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The Relationship Between Educational Reform and Talent Demand

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Abstract. Currently, China emphasizes the integration of education, talent, and technology. The changes in China's education system, particularly the reform of the college entrance examination (Gaokao), have received widespread attention. However, most research focuses on specific measures of the Gaokao reform and its impact on the teaching models of various subjects in high schools. There is still a lack of research on the relationship and mutual influence between education system reform and talent demand, as well as the reasons and significance of education system reform. This article analyzes the relationship between the education system and talent demand using the college entrance examination reform as an example. It concludes that the education system and talent demand mutually influence each other. Based on this, the article proposes that the new college entrance examination reform should continue to promote the cultivation of diverse talents and maintain educational equity, while selecting more outstanding talents for the nation and society.

Keywords: Talent Demand, Gaokao Reform, Educational Equity

1. Introduction

With the advancement of technology, industries such as the internet and artificial intelligence are rapidly rising, and the market's demand for talent has gradually shifted under the leadership of new productivity to innovation capabilities, adaptability, and cross-disciplinary integration abilities, etc. [1].

The changes in the demand for talent by the country and society ultimately reflect on the reform of the education system. As an important educational system from ancient times to the present, the college entrance examination (Gaokao) bears the crucial responsibility of talent selection. Its reform is more representative in responding to national policies that cultivate more specialized and well-rounded talents. Therefore, by studying the reform of the Gaokao system, it can explore the relationship between the education system and the demand for talent.

A review of existing research shows that some scholars, such as Li Muzhou and Liu Zirui, have reflected on the achievements and shortcomings of the new college entrance examination reform after ten years. They propose that further deepening of this reform should focus on enhancing the scientific rigor of grading and improving the adaptability of high school teachers and students to the new examination system. Zhao Fang, Liang Junrong, and others explored the changes in teaching models of various subjects under the background of the new college entrance examination reform,

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concluding that each subject should construct a diversified evaluation system, promote subject integration, and develop in a more scientific and comprehensive direction; however, current research generally overlooks the influence of national education reform policies, social environment, and other factors on the new college entrance examination reform [2]. There is still further research space regarding the connection between talent demand and education system reform. Therefore, this article attempts to explore their relationship to better understand the inseparable connection between the education system and talent.

2. Reform

The college entrance examination is the main method of large-scale talent selection in China, which can promote educational reform and social progress. In 2014, the State Council issued a document, marking the official launch of a new round of comprehensive reform of the college entrance examination (referred to as the new college entrance examination reform, and the one before 2014 as the old college entrance examination) [3]. As of 2024, 29 provinces (cities and autonomous regions, excluding Hong Kong, Macau, and Taiwan) across the country have implemented the new college entrance examination reform plan in five batches, all of which have basically achieved a stable rollout. This article will review and summarize the main features, policy changes, and effects of the old and new college entrance examination reforms, exploring the mutual influence of the college entrance examination education system reformation on different eras and talent demands. At the same time, it has important theoretical and practical significance for guiding students in the new era to achieve comprehensive development in morality, intelligence, physical fitness, aesthetics, and labor, as well as for cultivating top innovative talents.

2.1. Old college entrance examination

In the late 1970s in China, there was a need for revitalization. The country's demand for development was high, but the lack of talent was significant, so greater emphasis was placed on talent cultivation. Before the reinstatement of the college entrance examination, in order to alleviate the difficulties of insufficient and low-quality student sources at that time, some universities had already implemented a recommendation admission system for enrollment. After the resumption of the college entrance examination, there is a national unified examination and unified testing, where everyone is equal before scores, gradually shifting from elite selection to popularization. After the reinstatement of the college entrance examination system, the exam had a dual role for a long time: it not only selected top students but also served as a teaching evaluation tool. It primarily assessed basic knowledge, was heavily reliant on memory, and gave little consideration to knowledge systems, critical thinking, and practical abilities. In the 1980s, the selection principle of 'comprehensive assessment of morality, intelligence, and physical fitness, with preferential admission' was proposed, and thereafter, measures such as the establishment of high school archives and the admission of outstanding candidates with reduced scores were introduced successively. However, the results are not ideal; the high school graduation examination system takes on the task of evaluating students and schools, which provides space for the diversification of subjects set for the college entrance examination in the future.

