varnas were classified into four caste categories, i.e., General category, Other backward classes (OBC), Scheduled Castes (SC), and Scheduled Tribes (ST). The OBC, SC, and ST students belong to the marginalized social background, while the General category students belong to the privileged social background [Gaur, Pandey, Sharma, 2024].

Apart from Hindus, other religious groups, such as Muslims, Christians, and Sikhs, also witnessed a shift in their caste system. Clause 3 of the Scheduled Caste Order 1950, appended to Article 341 of the Indian constitution[2], states that certain low castes belonging to Sikhism deemed to be a member of SCs [Fazal, 2017]. Similarly, Muslims were classified into the General and OBC categories [Dasgupta, 2009].

In the Indian education system, students have three academic track choices after their 10th grade, i.e., science, commerce, and arts streams. After high school (12th grade), a student may continue in the chosen stream or select a different one. The selection of streams often defines students' job opportunities in the labor market [Arcidiacono, 2004; Bertschy, Cattaneo, Wolter, 2009]. Since recruiters value graduates from the same professional tracks who are also good performers at every educational level [Yeravdekar, Behl, 2017], previous academic performances and track selection become essential.

3. Data and methods

The empirical analysis is based on a unique dataset of students' academic performance at different educational levels obtained from the Common Admission Test (CAT), 2018. The CAT is an entrance examination for the prestigious Indian Institutes of Management (IIMs) and other renowned private institutions. The sample consists of students appearing for the CAT examination[3], which has a minimum cri-

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[1] Brahmins were priests or teachers by profession and were considered the higher class. Kshatriyas consisted of warriors and rulers, and Vaisyas were traders. These two castes were also regarded as the elite section of the society. Shudras, comprising people who performed menial jobs, were regarded as the marginalized segment [Borooah, 2012; Deshpande, 2011].

[2] The Constitution of India (Scheduled Castes) Order, 163 (1950): http://socialjustice.nic.in/writereaddata/UploadFile/CONSTITUTION (SC) ORDER 1950 dated 10081950.pdf (accessed 02.09.2025).

[3] It is an aptitude test required for admission in MBA programs in India, similar to the Scholastic Aptitude Test (SAT) conducted in the U.S college admission process.

terion of bachelor's in any stream. The exam tests students on their quantitative ability, data interpretation, logical reasoning, verbal ability, and reading comprehension. The CAT result is a relative score, i.e., the candidate's rank is calculated in percentile compared to those of other candidates who have scored less than him/her (the range of CAT score is from 0 to 100).

To identify educational achievement differences between social groups in time, this research considers educational achievements at three educational levels: a) high school, b) bachelor's, c) professional entrance exam for Masters of Business Administration (MBA). A student's performance in the MBA entrance exam is an essential determinant of labor market outcomes [Bertschy, Cattaneo, Wolter, 2009; Brand, Halaby, 2006; Black, Smith, 2004]. Better performance in the MBA entrance exam ensures admission into a more prestigious college, which increases a candidate's chances of improving his or her labor market outcomes [Baruch, Peiperl, 2000; Forrester, 1986]. For instance, a management graduate in India earns approximately 30 to 40 percent more than a non-management graduate [Dhar, 2012; Yehuda, Uday, Bijaya, 2019; Yeravdekar, Behl, 2017]. Recruiters and students value these prestigious colleges as they provide a higher socio-economic return [Bordón, Braga, 2020; Lin, Lin, 2012; Tan, Morgan, Zagheni, 2016].

Table 1 presents descriptive statistics that highlights the achievement inequalities among privileged and marginalized social groups through their mean educational achievement scores.

Table 1. **Descriptive statistics**

	General		OBC		SC		ST	
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
CAT percentile	52.79	28.78	43.64	28.17	38.66	26.01	34.45	24.16
Bachelor's %	70.33	9.85	68.85	9.51	65.36	9.02	64.25	9.10
HSC %	78.41	11.84	76.96	12.54	72.48	12.23	70.22	12.44
SSC %	82.34	10.91	81.62	11.40	77.96	11.79	75.35	12.17
Academic Track								
Arts	0.02	0.15	0.03	0.18	0.04	0.19	0.05	0.22
Commerce	0.32	0.47	0.22	0.42	0.20	0.40	0.26	0.44
Science	0.66	0.47	0.74	0.44	0.76	0.42	0.69	0.46
Educational Board at SSC								
CBSE	0.56	0.50	0.42	0.49	0.48	0.50	0.44	0.50
State Boards	0.31	0.46	0.51	0.50	0.44	0.50	0.40	0.49
Cambridge A-Level	0.00	0.03	0.00	0.02	0.00	0.01	0.00	0.02
CISCE	0.06	0.23	0.03	0.17	0.03	0.18	0.07	0.26
ICSE	0.08	0.26	0.04	0.20	0.04	0.20	0.09	0.29
International Baccalaureate	0.00	0.01	0.00	0.01	–	–	–	–

Variable	General Mean	Std. Dev.	OBC Mean	Std. Dev.	SC Mean	Std. Dev.	ST Mean	Std. Dev.
NIOS	0.00	0.03	0.00	0.02	0.00	0.03	0.00	0.03
Educational Board at HSC								
CBSE	0.54	0.50	0.36	0.48	0.42	0.49	0.42	0.49
State Boards	0.39	0.49	0.60	0.49	–	–	–	–
Cambridge A-Level	0.00	0.02	0.00	0.01	0.53	0.49	0.49	0.50
CISCE	0.04	0.19	0.02	0.13	0.02	0.14	0.05	0.21
ICSE	0.04	0.19	0.02	0.13	0.02	0.14	0.05	0.21
International Baccalaureate	0.00	0.02	0.00	0.01	0.00	0.01	–	–
NIOS	0.00	0.06	0.00	0.06	0.01	0.08	0.00	0.07
University Type								
Central University	0.10	0.30	0.09	0.29	0.11	0.31	0.13	0.34
Deemed University	0.14	0.35	0.08	0.28	0.08	0.27	0.10	0.31
Foreign University	0.00	0.03	0.00	0.02	0.00	0.02	0.00	0.02
IITs	0.02	0.14	0.03	0.16	0.05	0.22	0.06	0.23
NITs	0.03	0.16	0.04	0.19	0.05	0.22	0.07	0.25
Others	0.04	0.19	0.05	0.22	0.05	0.22	0.04	0.20
Private University	0.12	0.32	0.07	0.26	0.07	0.25	0.08	0.27
State University	0.56	0.50	0.64	0.48	0.59	0.49	0.52	0.49
Age	24.11	2.54	23.97	2.19	24.57	2.60	24.60	2.64
Gender	0.36	0.48	0.30	0.46	0.31	0.46	0.34	0.48
N	157550		33211		14692		3952	

Notes: HSC = Higher Secondary Certificate (12th Grade), SSC = Secondary School Certificate (10th Grade), CBSE = Central Board of Secondary Education, CISCE = Council for the Indian Certificate Examinations, ICSE= Indian Certificate for Secondary Education, NIOS = National Institute of Open Schooling, IIT = Indian Institute of Technology, NIT = National Institute of Technology.

To identify the predictors of educational achievements, we used the Ordinary Least Squares (OLS) regression technique because the dependent variable (educational achievements) is continuous [Hutcheson, 1999].

The main independent tested variables were 1) the selected academic track (out of the three tracks) and 2) social-ethnic group (out of the four caste categories).

The literature revealed that predictors of educational achievements include family income, parental education, and educational expenditure [Carruthers, Wanamaker, 2013; Dee, 2005; Evans, Schwab, 1995]. Since data on these variables were not available, the study used an alternate approach suggested in the literature that considers previous academic performance as it is directly influenced by students' personal qualities and the household environment [Boissiere, Knight, Sabot, 1985]. Data on academic performance at the previous educational level (Secondary School, High School, and bachelor's) was

used in the model as the control variable along with gender and age. For instance, while estimating factors for educational achievements at the HSC level, SSC's performance data was included in the model.

Apart from individual and household level variables, school or university quality indicators proved to be significant predictors of educational achievements [Behrman, Birdsall, 1983; Card, Krueger, 1992; Glewwe, 1999; Black, Cortes, Lincove, 2020; Thiele et al., 2016]. Thus, our model includes educational boards and university type as control variables. Educational boards can be considered as a robust measure for providing information regarding school quality in India [Bhattacharji, Kingdon, 2015; Jain, Prasad, 2018] and have been broadly divided into seven categories (Table 1). These educational boards follow stringent criteria to accredit schools based on different quality parameters [Bhattacharji, Kingdon, 2015]. Similarly, university type at the bachelor's level also provides information regarding the quality of a student's university during a bachelor's course and has been broadly divided into eight categories (Table 1).

The model also includes geographical state-level variables to control for variances on the regional level.

The regression analysis has been performed for three different educational levels of educational achievements, namely, high school, bachelor's, and entrance exam, i.e., CAT as follows:

$$12th\ Grade\ Scores = \beta_0 + \beta_1 X_i + \beta_2 Y_i + \beta_3 Z_i + \varepsilon \qquad (1)$$

$$Bachelor's\ scores = \beta_0 + \beta_1 X_i + \beta_2 Y_i + \beta_3 Z_i + \varepsilon \qquad (2)$$

$$CAT\ percentile = \beta_0 + \beta_1 X_i + \beta_2 Y_i + \beta_3 Z_i + \varepsilon \qquad (3)$$

$$12th\ Grade\ Scores = \beta_0 + \beta_1 X_i + \beta_2 Y_i + \beta_3 Z_i + \beta_4 X_i Y_i + \varepsilon \qquad (4)$$

$$Bachelor's\ scores = \beta_0 + \beta_1 X_i + \beta_2 Y_i + \beta_3 Z_i + \beta_4 X_i Y_i + \varepsilon \qquad (5)$$

$$CAT\ percentile = \beta_0 + \beta_1 X_i + \beta_2 Y_i + \beta_3 Z_i + \beta_4 X_i Y_i + \varepsilon \qquad (6)$$

In all equations, X_i is the vector containing variables of academic choices, i.e., science, arts, and commerce. Vector Y_i comprises an individual's social group (General, OBC, ST, SC). Finally, Vector Z_i contains control variables, including previous academic performances, school educational board, university type, gender, region, and age.

