

# The Role of China's Teaching Research System in Promoting Evidence-based Reform in Education: A Case Study of Jiangsu Province

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**Abstract.** *Teaching research system is a unique professional community of education and teaching research in China. It is an important driving and leading force in promoting evidence-based reform in education in China. Using fifteen-year exploration of evidence-based reform in education in Jiangsu Province as a case, this paper presents the ways and characteristics of evidence-based reform in education in China, with a focused analysis of the role of teaching research system in the reform. Despite its uniqueness, China's evidence-based reform in education can still contribute experience to its world counterpart.*

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## Introduction

“THE 4th Five-Year Plan for National Economic and Social Development of the People's Republic of China and the Outline of Long-term Objectives for 2035” emphasizes the orientation and objectives for the policy “building a high-quality education system”. Promoting education reform through assessment mechanisms and building a high-quality education system are one of the important paths to drive high-quality development during the 14th Five Year Plan period. However, in the practical reform, there are still some problems, such as backward assessment concepts, unscientific assessment tools, inaccurate analysis and diagnosis, and unremarkable effects. To prevent subjective or even emotional judgements and stimulate sound and reasonable educational reform is essential in improving the quality of education and teaching and in building a powerful education system.

In fact, how to make educational decision-making more rational and effective has not only been an issue faced by China, but also by the whole world. Amidst this situation, the evidence-based reform came into being in the 1980s, providing a possible way to address this issue. Being “evidence-based” refers to the concept that any decision, opinion, or conclusion must be based on solid evidence drawn from scientific research. The evidence-based reform was meant to reduce the randomness in educational development, ensure that educational reform complies with scientific logic, and achieves the goal of educational development in a more efficient and steady way. Up till now, the evidence-based reform, as an important driver in global educational reform and development, has made remarkable achievements (Slavin & Cheung, 2019; Slavin et al., 2021).

In this context, the importance of acquisition and use of scientific evidence has been increasing in China's educational reform and development. Jiangsu, as a province with a high level of socio-economic and educational development, started the survey of student academic quality in basic education in 2006. Since then, following the principles of evidence-based reform, Jiangsu has made great efforts in pursuing effective and rational surveys and attaining a large amount of scientific evidence in improving the efficiency and quality of education and teaching. In driving the evidence-based reform of regional education, the unique teaching research system has played an important part. Teaching research institutions at all levels contribute to the search for laws of effective education and teaching, summarize and promote typical experience and effective practice through research results feedback, evidence-based reform projects and multi-party cooperation. As a result, Jiangsu succeeds in finding the path for evidence-based reform in education with Chinese characteristics.

As part of the global wave of evidence-based reform in education, China started relatively late, but has been making rapid progress. By taking Jiangsu as a case and analyzing its evidence-based reform process, this study presents the patterns and characteristics of China's evidence-based reform in education and examines the roles of China's teaching research system in this reform. Although China's mode of promoting evidence-based reform through its unique teaching research system cannot be used by

other countries directly, considering China's huge volume and the important role of the teaching research system in promoting the development of high-quality education, we believe the general laws inferred from its exploration can be used as references for global educational development.

## **China Teaching Research System**

China's basic education is stereotyped as a process in which rigid, intensive and authoritative exercises and training are emphasized by teachers in pursuit of academic achievements. In this process, educational outcomes depend mainly on the investment of time, energy and even money, while cultivation of students' independent inquiry ability and teacher's search for education and teaching methods are ignored. It is believed that when bringing excellent academic performance to Chinese students, the current practice also causes problems such as heavy academic burden and unfavorable development of high order thinking abilities. For this reason, Zhao (2014) believes that China may have the best and at the same time the worst education system in the world. In such an education system, students may be able to cope well with standardized examinations and obtain better exam results but have difficulty in developing other important skills based on individual talent.