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2.2. New college entrance examination

The old college entrance examination implemented a traditional division of arts and sciences, which is beneficial for cultivating specialized talents. Education under a multicultural background increasingly aims to cultivate talents with personalized, differentiated, and innovative development. In 2014, the new college entrance examination reform was launched, and the first and second pilot provinces and cities, such as Beijing, Shanghai, Zhejiang, and Shandong, successively implemented the '3+3' subject selection model. The increase in the freedom to choose subjects has expanded the options available to students. By choosing according to their interests and career plans, it not only makes the high school talent cultivation program more flexible and diverse, but also enhances students' enthusiasm for learning to a certain extent.

In the old college entrance examination system with a division between arts and sciences, the two types of subject selection target different university admission majors, with no overlap, and the two subject selections are ranked separately. While the new college entrance examination reform implements the Elective Subject System, it has resulted in different combinations of subjects, making it impossible to score and rank them separately. The differences in difficulty among different subjects during the exam and the varying abilities of candidates lead to an inability to compare raw scores. In order to align with the Elective Subject System and ensure the fairness and scientific nature of the education system, various pilot provinces (cities) for the new college entrance examination reform have adopted Standardized Score Conversion. Although there are differences in the rules of the Standardized Score Conversion across different batches and provinces, the basic steps are generally similar: First, the original scores of candidates in each subject are ranked from high to low to define different levels. Then, the proportion of the number of people in each level is set, and the score ranges corresponding to the levels are proportionally converted based on the original scores obtained by the candidates. Convert the base number to the actual number of people who took the exam for this subject and achieved valid results [4]. The Standardized Score Conversion is an inevitable result of the new college entrance examination reform that allows for the Elective Subject System. It effectively addresses the issue of non-comparability of scores between different subjects. Using proportional conversion methods allows for the addition of scores from the re-selected subjects while maximizing the consistency of scores and rankings of candidates in those subjects, thus maintaining the fairness of the college entrance examination [4].

As an education system responsible for talent selection, the college entrance examination must inevitably consider the issue of 'educational equity' and must pay attention to the needs of different social classes and the demands of relevant participants. Since the resumption of the college entrance examination in 1977, China's enrollment policies have continuously changed. The former national unified exam for the college entrance examination has broken the university recommendation admission system, shifting education from elitism to mass education. However, the economic development levels in different regions have led to an uneven educational level. To balance 'supporting the weak' and 'selecting the excellent', the country has promoted the Special Enrollment Program for higher education institutions. The 'Special Enrollment Program' in higher education refers to specific enrollment plans by key universities targeting rural, remote (including ethnic minority), and impoverished areas. This includes the 'National Special Program' aimed at directed enrollment in rural impoverished areas, the 'University Special Program' for separate enrollment of rural students, and the 'Local Special Program' for local key universities to recruit rural students [5]. The policy adheres to the principle of 'capability first', originally aimed at promoting the fair distribution of educational opportunities and quality educational resources. Since the implementation of this policy, the number of students from rural and remote impoverished areas

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who have been admitted to key universities has significantly increased, and the opportunities for students from rural and remote (ethnic, etc.) impoverished areas to access quality educational resources have also greatly improved [5].

3. Relationship

3.1. Social and policy-driven reform of the education system

The above text detailed how the development of productivity and the changing demand for talent by the state in different eras have led to the transformation of the college entrance examination education system. In addition to the college entrance examination, other educational systems are also affected by the above factors. For example, the implementation of the "Double Thousand" Plan in 2025 is an educational reform that arises alongside the ongoing decline in birth rates and issues of unequal distribution of educational resources. Guided by industrial demand and national strategy, focusing on market needs, and addressing the urgent talent requirements brought about by the rapid development of future industries, strategic emerging industries, the transformation of traditional industries, the digital economy, and the green economy, it will promote the establishment of 1, 000 'micro-majors' and 1, 000 vocational skills training courses nationwide. These will mainly cover 60 construction directions across 12 key industrial areas, including next-generation information technology and artificial intelligence applications, to help graduates enhance their professional skills and promote employment [6]. The aforementioned evidence indicates that the development of society and changes in national policies have a reconstructive effect on the education system, promoting reforms in the education system.