Equations 1, 2, and 3 measure the educational achievement predictors testing for the impact of social groups and students' academic track choices controlling for previous academic performances, school educational board, university type, gender, region, and age. Equations 4, 5, and 6 include interaction effects between academic tracks and social groups to see if social groups define the influence of track choices on the outcome variable. A brief description of the variables is presented in Table 2.

Table 2. **Summary description of variables**

Variables	Description
CAT percentile	Aggregate score in the Common Admission Test
Bachelor's%	Aggregate score at bachelor's level
HSC%	Aggregate score at HSC level (year 12)
SSC%	Aggregate score at SSC level (year 10)
Academic Track	Field of study opted after SSC, i.e., Arts, Commerce, or Science
Educational Board	Educational board deciding the quality of education at the SSC and HSC level
University Type	University in which the individual is enrolled during bachelor's
Age	Age of the student
Social Group	Background of the student, i.e., General, OBC, SC, ST
Gender	Gender of the student
Region	Region where the student is residing (states classified into regional zones decided by the Indian government)

4. Results and discussion
4.1. Effect of academic choices and performance on achievement inequality

Our research demonstrated that differences in educational achievement scores across social groups partially decreased when controlled for individual's academic track selection and previous performances along with the other variables. The marginalized social groups continued to perform poorly as compared to the General caste at different stages (Table 3). Achievement inequalities dropped across social groups at the HSC level; however, marginalized students failed to perform on par with General category students. Despite controlling for track selection and previous performances, the results highlighted that those inequalities in the HSC performance scores are linked with the social group variable.

On the contrary, at the bachelor's educational level, the differences in educational achievement scores across social groups increased. This result demonstrates that, at the bachelor's level, marginalized students perform worse than those from privileged groups. It means that providing equal academic pathway opportunities for all students irrespective of their social background will not solve the inequality challenge as less privileged groups will acquire lower scores, which will maintain educational achievement inequalities.

Similarly, at the third educational level, the findings display that performance score inequality increases in the CAT percentile. This demonstrates that though increased schooling years improve educational achievements of marginalized students, educational achievement differences remain in place. The above might mean that students from marginalized social background did not develop the professional skills required to perform well in MBA entrance exams [Lin, Lin, 2012; De Alwis, Parr, Guo, 2020].

Table 3. **Achievements' inequality after controlling for academic choices and performance**

VARIABLES	HSC%	Bachelor's%	CAT percentile
Academic Track (Ref: Science)			
Arts	4.77***	−2.14***	−7.12***
	(0.12)	(0.12)	(0.29)
Commerce	4.83***	−2.62***	−5.07***
	(0.05)	(0.05)	(0.13)
Social Groups (Ref: General)			
OBC	−0.75***	−0.85***	−4.97***
	(0.05)	(0.05)	(0.13)
SC	−1.87***	−2.73***	−6.98***
	(0.08)	(0.07)	(0.18)
ST	−2.73***	−3.09***	−7.07***
	(0.15)	(0.14)	(0.34)
Academic Performance			
Bachelor's%			0.23***
			(0.01)
HSC%		0.25***	0.72***
		(0.00)	(0.01)
SSC%	0.74***	0.14***	0.69***
	(0.00)	(0.00)	(0.01)
Educational Board (Ref: CBSE)			
State Boards 10th Grade	−0.60***	0.06	−4.62***
	(0.07)	(0.06)	(0.17)
Cambridge A-Level 10th Grade	3.28***	0.13	7.55***
	(0.92)	(0.96)	(1.91)
CISCE 10th Grade	3.11***	1.00***	5.55***
	(0.11)	(0.11)	(0.27)
ICSE 10th Grade	2.93***	0.78***	5.17***
	(0.09)	(0.09)	(0.22)
International Baccalaureate 10th Grade	4.64*	0.51	12.02***
	(2.41)	(2.20)	(4.05)
NIOS 10th Grade	2.07**	1.08	3.46*
	(0.98)	(0.70)	(1.80)
Educational Board (Ref: CBSE)			
State Boards 12th Grade	0.35***	−0.69***	−3.96***
	(0.07)	(0.07)	(0.17)
Cambridge A-Level 12th Grade	−9.59***	3.16***	17.25***
	(1.31)	(1.17)	(2.38)
CISCE 12th Grade	−0.39***	−1.69***	−0.19
	(0.13)	(0.14)	(0.33)
ICSE 12th Grade	−0.77***	−1.41***	−0.17
	(0.12)	(0.13)	(0.31)
International Baccalaureate 12th Grade	−6.36***	3.76***	10.94***
	(1.19)	(1.25)	(2.67)

VARIABLES	HSC%	Bachelor's%	CAT percentile
NIOS 12th Grade	−1.71***	−1.11***	−7.14***
	(0.43)	(0.30)	(0.77)
University Type (Ref: Central University)			
Deemed University		4.82***	−1.52***
		(0.08)	(0.20)
Foreign University		2.11**	4.48***
		(0.95)	(1.65)
IITs		2.97***	14.26***
		(0.15)	(0.26)
NITs		4.19***	7.98***
		(0.12)	(0.27)
Others		1.89***	−6.85***
		(0.11)	(0.27)
Private University		4.63***	−3.86***
		(0.08)	(0.21)
State University		1.44***	−2.34***
		(0.06)	(0.16)
Age	−0.05***	0.15***	2.25***
	(0.01)	(0.01)	(0.03)
Region of India (Ref: Central)			
North	1.16***	−0.68***	1.72***
	(0.06)	(0.06)	(0.14)
South	3.75***	1.00***	−5.95***
	(0.07)	(0.06)	(0.16)
East	−3.06***	0.79***	−1.45***
	(0.06)	(0.06)	(0.16)
West	−4.07***	−0.34***	6.66***
	(0.07)	(0.06)	(0.16)
North East	−0.27	−0.73***	−0.50
	(0.18)	(0.16)	(0.42)
Female	−0.27***	2.46***	−8.74***
	(0.04)	(0.04)	(0.10)
Constant	17.03***	33.34***	−122.63***
	(0.28)	(0.28)	(0.82)
Observations	206,701	206,622	206,622
R-squared	0.52	0.32	0.49

Robust standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

4.2. Interaction effects

The estimation of the interaction effects disclosed that marginalized students at the secondary (SSC) educational level who opted for science were performing poorly as compared to those in the General category (Table 4). The worst performing category is ST, followed by SC and OBC. Despite students having equal opportunities for profes-

sional choices, the differences in the HSC scores due to social groups remained stable.

Table 4. **Interaction effect of academic choices and social groups**

VARIABLES	HSC%	Bachelor's%	CAT percentile
Social Group (Ref: General)			
OBC	−0.49***	−1.13***	−5.24***
	(0.06)	(0.06)	(0.15)
SC	−1.81***	−3.10***	−7.91***
	(0.09)	(0.08)	(0.21)
ST	−2.58***	−3.85***	−9.23***
	(0.17)	(0.17)	(0.41)
Academic Track (Ref: Science)			
Arts	5.14***	−2.59***	−7.81***
	(0.15)	(0.15)	(0.36)
Commerce	4.97***	−2.87***	−5.52***
	(0.05)	(0.05)	(0.14)
Interaction effects			
OBC*arts	3.04***	−1.98***	−11.17***
	(0.25)	(0.26)	(0.62)
OBC*commerce	3.61***	−3.09***	−10.02***
	(0.11)	(0.10)	(0.25)
SC*arts	2.94***	−4.77***	−14.56***
	(0.42)	(0.37)	(0.87)
SC*commerce	2.99***	−4.41***	−9.24***
	(0.18)	(0.16)	(0.37)
ST*arts	2.11***	−5.65***	−10.02***
	(0.73)	(0.65)	(1.50)
ST*commerce	1.88***	−3.91***	−7.75***
	(0.30)	(0.27)	(0.61)
Academic performance			
Bachelor's%			0.23***
			(0.01)
HSC%		0.25***	0.72***
		(0.00)	(0.01)
SSC%	0.74***	0.14***	0.70***
	(0.00)	(0.00)	(0.01)
Educational Board (Ref: CBSE)			
State Boards 10th Grade	−0.60***	0.06	−4.62***
	(0.07)	(0.06)	(0.17)
Cambridge A-Level 10th Grade	3.26***	0.17	7.64***
	(0.92)	(0.96)	(1.91)
CISCE 10th Grade	3.11***	0.99***	5.55***
	(0.11)	(0.11)	(0.27)