We believe that such stereotyped ideas are biased in that they fail to cover the other side of China's basic education. In fact, in the basic education area, China has established a complete and powerful teaching research system. Some people held the view this system is a simulation of the teaching research organizations of the former Soviet Union. In recent years, more researchers come to believe that China's teaching research system is the result of domestic practice and exploration (Liu, 2021). It is thought to have originated in the late Qing Dynasty when the then-education department began the trial to build teaching research institutions and implement teaching research policies to meet the demands for school system reform. After the National Government was set up in 1912, it strengthened the guidance and survey of school teaching through a series of organizational construction, which laid the foundation for the establishment of China's education system. After the founding of the People's Republic of China in 1949, a complete teaching research system covering the whole country has been gradually established. It started with learning from the teaching research system of the former Soviet Union, and then built up China's own system with Chinese characteristics based on domestic practice, which is not only the result of inheritance and development of the previous systems, but also that of exploration under the new historical background (Li, 2014).

To date, China has built up a teaching research team of nearly 100,000 staff and a five-level working system. In 2019, the State Council issued the document named "Opinions on How to Deepen Education and Teaching Reform and Comprehensively Improve the Quality of Compulsory Education,"<sup>1</sup> which not only fully affirmed the professional and supportive role of teaching research in basic education, but also put forward a series of tasks and requirements on how to strengthen teaching research in the next stage, further reinforcing the role and status of the teaching research system. Chi-

na's teaching research system has become a professional community for the growth of Chinese teachers and the improvement of education and teaching quality. Its functions include training and guiding teachers, engaging teachers in teaching research and directing teaching reform. Some scholars believe that emphasis on teaching research is advantageous to Chinese teachers, and the research itself is far superior to the general in-service training received by foreign teachers (Chen, 2021). Given that, simply attributing the excellent academic achievements of Chinese students to highly intensive learning is somewhat biased. What worth noticing is the significant positive impact of China's teaching research system on the educational reform.

Furthermore, China's teaching research system is not only a conglomerate of professional research institutions, but also undertakes certain administrative functions. In terms of organizational structure, it mainly consists of teaching research offices at all levels, from the central to local. The system exerts vertical and centralized management to implement the national policies on education through all kinds of teaching research programs. In addition, teaching research offices at each level can also set up their own teaching research projects and reform measures according to the specific needs of regional education reform and development. Therefore, the system is run with a management mode combining centralization and decentralization. Moreover, although China's teaching research offices at all levels exist in the form of "research institutions", they are also responsible for formulating educational and teaching policies, managing scientific research projects and funds, assessing and displaying teaching scientific research outcomes, etc. Because these roles are closely related to the development of schools and teachers, the "instructions" issued by teaching and research offices are normally highly valued and seriously implemented by schools at all levels. Compared with Western teaching research institutions and professional bodies of teachers, China's teaching research system has stronger resource allocation and administrative power. Such power enables China's teaching research system a strong capacity to organize and implement broad, highly intensive and targeted reforms and experiments (Liang et al., 2010; Lu & Shen, 2010).

In the 21st century, Chinese educators have significantly increased awareness of scientific evidence acquisition, and accordingly, made great progress in the improvement of teaching quality and effectiveness. With the expansion of the influence of evidence-based reform, how to promote evidence-based reform with Chinese characteristics has become an important topic in China's education community. Early this century, Jiangsu established a provincial academic survey system for the purpose of accurate assessment of student academic performance and exploration of teaching effectiveness, and on that basis, vigorously promoted evidence-based reform in education. In this process, the teaching research offices in primary and secondary schools in the provincial teaching research system played an important role in the reform and in harnessing the direction of the reform. Citing Jiangsu as a case, this article will further explain the progress of evidence-based reform in China and how the unique teaching research system works in this momentous reform.

## **Fifteen-Year Evidence-Based Reform in Jiangsu Province**

In 2006, Jiangsu initiated the follow-up evidence-based reform, based on the provincial survey of basic education quality. In the initial phase of the reform, Jiangsu relied on the survey of academic performance to obtain promising evidence from relevant research. After further accumulation of such evidence, the Provincial Teaching research Office arranged a series of follow-up reforms through the teaching research system, so as to obtain more stable evidence and reform experience. The fifteen-year reform can be divided into four stages.