3.2. The structural shaping of talent supply by the education system

The college entrance examination (Gaokao) is the main method of large-scale talent selection in China. As a fundamental educational system in the country, the Gaokao can further supply talents for the nation and society through the selection of individuals, playing an important role in promoting social mobility, ensuring educational equity, and enhancing national competitiveness. From the perspective of talent selection, more than 10 million candidates take the college entrance examination each year to attend various schools and receive more specialized education, providing a solid foundation for China's modernization. Graduates from key universities entering critical fields of work, including the 'Strong Base Plan' of the new college entrance examination reform, have selected a large number of outstanding talents to become the main force of technological innovation.

The reform of the education system has also played an important role in supporting social equity. As mentioned above, the special admission policy has recruited nearly 1. 1 million students from its implementation in 2012 to 2023 [7]. Some scholars found through qualitative interviews that the Special Enrollment Program not only improves the college entrance examination situation for high schools in counties, selecting more outstanding talents, but also attracts some high-quality students back to the counties, promoting a virtuous cycle of 'student source - college entrance exam results', thereby further promoting regional development and poverty alleviation [8]. It can be seen that education, talent, and strategy are a whole, and the reform of the education system to adjust the talent selection and supply system can better adapt to social demands and national strategies.

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4. Problems and solutions

4.1. Current problems and challenges exist

The new college entrance examination reform is a 'renewal of the old system' based on the old exam, and it is a never-ending process of continuously discovering and improving problems. It covers a wide range of areas and involves complex links. It faces new problems and challenges in aspects such as Standardized Score Conversion, comprehensive quality evaluation, and regional development levels. Clarifying these issues and their root causes is an important foundation for further deepening the college entrance examination reform. As mentioned above, some provinces (cities) implementing the new college entrance examination system have also adopted a grading system to accommodate the free subject selection policy, but there are certain drawbacks. The final grades are assigned based on the ranking and proportion of students' raw scores, which means it is influenced by the difficulty level of the exam and the number of candidates, diminishing the differences in student performance and hindering the emergence of potential top talents [3]. At the same time, due to the higher difficulty of studying history and physics compared to other subjects, the "3+3" model has also led to a decline in the number of students choosing to take physics and other subjects, as well as an increase in the difficulty of admissions for related university programs [9]. In addition, it is relatively difficult for many regions with weak educational resources to implement a variety of subject combinations, ultimately resorting to traditional divisions between humanities and sciences or establishing classes based on a few combinations with a large number of students.

The new college entrance examination reform is expected to eliminate the reliance solely on test scores and promote a diverse admissions process through comprehensive quality evaluation. However, surveys show that 80. 20% of students believe that comprehensive quality evaluation is a very utilitarian approach when filling it out as a method of college admissions; 65.84% of students believe that comprehensive quality evaluation has the phenomenon of score inflation and does not reflect true abilities and level [10]. On the other hand, the weight of the comprehensive quality evaluation in university admissions is still relatively low, and its application scale is quite limited. After more than seven years of pilot exploration, only seven universities in Beijing have implemented admissions based on comprehensive quality evaluation [11].