VARIABLES	HSC%	Bachelor's%	CAT percentile
ICSE 10th Grade	2.93***	0.78***	5.18***
	(0.09)	(0.09)	(0.22)
International Baccalaureate 10th Grade	4.65*	0.50	12.00***
	(2.42)	(2.19)	(4.06)
NIOS 10th Grade	2.04**	1.08	3.41*
	(0.98)	(0.69)	(1.80)
Educational Board (Ref: CBSE)			
State Boards 12th Grade	0.35***	−0.68***	−3.94***
	(0.07)	(0.07)	(0.17)
Cambridge A-Level 12th Grade	−9.61***	3.18***	17.28***
	(1.31)	(1.17)	(2.39)
CISCE 12th Grade	−0.41***	−1.67***	−0.16
	(0.13)	(0.14)	(0.33)
ICSE 12th Grade	−0.78***	−1.40***	−0.17
	(0.12)	(0.13)	(0.31)
International Baccalaureate 12th Grade	−6.44***	3.87***	11.15***
	(1.19)	(1.25)	(2.67)
NIOS 12th Grade	−1.72***	−1.08***	−7.09***
	(0.43)	(0.30)	(0.77)
University Type (Ref: Central University)			
Deemed University		4.82***	−1.49***
		(0.08)	(0.20)
Foreign University		2.13**	4.52***
		(0.95)	(1.65)
IITs		3.03***	14.41***
		(0.15)	(0.26)
NITs		4.23***	8.10***
		(0.12)	(0.27)
Others		1.90***	−6.82***
		(0.11)	(0.27)
Private University		4.65***	−3.82***
		(0.08)	(0.21)
State University		1.46***	−2.30***
		(0.06)	(0.16)
Age	-0.05***	0.14***	2.25***
	(0.01)	(0.01)	(0.03)
Region of India (Ref: Central)			
North	1.14***	−0.66***	1.74***
	(0.06)	(0.06)	(0.14)
South	3.75***	1.00***	−5.97***
	(0.07)	(0.06)	(0.16)
East	−3.07***	0.79***	−1.45***

VARIABLES	HSC%	Bachelor's%	CAT percentile
	(0.06)	(0.06)	(0.16)
West	−4.09***	−0.32***	6.68***
	(0.07)	(0.06)	(0.16)
North East	−0.28	−0.71***	−0.52
	(0.17)	(0.16)	(0.42)
Female	−0.27***	2.47***	−8.73***
	(0.04)	(0.04)	(0.10)
Constant	16.98***	33.39***	−122.51***
	(0.28)	(0.28)	(0.82)
Observations	206,701	206,622	206,622
R-squared	0.52	0.32	0.49

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

At the bachelor's education level, inequalities in achievements across social groups increased for students who had opted for science. The opposite tendency was discovered for students who had opted for arts or commerce, here inequalities across social groups reduced. However, they achieved significantly lower scores in absolute numbers compared to their counterparts who had opted for science. This indicates that better academic track selection can improve achievements within a social group; however, it may not reduce achievement inequalities across social groups completely.

Similarly, at the CAT educational level, our research shows that students who had opted for science largely performed well in CAT compared to arts and commerce students. This result is in line with previous findings, highlighting the importance of choosing natural sciences and engineering over arts as academic tracks at the early stages of schooling [Arcidiacono, 2004; Reimer, Noelke, Kucel, 2008].

4.3. Discussion   The study revealed that students from marginalized social backgrounds, such as OBCs, SCs, and STs, continue to perform poorly compared to those from privileged backgrounds at different education stages despite their track selection. The results for Indian panel data are consistent with the existing literature, which suggests that increasing years of schooling can hardly reduce achievement inequalities across social groups [Breen, 2010; Walters, 2000].

In line with previous studies, this empirical research demonstrated that though schooling years improved the educational achievements of the students from lower social background, these students do not develop the skills required for further professional MBA exams [Lin, Lin, 2012; De Alwis, Parr, Guo, 2020].

Professional skills are considered an absolute necessity by prestigious educational institutions. Students having inadequate professional skills, evaluated through the performance in competitive entrance exams, failed to qualify for these institutions. Since recruiters value college prestige more than skills, inequalities in professional achievements will further amplify for those who failed to qualify for prestigious educational institutions [Bordón, Braga, 2020]. Even if students from marginalized social backgrounds enter such prestigious institutes with the help of affirmative action policies, their predicted poor performance in the future hinders further professional opportunities [Frisancho, Krishna, 2016; Lopes, 2017]. This forces them to look for Government-provided jobs, where affirmative action policies are applicable, rather than jobs in the private sector, which mostly prefers professional skills [Desai, Kulkarni, 2008].

The empirical results of the study showed that the performance of students with poor social background hardly improved even after opting for professional tracks that provided occupational orientation. At the same time, one finding of the study resonates with the hypothesis of the social transformation theory that individuals with aspirational mindset can reduce inequalities. It was found that students from a marginalized background who had opted earlier for science managed to perform better than their arts and commerce counterparts at the CAT entrance exam. It clearly signifies that individuals with high aspirations performed better and had higher probability to improve their labor market outcomes as compared to their counterparts who did not select academic tracks.

The social transformation theory allows to interpret this result as follows: individuals try to enhance their ascribed status acquired by birth (caste) through efforts [Foladare, 1969; Kaufman, 2003; Linton, 1936]. Although these aspirational students with marginalized background reduced educational achievement inequalities by their better performance, they did not eliminate those inequalities completely [Becker, Mayer, 2019; Blossfeld, Blossfeld, Blossfeld, 2015; Neidhöfer, Serrano, Gasparini, 2018].

The study concludes that it is not possible to achieve transformation towards fewer social inequalities by merely providing equal opportunities for choosing academic tracks. The research results extend the idea of Barakat & Shields [2019] by identifying the importance of academic choices and previous performances along with primary and secondary educational attainment in developing economies.

5. Conclusions and policy implications

The findings of the research generate several implications for teachers and career counselors. First, in order to build familiarity with the professional tracks, early interventions ,such as ensuring success in math classes, are required [Hall, Nishina, Lewis, 2017]. Second,

more attention should be paid to culturally oriented guidance [Metz, Fouad, Ihle-Helledy, 2008; Neault, Mondair, 2011], which can help in shaping the careers of students from marginalized social groups, thereby improving their professional achievements. Third, as an individual's family and social background play a crucial role in career-related choices [Fouad et al., 2015], it becomes vital to increase societal awareness of the benefits of choosing academic tracks from early ages.

Research-based recommendations for the government could be as follows: first, the government can probably consider formulating policies that encourage schools and colleges to improve academic achievements across social groups. Government can ask schools and colleges to provide social category-wise data of achievements by students' social group. This will put pressure on schools and colleges to improve the performance of the marginalized social groups.

Second, the government can probably consider establishing elite schools, which could prepare talented students from the marginalized social groups who do not have access to basic resources [Jagnani, Khanna, 2020]. Government assistance can be in the form of college special programs aimed at preparing students for professional entrance exams, such as CAT.

Third, the unequal provisioning of education during the initial school years can enhance professional achievement inequalities [Stier, Herzberg-Druker, 2017]. Therefore, to harness the potential of educational expansion during the initial years, developing countries may focus on increasing school enrolment rates, improving teacher-student ratio, and increasing educational expenditures [Coenen et al., 2018; Valente, 2019].

Finally, there are many countries like India, those with high socio-economic inequalities rooted in the social-ethnic background of the societal groups and rigid social mobility, including sound Western economies with large number of immigrants or refugees, which could be classified as marginalized communities. Children from such marginalized groups also choose different academic tracks as compared to children from the native community [Dollmann et al., 2023]. Thus, the findings of the study are relevant in improving their educational and socio-economic status.

The study concludes that social group factor remains the strongest and most significant predictor of educational achievements even after controlling for academic track selection. Due to the data limitations, this research did not test for other social factors, including gender, age, school/university type, geographical area, and previous academic performance. Future studies could consider the above as well as more social-demographic factors, such as parents' education level, parents' employment status, family size, income, or rural-urban divide.

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What Drives the Transformation? Unpacking China's Reforms in Doctoral Education

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Abstract   This study explores the development and reform of doctoral education in China, analyzing the trends in enrollment scale, the number of students in school, and degree conferrals, as well as the diversification of doctoral education structures. These trends reflect China's growing demand for high-level research talent and strategic emphasis on promoting technological innovation. During this period, doctoral education not only achieved breakthroughs in scale but also showed new trends in discipline distribution and the expansion of professional doctoral degree categories. To ensure the quality of doctoral education, China has implemented various reforms measures, including the introduction of the "application-assessment" admission model, innovations in the supervisor appointment system, and the improvement of the quality assurance system through the collaboration of multiple stakeholders. At the same time, challenges remain, such as insufficient supervisor accountability, underdeveloped curricula, inadequate collaborative education mechanisms, and the need to enhance doctoral students' research innovation capabilities. In the future, efforts should focus on promoting regional balance, optimizing the curriculum system, and advancing the integration of industry, academia, and research to better meet the demand for high-quality innovative talent.

Doctoral education plays a critical role in cultivating high-level talent and advancing knowledge, serving as a cornerstone for national development and global competitiveness. The rapid expansion of doctoral education in China has significantly contributed to its national research and innovation capacity. The large-scale increase in high-

er education — particularly at the doctoral level—has been a major driver of growth and innovation. Quantitative estimates suggest that China's college expansion policy accounts for up to 72% of the increase in manufacturing R&D intensity between 2003 and 2018 [Ma, 2024] reflecting the essential role of advanced-degree holders in enhancing research output and technological advancement. This surge in innovation was especially prominent in exporting firms and high-skill industries, which highlights that doctoral-level human capital serves as a cornerstone of China's innovation-driven development strategy.

In recent years, China's higher education system has transitioned from a stage of massification to one of universalization. In 2023, the gross enrollment rate in higher education increased from 40.0% in 2015 to 60.2%[1]. This shift not only signifies the establishment of the world's largest higher education system but also provides a robust foundation for cultivating a diverse range of talents. This trend aligns with the global patterns observed in other countries, where the expansion of doctoral education has been strategically employed to enhance innovation and economic growth. For instance, in developed economies, the proportion of individuals attaining doctoral degrees has seen a significant rise, with an average of 1% among 25–64-year-olds in OECD countries holding such qualifications as of 2019. Projections suggest that if current trends persist, approximately 2.3% of today's young adults will pursue doctoral studies during their lifetime. This growth is driven by the increasing demand for advanced skills and knowledge in the global knowledge economy, emphasizing the pivotal role of doctoral education in fostering research and innovation capabilities [Sarrico, 2022].

The trend towards a global innovation-driven economy has intensified the demand for skills, knowledge, and higher education credentials. Graduate education, particularly doctoral programs, bears the mission of nurturing high-level talent in China. Positioned at the pinnacle of the national education system, doctoral education is closely linked to China's national innovation system, serving as the primary source of top-tier innovative talent and a reservoir for scientific research potential. It plays a vital role in enhancing comprehensive national strength and international competitiveness. High-quality doctoral education is intricately connected to China's robust national innovation system, acting as a nexus between technological productivity and innovative driving forces.

Within this context, the importance of doctoral education has become increasingly prominent. The Guiding Opinions on Accelerating the Construction of "Double First-Class" Universities issued by the Ministry of Education emphasizes the need to appropriately expand

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[1] Transcript of the 2024 press conference of the Ministry of Education. Ministry of Education of the People's Republic of China: http://www.moe.gov.cn/fbh/live/2024/55831/mtbd/202403/t20240301_1117707.html (accessed 04.10.2025).

the scale of doctoral programs, highlighting their critical role in building world-class universities and disciplines. Furthermore, the Opinions on Accelerating the Reform and Development of Graduate Education in the New Era, released by the Ministry of Education, the National Development and Reform Commission, and the Ministry of Finance, explicitly state the need for proactive planning of doctoral admissions to meet the growing demand for high-level innovative talent in the country. These policies reflect the government's high regard for doctoral education and aim to drive technological advancement and economic transformation.

However, the rapid expansion of doctoral education poses challenges in maintaining high educational standards. As enrollment scales increase, China must ensure that the quality of doctoral education is not compromised. To address these challenges, the government has implemented a series of comprehensive reforms aimed at ensuring high-quality doctoral education. Moreover, in light of the national demand for high-level talent, doctoral education must not only reach a certain scale but also guarantee the quality of training. As such, it is crucial for China's doctoral programs to align with the growing expectations of the innovation-oriented economy while ensuring that graduates are equipped with the skills and knowledge necessary to contribute effectively to scientific research and national development.

This article explores the changes that occurred in China's doctoral education system from 2012 to 2022, focusing on significant growth in scale and diversification in structure. It also examines the key reforms introduced during this period, which have sought to uphold the quality of doctoral education despite the system's rapid expansion.

1. Institutional foundation of doctoral education in China

The Academic Degrees Law of the People's Republic of China was enacted on April 26, 2024, and came into effect on January 1, 2025, replacing the previous Degree Regulations, established in 1980[2]. This law provides a comprehensive legal framework governing the national degree system, including the organization of degree awarding bodies, qualification criteria, degree conferral procedures, and quality assurance mechanisms. It emphasizes the principles of fairness, transparency, and academic integrity, aiming to strengthen the governance and standardization of degree education. By establishing clear rules and responsibilities, the law lays a solid institutional foundation for the development and quality management of doctoral education in China.

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[2] The Central People's Government of the People's Republic of China. Academic Degrees Law of the People's Republic of China / Xinhua News Agency. 2024, April 26: https://www.gov.cn/yaowen/liebiao/202204/content_6947841.htm (accessed 04.10.2025)

1.1. Degree granting institutions and governance

China's academic degree governance is structured across three key levels to ensure comprehensive oversight and quality assurance. At the national level, the State Council establishes the Academic Degrees Committee, which leads degree work nationwide and operates through an administrative office responsible for daily management of degree and postgraduate education affairs[3]. This committee also establishes specialized expert groups tasked with conducting degree evaluation, quality supervision, and research consultation.

Beneath the national level, provincial and equivalent regional governments set up their own academic degree committees. These regional bodies operate under the guidance of the central committee and coordinate degree management within their jurisdictions, allowing for localized oversight while maintaining alignment with the national standards.

At the institutional level, degree-conferring entities form Degree Evaluation Committees charged with implementing degree awarding policies, reviewing the addition or cancellation of degree programs, deciding on degree conferrals or revocations, and handling disputes and complaints. This structure balances centralized policy direction with decentralized execution, fostering both uniformity in academic standards and responsiveness to institutional contexts.

1.2. Degree types and conferral procedures

The conferral of a doctoral degree must follow a rigorous review and defense process. Candidates must first undergo expert evaluation of their dissertation or practical achievement before being allowed to proceed to the oral defense stage. A doctoral defense committee must be formed, consisting of no fewer than five members, including at least two experts from outside the degree-granting institution. The defense must be conducted publicly (except when involving classified information) and decisions are made through a vote; a two-thirds majority is required for successful defense.

If the candidate fails the defense, they may, with committee approval, revise and reapply within a stipulated timeframe. Additionally, if the committee concludes that the candidate has not reached the doctoral level but has met the requirements for a master's degree — and has not yet received one in the same field — the committee may recommend awarding a master's degree.

The law classifies doctoral degrees into two categories: academic doctoral degrees and professional doctoral degrees. Academic degrees emphasize theoretical innovation and research capacity, while professional degrees focus on practical competence and the generation of applied outcomes. Regardless of the type, all doctoral candidates must do the required coursework, complete systematic re-

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[3] Office of the State Council Academic Degrees Committee: http://en.moe.gov.cn/about_MOE/departments/201812/t20181219_364000.html (accessed 04.10.2025).

search or practical training, and successfully defend a dissertation or professional achievement to demonstrate profound theoretical knowledge and remarkable professional skills.

1.3. Degree conferral quality assurance

The law mandates that institutions authorized to confer doctoral degrees must establish a comprehensive degree quality assurance system. This system covers all stages of doctoral education, including student recruitment, training, and degree conferral, with an emphasis on transparent information disclosure and acceptance of societal supervision to guarantee the quality of degrees awarded.

A key component in quality assurance is the supervision of doctoral students. Institutions must assign supervisors who demonstrate good moral character and possess advanced academic or professional qualifications. These supervisors, who may be faculty members, researchers, or professionals with strong academic or practical capabilities, are selected through a rigorous mechanism involving evaluation, monitoring, and dynamic adjustment to ensure optimal guidance quality. Supervision may be provided by a single supervisor or through joint/team supervision as various models exist to accommodate different disciplines and student needs [Shen, Gao, Zhao, 2018].

Doctoral supervisors are expected to fulfill their responsibilities diligently, providing close oversight throughout critical stages of training. This includes strict quality control at key milestones and ongoing mentorship aimed at enhancing students' academic and professional development.

In addition to institutional measures, government bodies play an important role in quality supervision. The Ministry of Education and provincial academic degree committees are tasked with regularly organizing expert evaluations of degree-conferring institutions and programs within their respective jurisdictions. These evaluations assess compliance with the national standards and drive continuous improvements in the quality of doctoral education.

Notably, Article 19 of the Higher Education Law[4] allows qualified bachelor's degree holders to be directly admitted to doctoral programs, providing a legal basis for "direct-track" doctoral training in leading Chinese universities.

2. Overview of the development of doctoral education in China

China's expansion of doctoral education is driven by the nation's ambition to bolster its global competitiveness through innovation and technological advancement. This strategic initiative addresses critical societal needs, including the development of a highly skilled workforce capable of driving economic growth and addressing complex

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[4] Higher Education Law of the People's Republic of China: http://www.npc.gov.cn/zgrdw/npc/xinwen/2019-01/07/content_2070258.htm (accessed 04.10.2025)

challenges. In January 2025, China unveiled a comprehensive plan to build a "strong education nation" by 2035, emphasizing the expansion of graduate education and increasing the proportion of doctoral students to cultivate top-tier talent in the strategic areas[5]. Institutional efforts, such as the "Double First-Class" initiative, launched in 2015, aim to develop world-class universities and disciplines by providing targeted funding and resources to selected institutions. These policies reflect China's commitment to enhancing its educational infrastructure to meet the evolving societal demands.

The data in the following sections are based on the findings from the Annual Report on the Development of Degree and Graduate Education in China 2021–2022 [Degree and Graduate Education Research Group, 2024].

2.1. Development of doctoral education scale (2012–2022)[4]
2.1.1. Admission and total number of doctoral students

Between 2012 and 2022, the scale of doctoral admissions in China saw significant growth. In 2012, 68,781 doctoral students were admitted, and by 2022, this number had reached 138,951, representing a 2.02-fold increase, or an additional 70,170 students (Fig. 1). In comparison, master's student admissions grew from 645,715 in 2012 to 1,103,528 in 2022, an increase of 457,813 students, or 1.71 times. Although the scale of master's student admissions remained larger, the growth rate for doctoral admissions surpassed that of master's students, demonstrating the rapid development of doctoral education in China. The total number of doctoral students in 2012 was 283,615,

Fig. 1. **PhD student admissions in China (2012−2022)**
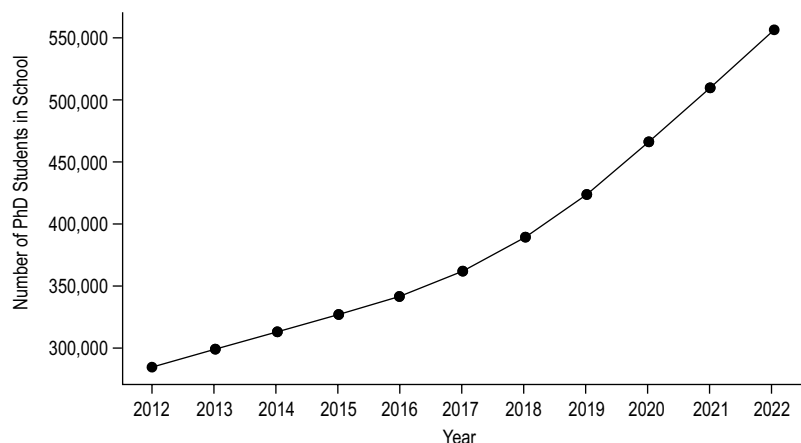
⁵ China unveils 2024–2035 plan to build 'strong education nation' / Reuters. 2025, January 19: https://www.reuters.com/world/asia-pacific/china-unveils-2024-2035-plan-build-strong-education-nation-2025-01-19/ (accessed 04.10.2025).
⁶ The data in Figure 1 — Figure 5 include the numbers of professional doctorates.