The implementation process of the new college entrance examination reform is also constrained by the varying levels of educational development in different regions. Because it is necessary to identify and solve problems through pilot programs, the reform is first trialed in the eastern region, with gradual implementation in the central and western regions, utilizing the relatively rich educational resources in the eastern region to improve the design of the college entrance examination system. However, there is a lack of samples from the reform in the central and western regions, and it cannot change the objective reality of relatively insufficient educational resources in these areas. As mentioned above, after the implementation of the free subject selection system, the combinations of subjects selected by students have increased. However, the implementation of the subject selection and examination system requires high schools to adopt a class-switching teaching model, which poses higher requirements for teaching staff and facilities in the central and western regions. Additionally, provinces that started the new college entrance examination reform in the third batch and afterwards commonly face a shortage of high school teachers, with a teacher gap rate of 21% to 50%. Furthermore, 61. 1% of per-student public funding is below standard, and many high schools supporting subject selection and class-switching teaching have hardware facility

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shortages ranging from 26% to 50% [12]. The imbalance in educational development levels between regions is a reality that the new college entrance examination reform cannot avoid.

4.2. Targeted suggestions and measures

The issues faced by the new college entrance examination reform mentioned above urgently need to be rectified. In response to the problems caused by the grading system, such as the decrease in the number of students choosing history and physics subjects and the inability of the grading system to reflect the overall level of students, relevant measures have been taken to improve the situation. Starting from the third batch of pilot provinces and cities, a "3+1+2" subject selection model is implemented, where students must choose one from history and physics and then select two from the remaining four subjects. This model can avoid the utilitarian tendency of some students in subject selection, while balancing the diverse needs of students, the demand for talent in university majors, and the status of the two foundational courses, history and physics. For regions with weak educational resources, this model reduces the combination of elective subjects to 12, thereby lowering the difficulty of matching school resources and teaching classes. In certain areas, a grading system based on level score implementation is used as a reference, setting subject ability standards for elective subjects, and ensuring a roughly uniform difficulty level for the exam papers of each elective subject. Therefore, students' grades are not only determined by the number of candidates and their raw scores but also related to subject ability factors. This approach can help to a certain extent avoid interference from various factors on students' grade results, which is beneficial for enhancing the validity of grade scores.

In response to the formalization and utilitarian issues of comprehensive quality evaluation, the country can first support a group of "Double First-Class" universities to take the lead in piloting comprehensive evaluation admissions. During the pilot process, they can explore how to operate and improve the comprehensive quality evaluation. Then, further optimize the college admissions mechanism based on 'two bases and one reference', comprehensively examine non-intellectual factors such as moral, physical, aesthetic, and labor qualities, and build a comprehensive evaluation method combining selective testing and standard-oriented evaluation [13].

To address the issue of uneven educational resources in the reform of the gaokao (National College Entrance Examination) and the imbalance of regional development in China's modernization process, supportive policies can be implemented, where eastern regions provide targeted support to western regions in education, sending a substantial amount of teacher resources to areas lacking educational resources, while also providing subsidies to teachers. Currently, regional special policies have been adopted, such as additional points for the gaokao for remote areas and ethnic minorities, among others.

In summary, the process of reform is arduous and torturous, a gradual and long-term process. Often, "once a law is established, a new disadvantage arises".New reform measures, while eliminating a certain flaw, often generate new and even more difficult problems. Therefore, relevant reforms must first be piloted and then gradually promoted based on sufficient testing, seeking optimal outcomes and approaching educational equity through continuous improvement [14].

5. Conclusion

This article studies the relationship between education system reform and talent demand using the case of the new college entrance examination reform, analyzing the three main policy changes of the reform and their impact on the talent selection mechanism. It concludes that factors such as national

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strategy and market influence talent demand, and while pushing for education system reform, the supply of talent is also affected and shaped by the education system. The new college entrance examination reform has been underway for 11 years since 2014, during which a series of pilot programs in various provinces and cities have revealed drawbacks such as a single talent training model, uneven distribution of educational resources, and an inability to reflect students' overall abilities. This article proposes some suggestions and relevant measures that have been taken. However, it should be made clear that in the dynamic balance of relationships, the education system is always in a state of reform. Under the background of self-reliance and self-improvement in science and technology, as well as high-quality development, the reform of the college entrance examination should adhere to the principles of 'dynamic coupling, comprehensive synergy, and competency leap', continuously upgrading the resilience and creativity of the national talent supply system, laying the foundation for gradually achieving educational equity.

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