Fig. 2. **Total number of doctoral students (2012–2022)**
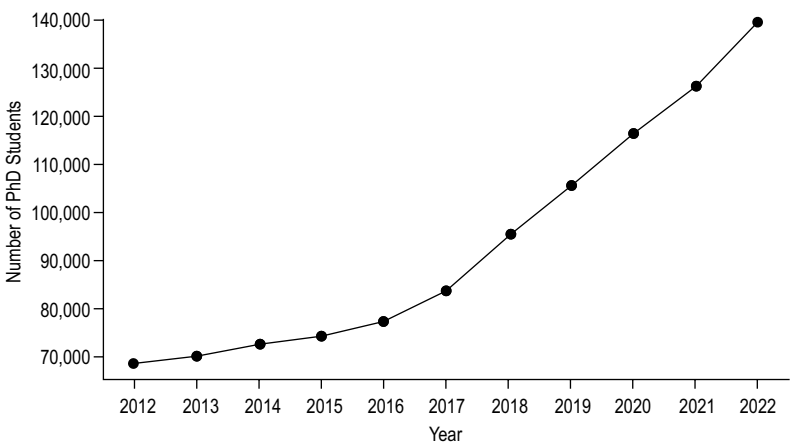
which grew to 556,065 by 2022, an increase of 272,450 students, or a 1.96-fold increase (Fig. 2). This expansion highlights the growing demand for doctoral education in China, driven by both societal needs for advanced research expertise and institutional efforts to meet these needs.

2.1.2. Doctoral degree conferral In terms of doctoral degree conferrals, the number of degrees awarded also grew significantly during this period. In 2012, 56,338 doctoral degrees were conferred, and by 2022, the number had increased to 88,036, representing an increase of 31,698 degrees or 1.56 times (Fig. 3). This growth demonstrates the successful output of China's doctoral education system, where a greater number of students are completing their studies and contributing to China's research and innovation landscape. Over the past decade, China's postgraduate edu-

Fig. 3. **PhD degrees awarded in China (2012–2022)**
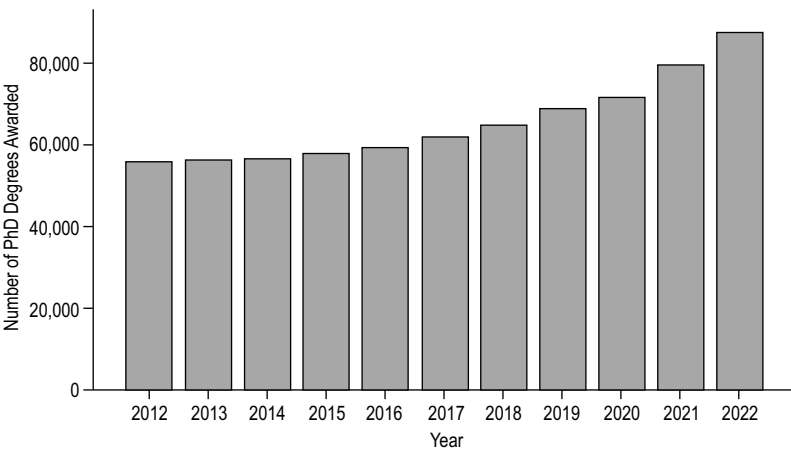
cation system has continuously expanded its training capacity, effectively supplying high-level talent to meet national strategic needs and driving scientific and technological advancement [Hong, 2023].

2.1.3. International comparison

As shown in Fig. 4, the proportion of 25 to 64-year old doctoral or equivalent degree holders in OECD countries increased steadily from 0.9% in 2014 to 1.3% in 2023, indicating gradual progress in the international expansion of advanced educational attainment. This upward trend reflects the continued global emphasis on research capacity and cultivation of high-level talent. In parallel, China has witnessed a rapid expansion in doctoral education. Between 2012 and 2022, doctoral admissions in China rose from 68,781 to 138,951, while the number of doctoral graduates increased from 56,338 to 88,036. These figures demonstrate China's growing commitment to strengthening its graduate education system. The pace and scale of this development suggest that China is aligning closely with international trends in fostering a highly educated, research-oriented workforce.

Fig. 4. **OECD population (aged 25−64) with doctoral or equivalent degree (2014−2023)**
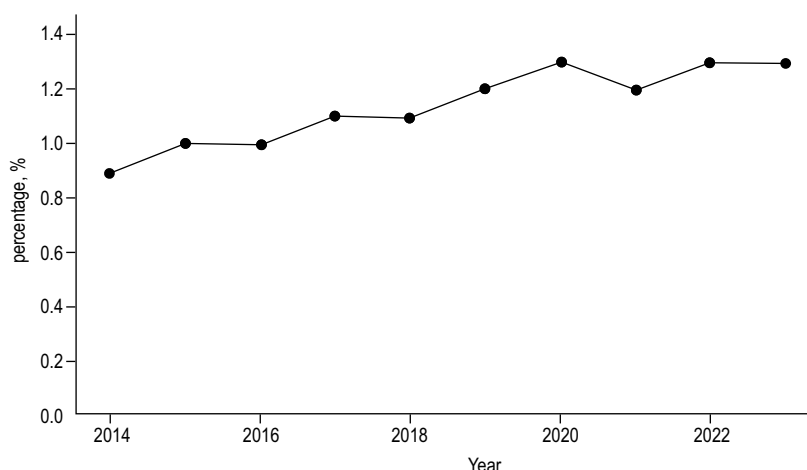

2.1.4. The distribution of doctoral education resources
2.1.4.1. Discipline distribution

In China, engineering has consistently been the largest category for doctoral degree conferrals. In 2012, engineering doctoral degrees accounted for the highest proportion of all doctoral academic degrees, representing 36.55% of the total. Together, the four primary disciplines — engineering, natural sciences, medicine, and agricultural sciences — comprised 72.15% of all doctoral degrees awarded in that year (Fig. 5). This concentration of doctoral degrees in these disciplines reflects the significant emphasis on technical, scientific, and applied fields, which are crucial to China's technological advancement and industrial development.

Fig. 5. **PhD degrees discipline distribution in China (2022)**
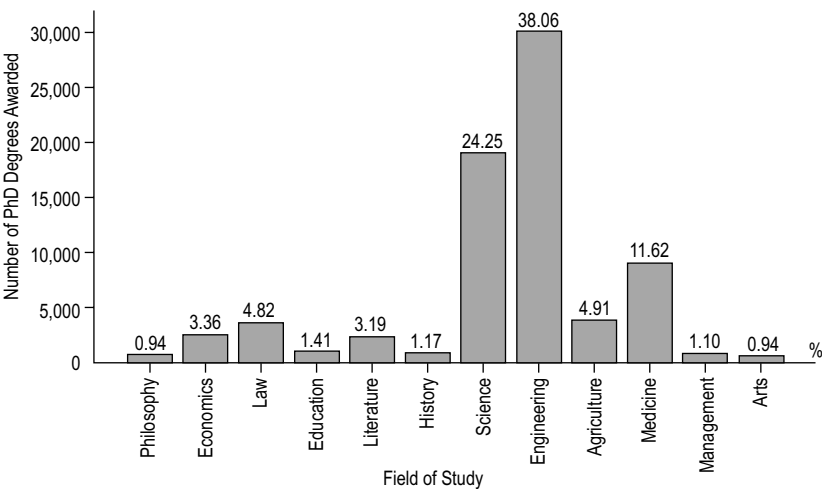
A decade later, in 2022, this trend remained largely unchanged. Engineering continued to dominate the doctoral education landscape; its share kept rising and reached 38.06%. The combined proportion of doctoral degrees awarded in engineering, natural sciences, medicine, and agricultural sciences increased to 78.84%. This stability in the distribution of doctoral degrees across these key disciplines further underscores China's focus on cultivating expertise in research fields that drive innovation and support the country's development goals. The persistence of this trend highlights the central role that STEM (Science, Technology, Engineering, and Mathematics) fields play in shaping the future of China's education and research landscape.

2.1.4.2. Regional disparities in doctoral education resources

Beijing has long been the dominant hub for doctoral education in China, serving as the central point for the country's advanced academic and research output. In 2012, Beijing awarded the largest number of doctoral degrees among all provinces and municipalities, with a share of 30.41% of the total doctoral degrees conferred nationwide. The top five regions for doctoral degree conferrals in that year were Beijing, Shanghai, Hubei, Jiangsu, and Guangdong. Notably, while Beijing held the largest share, other provinces and municipalities each accounted for less than 9% of the total doctoral degrees awarded, underscoring the concentration of doctoral education resources in these major cities.

A decade later, in 2022, the concentration of doctoral education resources remained highly centralized in the same regions. The top five provinces and municipalities with the highest number of doctoral degrees awarded were Beijing, Shanghai, Jiangsu, Hubei, and Guangdong. Despite the slight decrease to 27.44% in its share, Beijing still retained the largest proportion of doctoral degrees awarded (Fig. 6). Once

again, the other provinces and municipalities each held less than 10% of the total, further highlighting the concentration of doctoral education resources in China's key academic and research centers.

This sustained centralization of doctoral degree conferrals in major metropolitan areas reflects the uneven distribution of educational resources and research institutions across the country. The major cities such as Beijing, Shanghai, and Jiangsu, continue to dominate in doctoral student admissions, boasting a significantly higher enrollment scale compared to other regions. The development of doctoral education in China's provinces exhibits certain regional commonalities. Overall, the doctoral education development across Chinese provinces demonstrates a clear pattern of "higher in the east and lower in the west". The development of doctoral education is closely related to the economic development level of each province, as well as other factors, such as political status, the history of doctoral education development, geographical location, and the state of doctoral education in the neighboring provinces. A robust economic foundation provides continuous support for the growth of doctoral education.

Additionally, economically developed provinces are able to attract and retain more doctoral graduates by offering more employment opportunities, which in turn contributes to further economic growth and enhances local technological capabilities. This mutually reinforcing relationship between economic development and doctoral education significantly strengthens the scientific and technological potential of the region [Lou, 2023].

Fig. 6. **PhD degrees awarded by province in China (2022)**
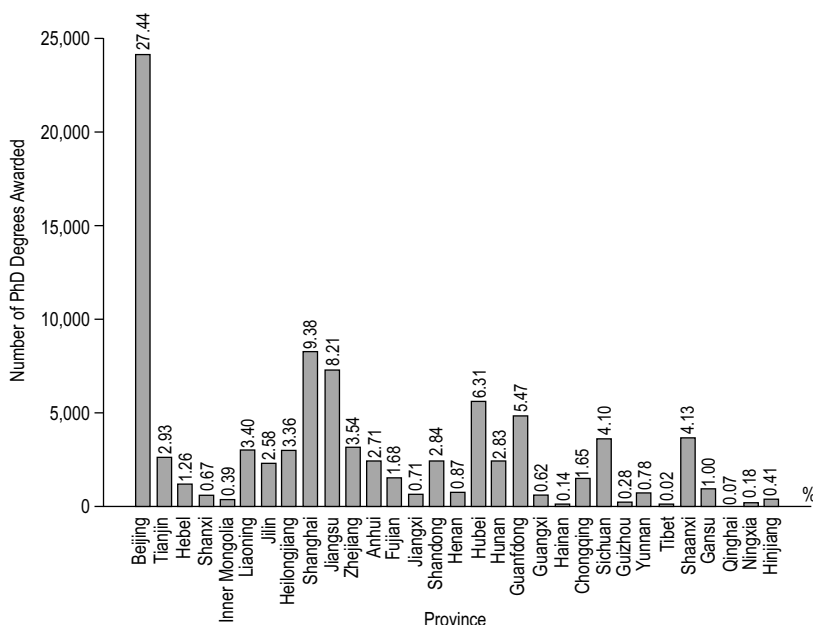
2.2. Development of doctoral education structure

2.2.1. Increase in the number of professional doctoral degrees

Professional doctorates (PDs) are distinct from traditional PhD programs in both structure and purpose, and understanding these differences is particularly important for international audiences unfamiliar with multiple doctoral pathways. Unlike PhDs, which focus primarily on producing original theoretical knowledge, professional doctorates emphasize the application of research to real-world professional practice. Candidates in PD programs are typically experienced practitioners, who aim to address complex problems within their professional contexts. The curriculum often combines coursework with a practice-oriented research project, and the assessment may include applied outputs and reflective components, rather than a purely theoretical dissertation. These programs are designed to foster "researching professionals" rather than "professional researchers", with a strong emphasis on impact, innovation, and change within specific industries or sectors [Fink, 2006; Costley, Boud, 2020]. Having originated primarily in the United Kingdom and Australia in the 1990s, professional doctorates have since expanded internationally as a response of higher education systems to the demands of the knowledge economy and the need for advanced practitioner-led inquiry [Neumann, 2005].

Between 2012 and 2022, the number of professional doctoral degrees awarded in China saw significant growth. The number of academic doctoral degrees rose from 53,011 in 2012 to 79,399 in 2022, reflecting an increase of 26,388 degrees. In contrast, the number of professional doctoral degrees awarded grew from 3,327 in 2012 to 8,637 in 2022, a remarkable 2.60-fold increase (Fig. 7). This demonstrates the rising importance and recognition of professional doctoral education in China.

Fig. 7. **Professional PhD degrees awarded in China (2012−2022)**
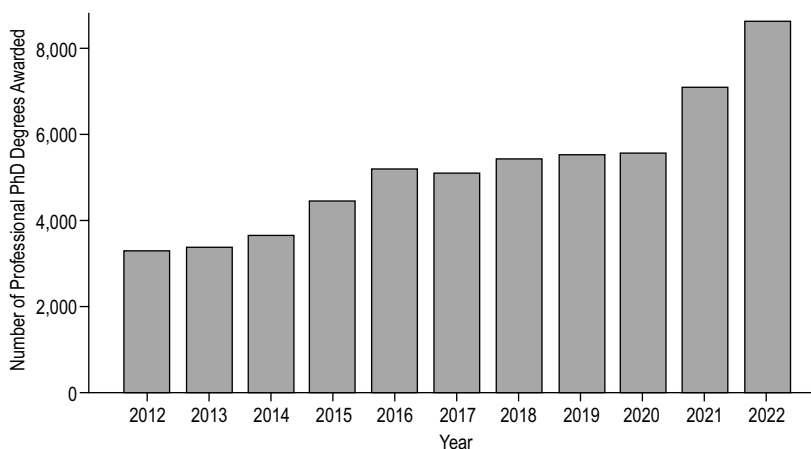
In terms of proportion, the share of academic doctoral degrees fell from 94% of all doctoral degrees in 2012 to 90% in 2022. Meanwhile, the share of professional doctoral degrees increased from 6% to 10%,

highlighting the growing emphasis on professional, practice-oriented education at the doctoral level. This shift reflects the broader trend in China's higher education system towards more applied research and specialized knowledge in various fields. A notable example of this expansion can be seen in the field of engineering. In 2012, only 178 students were enrolled in professional doctoral engineering programs, but by 2021, this number had reached 8,131.

2.2.2. Expansion of professional doctoral degree categories

The growth in the number of professional doctoral degrees is paralleled by an expansion in the diversity of doctoral programs. In 1997, China introduced its first professional doctoral degree, Clinical Medicine. Since then, the number of professional doctoral degree types has grown to 36, covering a wide range of disciplines. These programs now encompass fields such as law, social work, education, sports, international Chinese, applied psychology, translation, publishing, meteorology, electronic information, mechanical engineering, materials and chemical engineering, resource and environmental management, energy and power, civil and hydraulic engineering, biological and pharmaceutical sciences, transportation, landscape architecture, agriculture, veterinary medicine, forestry, forensic medicine, public health, traditional Chinese medicine, medical technology, accounting, auditing, music, dance, drama and film, opera, and visual arts.

This diversification in professional doctoral programs reflects China's shifting educational priorities, where both specialized knowledge and practical, industry-oriented research are increasingly valued. By expanding the range of available doctoral programs, China is better positioned to address the growing demand for expertise across various sectors and industries, thus contributing to the country's innovation and development goals.

3. Reform measures of doctoral education
3.1. Reform of doctoral admissions: The "application-assessment" system

One of the key reforms in China's doctoral education has been the introduction of the "application-assessment" system, aimed at selecting candidates who exhibit strong academic potential and innovative capabilities. Traditionally, the admissions process for doctoral programs in China relied heavily on a unified examination system, one of which combined written tests and oral assessments. This approach often resulted in a situation where a single written examination could not adequately determine a candidate's research potential and abilities. Many students selected through these public examinations were often described as "high scorers with low abilities", indicating a gap between their test performance and actual research capabilities. Studies have shown that such exam-dominant systems tend to overvalue quantifiable credentials while overlooking qualitative traits like research skills, innovation capacity, and academic motivation [Jung,

Li, Horta, 2023]. This has contributed to a decline in the quality of doctoral education, which has caused deep concern in society.

To address the shortcomings of the traditional examination-based admissions process, China has actively explored reforms in doctoral admissions. The "application-assessment" system, which draws from practices common in many Western countries, was first proposed by Peking University in 2003 as a means to shift the selection mechanism for doctoral candidates away from the purely exam-based model. In 2007, Peking University and Fudan University launched pilot programs to implement this approach. By 2020, it was reported that 274 doctoral training units had adopted this system, including all 42 of the first-class universities, showcasing a significant shift in the landscape of doctoral admissions in China.

The "application-assessment" system is characterized by two key features compared to traditional public examinations. First, it shifts the focus from the conventional written tests to application materials, which include academic transcripts, research proposals, and letters of recommendation. This allows for a more comprehensive evaluation of a candidate's academic background and research interests. Second, it expands the autonomy of faculty mentors and research groups in the selection process, empowering them to make admissions decisions based on a holistic understanding of an applicant's potential [Zhou, Huang, Liu, 2023].

This approach has been shown to better identify students who are not only academically capable but also exhibit strong intrinsic motivation for research and innovation. According to Zhou, Huang, Liu [2023], National surveys indicate that students admitted through this system outperform their counterparts in various dimensions, including professional foundations, motivation for learning, academic interests, and potential for scientific research development.

Moreover, the shift towards the "application-assessment" system is consistent with the broader trend in global higher education, where many institutions are moving away from purely exam-based selection processes and focusing more on candidates' research capabilities and creativity. By empowering mentors and experts to play a central role in admissions, the system acknowledges that a candidate's potential for groundbreaking research is often better assessed through academic experience and mentoring relationships rather than standardized testing alone [Liang, Cao, 2021]. In countries like the United States, doctoral admissions have long emphasized qualitative judgments made by faculty committees based on a range of materials, including personal statements, recommendation letters, and research experience. Studies highlight that U.S. graduate schools often rely on discipline-specific criteria and faculty discretion to ensure alignment between candidate potential and research group needs, a practice increasingly seen as effective in fostering high-quality research outcomes [Posselt, 2015;

Jung, Li, Horta, 2023]. The Chinese application-assessment system draws heavily on this model, reflecting a broader international trend toward assessing creativity, fit between the applicant and the research position, and research capacity rather than exam performance alone.

3.2. Innovation of the supervisor appointment system: Enhancing the academic vitality of doctoral supervisors

The reforms in the doctoral supervisor appointment system aim to attract scholars with diverse backgrounds and innovative approaches, thereby increasing the academic vitality of doctoral supervision teams. The inclusion of more active researchers in doctoral supervision has been associated with a greater capacity for innovation and a higher rate of interdisciplinary research, both of which are crucial for fostering an environment conducive to groundbreaking research [Zhang, 2017].

A key reform measure in this regard has been the relaxation of doctoral supervisor appointment criteria to allow more young faculty members with active research experience to assume supervisory roles. For example, since 2009, Tsinghua University has allowed the right to appoint doctoral supervisors to be decentralized to the academic committee of each department, granting more discretion to individual departments. Furthermore, the university implemented personnel reforms in 2017, allowing assistant professors to serve as independent doctoral supervisors. These changes have been instrumental in opening up new opportunities for promising young academics to participate in doctoral education, thus enhancing the overall quality of the supervision process [Yong, 2017].

The inclusion of younger faculty in supervisory roles not only reflects a shift in demographic dynamics within academia but also introduces fresh perspectives and innovative methodologies that are crucial to modern research. By incorporating these younger scholars, institutions can harness their enthusiasm and cutting-edge research ideas, which can directly contribute to a more creative and forward-thinking research environment. Young supervisors often possess recent experience with doctoral education themselves, making them relatable mentors, who can provide relevant guidance tailored to the contemporary challenges faced by PhD candidates. This mentorship model fosters an environment of collaboration and engagement, encouraging students to explore innovative ideas and interdisciplinary approaches.

As young supervisors often have a more flexible approach to research and mentoring, they are more inclined to experiment with new ideas and interdisciplinary collaborations. This openness not only enriches the academic experience of their students but also contributes to the production of research that is relevant to current societal challenges and scientific advancements.

Furthermore, by diversifying the supervisory pool, institutions can better address the needs of a wider range of doctoral candidates, encouraging inclusivity and raising the overall quality of education. This

approach aligns with global trends in higher education, where there is a growing recognition of the importance of mentorship in shaping the academic journeys of doctoral students.

3.3. Unifying multiple stakeholders to continuously improve the quality assurance system

In recent years, China has made substantial efforts to establish a robust quality assurance system for doctoral education, which integrates multiple stakeholders, including academic institutions, educational administrative bodies, academic organizations, industry sectors, and social institutions. The aim is to create a comprehensive internal quality assurance scheme, supported by external supervision mechanisms, which collectively ensure high standards of doctoral education. Such an inclusive approach not only enhances the credibility of the education system but also fosters a collaborative environment that encourages shared responsibility among stakeholders.

According to the "Opinions on Strengthening the Construction of the Quality Assurance and Supervision System for Degree and Postgraduate Education" issued by the State Council Academic Degrees Committee and the Ministry of Education[7], China has developed a comprehensive quality assurance framework for doctoral education that addresses the unique challenges of modern higher education. The system emphasizes internal quality assurance, where degree-granting institutions are responsible for maintaining high educational standards. It encourages these institutions to establish robust self-regulation mechanisms, create a culture of continuous improvement, and align their academic programs with national educational objectives.

The framework is guided by external oversight from educational administrative departments, which play a strategic role in policy implementation and resource allocation. These departments ensure that doctoral programs across the country meet standardized benchmarks through regular quality evaluations and inspections. Additionally, the involvement of academic organizations, industry sectors, and social institutions in the process helps to enrich the quality assurance system by incorporating diverse perspectives and varied expertise. This collaboration ensures that the system is adaptable to evolving educational needs and socio-economic demands.

Quality assurance is maintained through multiple mechanisms, including degree authorization reviews, which assess the eligibility and capacity of institutions to grant degrees; periodic evaluations of degree programs to verify the relevance and rigor of the curriculum; professional degree assessments to judge the practical competencies of

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[7] State Council Academic Degrees Committee & Ministry of Education of the People's Republic of China. (2014, January 29). Opinions on strengthening the construction of the quality assurance and supervision system for degree and postgraduate education: http://www.moe.gov.cn/srcsite/A22/s7065/201402/t20140212_165554.html (accessed 04.10. 2025).

graduates; and random inspections of doctoral dissertations to detect any issues related to academic standards or integrity. These measures are collectively aimed at upholding educational quality and promoting transparency, accountability, and innovation in doctoral education.

In recent years, specific quality assurance mechanisms have been piloted for professional doctoral programs, particularly in applied fields, such as engineering. One example is the practice-based degree application model[8]. This model outlines a structured quality assurance process, which includes feasibility analysis, implementation of practical achievements, submission of a summary report, demonstration and evaluation of the outcomes, and an oral defense. Notably, each key stage of this process — such as the feasibility discussion, demonstration and evaluation, and final defense — must involve industry experts. This requirement reflects a broader shift toward incorporating enterprise input into the doctoral education system to ensure that research outcomes are both academically rigorous and practically relevant. By mandating corporate expert involvement, the process helps align professional doctoral training with real-world needs, thereby enhancing quality assurance through multi-stakeholder evaluation mechanisms.

The policy also emphasizes the need for institutions to actively monitor and improve their educational practices, including improving the quality of faculty guidance, refining curriculum development, and strengthening student assessment procedures. By promoting a comprehensive quality assurance and supervision system, China aims to ensure that doctoral education meets national standards and supports the country's goal of advancing higher education and research. Administrative Departments, such as the Ministry of Education, serve as the guiding force behind these quality assurance efforts. They set regulatory standards and oversee the implementation of quality measures across institutions, ensuring that all doctoral programs meet the requisite criteria for excellence. Additionally, academic organizations and professional associations, including discipline-specific bodies, actively participate in ensuring that doctoral education remains agreed with industry and academic developments. Their involvement helps ensure that doctoral programs are responsive to the evolving needs of both academia and society. By engaging with industry stakeholders, these organizations facilitate the integration of practical insights into academic curricula, thus bridging the gap between theory and practice.

One key feature of this quality assurance system is the comprehensive set of evaluation mechanisms that have been implemented over the years. These include degree authorization reviews, evalua-

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[8] Central People's Government of the People's Republic of China (2024, October) Implementation plan for accelerating the application of "artificial intelligence plus" actions. Available at: https://www.gov.cn/zhengce/zhengceku/202410/content_6984013.html (accessed 04.10.2025).

tions of degree programs, professional doctoral degree assessments, and random sampling of doctoral dissertations. Each of these measures serves to continuously monitor and evaluate the quality of doctoral education, ensuring that academic standards are consistently upheld. For instance, a degree authorization review assesses the capacity of an institution to offer doctoral programs, focusing on factors such as faculty qualifications, research facilities, and support services. In contrast, program-level assessments concentrate on specific academic disciplines, evaluating curriculum relevance and alignment with national and international standards. Dissertation evaluations, including random checks on doctoral theses, further ensure that the research output meets high academic standards and adheres to ethical research practices [He, 2018].

Moreover, active involvement of various stakeholders fosters an environment where feedback is not only welcomed but actively sought. This feedback loop is critical for refining quality assurance processes and adapting to emerging trends in doctoral education. For example, stakeholder consultations can reveal gaps in existing programs and highlight areas for enhancement, leading to targeted reforms that address specific challenges faced by both doctoral candidates and faculty.

4. Challenges in doctoral education
4.1. Insufficient accountability of supervisors

Insufficient accountability among doctoral supervisors is a significant challenge in China's doctoral education system. Although supervision is recognized as a critical determinant of doctoral success, the system often lacks robust mechanisms for holding supervisors accountable for their role in guiding students. A national survey involving 100 doctoral supervisors across ten Chinese universities found systemic weaknesses in supervisory training, evaluation, and institutional support [Wang et al., 2013]. The study revealed that only 59% of supervisors maintained contact with their students at least once a week, indicating limited engagement and a lack of structured supervisory support in many cases. Another finding was inconsistent expectations across institutions. Additionally, recent qualitative research highlights that students often hesitate to raise concerns due to hierarchical and paternalistic academic cultures, limiting transparency and accountability [Bahtilla, 2022]. Such issues are magnified when institutions lack structured mechanisms for evaluating supervisory performance, relying instead on informal feedback or peer review. This issue is exacerbated by an overly hierarchical relationship, where students may find it difficult to voice concerns or demand a change of supervisor for inadequate supervision due to cultural norms emphasizing respect for authority. The paternalistic leadership style commonly observed in supervisor-student relationships tends to limit constructive feedback and foster a passive learning environment, impacting the quality of doctoral training [Peng, 2015].

Furthermore, there is a need for more structured accountability frameworks, including formal evaluation tools that capture supervisors' effectiveness in guiding students' research. Current practices often rely on self-assessment or peer critique, which do not adequately address the need for systematic, student-centered evaluations [Halse, 2011]. The absence of transparent criteria for supervisory roles further contributes to inconsistent quality across institutions, highlighting the need for reforms that emphasize clearer expectations and increased accountability of supervisors.

4.2. Insufficient emphasis on curriculum development

In China, the insufficient emphasis on curriculum development presents a major challenge for the quality and effectiveness of doctoral education. Despite the vast expansion of doctoral programs, the curriculum often lacks the necessary innovation and flexibility to meet the evolving needs of the rapidly changing academic and professional landscape. The existing curriculum tends to be outdated, overly rigid, and limited in scope, with a heavy focus on mandatory courses at the expense of elective ones. Recent data from the 2024 National Survey of Graduate Student Satisfaction in China further increases these concerns. The survey found that graduate students' satisfaction with curriculum design significantly lags behind their satisfaction with the quality of teaching. While over 80% of students were satisfied with faculty responsibility (82.3%) and teaching ability (81.1%), satisfaction with curriculum system rationality, content frontier, and especially curriculum practicality was notably lower: 71.5%, 72.5%, and 68.7%, respectively [Zhou, Huang, Liu, 2024]. These discrepancies suggest a systemic underinvestment in curriculum development. The data indicates that while faculty teaching is appreciated, the structure and content of doctoral programs are perceived as outdated and insufficiently tailored to students' academic and professional needs. This resonates with earlier critiques that emphasize the urgent need to restructure China's doctoral curriculum with a view to enhancing flexibility, interdisciplinarity, and applicability. This results in fewer opportunities for students to engage in interdisciplinary studies or tailor their education to specific research interests and emerging fields. Consequently, students may not gain the diverse set of skills and experiences required to excel in research, industry, or other professional settings [Zheng, Shen, Cai, 2018].

Additionally, the lack of curriculum reform means that doctoral programs are often misaligned with the global trends and local economic demands, limiting the ability of graduates to contribute effectively to national development. While some universities have taken steps to update their programs, such efforts are not widespread or systematic enough to significantly raise the quality of doctoral education across the country. There is a critical need for curriculum reforms

that emphasize interdisciplinary training, practical skills, and the integration of new teaching methods to better prepare doctoral candidates for complex, real-world challenges [Chen et al., 2018].

Reforming the curriculum to include more elective courses, cross-disciplinary subjects, and updated teaching practices is essential for fostering a learning environment that encourages critical thinking, innovation, and adaptability. Without these changes, the effectiveness of doctoral programs in cultivating high-level talent capable of driving scientific and technological advancements will remain limited.

4.3. Incomplete collaborative education mechanism

The lack of a comprehensive collaborative education mechanism between universities, industries, and research institutions poses a significant challenge to doctoral education in China. especially for that in STEM (Science, Technology, Engineering, and Mathematics) fields. While the country has made considerable efforts to expand higher education and improve doctoral programs, the disconnect between academic research and practical industry needs remains a major obstacle. According to a bibliometric comparison of university–industry collaboration in China and the United States, only 2.7% of Chinese university publications were co-authored with industry partners, compared to approximately 6.1% in the United States [Zhou, Tijssen, Leydesdorff, 2016]. This gap results in limited opportunities for doctoral students to engage in industry-relevant research, internships, and practical training, which are essential for developing skills that yield to real-world demands. The absence of a structured system for university-industry collaboration hinders the ability to foster innovation and produce graduates who are prepared to tackle complex socio-economic challenges [Zhao, Song, 2018].

Efforts to establish collaborative educational programs often suffer from inconsistencies and a lack of long-term planning, resulting in initiatives that are sporadic rather than systematic. Although some universities have attempted to create partnerships with companies through joint research projects or training programs, these efforts frequently lack the depth and sustainability needed for significant impact. For STEM doctoral students, this lack of depth is even more pronounced as their fields demand highly specialized and up-to-date knowledge from industry. The limited involvement of industry experts in curriculum design also contributes to a misalignment between skills taught in doctoral programs and competencies required by employers [Chen et al., 2019].

Additionally, the absence of incentives for companies to engage actively in educational collaboration further limits the potential for meaningful partnerships. Companies often lack motivation to invest in long-term educational collaboration projects due to a lack of clear benefits or policy support that would make such partnerships attract-

ive. Establishing policies that provide tax benefits, subsidies, or other incentives for companies to participate in doctoral training programs could foster a more integrated approach to education-industry collaboration [Fan et al., 2019].This is vital for STEM fields, where companies are often at the forefront of technological innovation and have much to offer in terms of practical knowledge and resources to STEM doctoral students.

Addressing these issues requires a multifaceted strategy, including policy reforms to encourage industry involvement, restructuring the current doctoral programs to include practical training, and establishing platforms that facilitate ongoing communication and joint initiatives between academia and industry. Strengthening the collaborative education mechanism is crucial for ensuring that doctoral education in China produces graduates who are not only academically accomplished but also equipped with the skills necessary to drive innovation and contribute to economic development, and this is of utmost importance for STEM doctoral students, who are expected to play a leading role in technological progress and economic transformation.

4.4. Further improvement needed in doctoral students' research innovation capabilities

The need for further improvement in research innovation capabilities of doctoral students is a critical challenge in China's doctoral education. Despite substantial progress in expanding doctoral programs, the innovative capacity of doctoral students remains a significant concern. Many students struggle with developing original research ideas and conducting groundbreaking work, often due to rigid training models and insufficient exposure to cutting-edge methodologies. The existing education framework tends to emphasize theoretical knowledge over practical application, limiting opportunities for students to engage in creative and interdisciplinary research endeavors [Dong, 2009].

One of the primary factors contributing to this issue is the traditional training model, which does not adequately prioritize the development of innovative skills. Current training practices often focus on rote learning and replicating established research methods, leaving little room for fostering creativity and originality. As a result, students may struggle to propose novel research questions or pursue unique research paths. Efforts to cultivate innovation are further hampered by limited funding for experimental research and an evaluation system that emphasizes publication quantity over research quality [Chen et al., 2018].

Moreover, there is a gap between doctoral education and industry needs, where students often lack opportunities to work on projects with direct practical applications. This disconnect restricts their ability to acquire problem-solving skills that are valuable in real-world settings. Addressing these gaps requires reforming the curriculum to include interdisciplinary training, hands-on projects, and industry

collaboration. Strengthening mentorship and providing access to resources that encourage risk-taking and innovation could also significantly improve the situation [Huo, Ge, 2010].

5. Future directions

China's doctoral education system continues to undergo substantial reforms aimed at enhancing quality, expanding access, and aligning training with national development goals. Despite the significant growth of the system, four key challenges persist: insufficient accountability of supervisors, limited curriculum development, weak university-industry collaboration, and inadequate cultivation of research innovation capabilities. The following future directions are proposed to directly address these concerns.

5.1. Strengthening supervisor accountability through structured mentorship programs

To address the challenge of insufficient accountability among doctoral supervisors, formal mentorship and evaluation mechanisms are essential. Structured mentorship programs, including peer-mentoring workshops, individual consultations, and supervisor training, ensure that doctoral students and their supervisors liaise closely [Szen-Ziemiańska, 2020]. Additionally, incorporating regular assessments of supervisory practices through structured questionnaires [Mainhard et al., 2009] are likely to provide actionable feedback and improve mentorship quality. These initiatives should promote accountability, professional development, and stronger supervisor-student relationships throughout the doctoral journey.

5.2. Advancing curriculum innovation to meet evolving needs

Given the limited emphasis on curriculum development in many Chinese doctoral programs, reforms are needed to promote curricular flexibility, interdisciplinarity, and real-world relevance. Integrating emerging fields, such as artificial intelligence and big data. into the curriculum, along with practical training in tools like Hadoop and Spark, could better prepare doctoral students for the demands of a technology-driven society [Gao, Sheng, Zhang, 2018]. Institutions should also prioritize curriculum reforms that encourage interdisciplinary connections, such as those exemplified by the BigKE project [Wu et al., 2017], and adopt AI-powered adaptive teaching models to enhance individualized learning outcomes [Yang, Huan, Yang, 2020].

5.3. Building robust university-industry collaboration platforms

To address the incomplete collaborative education mechanism, particularly in STEM disciplines, stronger partnerships between universities, research institutions, and industry are crucial. Establishing structured joint training programs, co-supervised research projects, and targeted government incentives might encourage sustained cooper-

ation. Learning from regional development models like the Special Economic Zones [Crane et al., 2018] and applying similar fiscal and administrative incentives in inland regions could stimulate industrial participation in doctoral training. This kind of collaboration is expected to provide students with industry-relevant experience while aligning academic output with national innovation priorities.

5.4. Enhancing doctoral students' research innovation capabilities

Improving the research innovation capacity of doctoral students requires a shift toward cultivating creativity and originality in training models. Institutions should increase support for experimental and interdisciplinary research and revise evaluation systems to value quality over quantity of publications [Chen et al., 2018]. Government funding ought to be strategically directed to support cutting-edge, high-risk projects, particularly in underfunded institutions [Yaisawarng, Ng, 2014]. Promoting policy experimentation [Han, 2020], such as pilot initiatives for interdisciplinary doctoral training and innovative supervision models, could help adapt training frameworks to the fast-changing global research environment.

6. Limitations

This study has provided an overview of provincial-level patterns in doctoral education development. However, as the educational landscape of China is vast and diverse, our paper only offers preliminary analysis of the issues. The interaction of the factors involved varies significantly across regions. Future research should adopt more fine-grained, data-driven approaches, such as regional case studies or spatial analysis, to better understand local dynamics. Special attention should be paid to underdeveloped areas to inform policies that promote balanced doctoral education nationwide.

While this study highlights the links between policy reforms, doctoral training, and national innovation strategies, it lacks an explicit, cohesive theoretical framework. We have implicitly drawn on concepts aligned with human capital theory — for instance, by discussing how doctoral expansion contributes to innovation-driven development and workforce upgrading. However, future research should more systematically integrate human capital theory and related frameworks to clarify the mechanisms through which doctoral education translates into innovation outcomes. This would enhance the explanatory power and theoretical depth of policy analysis in the Chinese context.

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Для заметок