### ***Preliminary Stage of Exploration (2006-2012): Systematic Study and Team Building Jiangsu***

In 2008, the Provincial Basic Education Quality Survey Center of Jiangsu was established, the first of its kind in China. Efforts were made in improving the survey rules and methods and building a stronger team with expertise. Through cooperation with the national project team and participation in survey projects, the Center accumulated surveying experience, and formed work specifications and relevant supporting systems. After that, three rounds of survey of compulsory education quality were carried out in Jiangsu Province, which help build up practical experience and laid a foundation for follow-up work.

### ***Practical Stage of Reform (2012-2016): Tool Innovation and System Construction***

A team of experts in academic quality survey were built in Jiangsu Province to study and create academic quality standards in line with the teaching situation of the province. They were engaged in research and development of assessment frameworks and tools for students' core skills and key abilities, in establishing the comprehensive index assessment system of student academic quality in compulsory education in Jiangsu Province, and in creating a feedback system of survey result. Xishan District and Binhu District of Wuxi City and Hongze District of Huai'an City were chosen to carry out the follow-up reform based on the analysis at the city district and county levels and the cooperative research on how to improve the quality of regional compulsory education. The pilot reform of improving the teaching management level based on the assessment and analysis was conducted in Nanjing foreign language school Xianlin Campus.

### ***Follow-Up Stage of Implementation (2015-2018): Model Construction and Project Promotion***

Under the guidance of evidence-based reform theory, the follow-up reform projects were implemented, and the working model of regional education quality improvement put forward. In 2015, the Provincial Department of Education set up “the Major Follow-up Reform Program Based on the Assessment and Analysis “. Twenty-nine key follow-up projects were launched at the levels of city, county, and school to promote the practical application of survey results of academic quality. A number of role models of the follow-up reform emerged, such as Suzhou Industrial Park, Nanjing Qinhuai District and Nanjing Foreign Language School Xianlin Branch. In 2017, the Provincial Teaching research Office, in cooperation with Nanjing Pukou District Government and other Institutions, carry out an evidence-based experimental intervention research to improve the quality and practical effectiveness of evidence-based reform.

### ***Finalizing Stage of Promotion (2018-2021): Results Refinement and Application Implementation***

Cooperating with academic institutions like Nanjing Normal University, the Provincial Teaching research Office strengthened scientific research and reinforced application of survey results. As a result, the evidence-based reform model of Jiangsu’s education was formed, which effectively integrates the academic research, teaching research management and the teaching practice of the front-line teachers and facilitates scientific decision-making and scientific ways of teaching. It solved the problems of over reliance on experience and lack of rationality and effectiveness in the process of educational reform and development. The popularization and application of this model in the whole province has greatly improved the quality of education and teaching and promoted the all-round development of students.

## **Evidence-Based Reform in Education Led by the Teaching Research System in Terms of Organization, Method, and Model**

To date, the survey of basic education quality has become a powerful driver to Jiangsu’s educational experiment and reform. With the joint efforts of multiple departments and institutions, Jiangsu Province has built organizational, back-up and working systems for evidence-based reform based on the survey of education quality, with scientific research as major duties and practice improvement as the objective.

### ***Academic Survey System***

At present, Jiangsu’s survey of basic education quality covers all the main subjects at the compulsory education stage and all cities and counties in the province. Teaching research offices at all levels make contributions to the wide-coverage and completeness of this survey system (see **Table 1**). Jiangsu province attaches great importance to the construction of a professional survey team, and continuously raises the academic level

**Table 1. Survey Sample Size in Jiangsu Province over the Years (2006-2020).**

Year	2006	2008	2010	2012	2014	2016	2018	2020	Total
Number of students	113,438	174,747	194,675	197,586	213,585	224,763	262,245	375,086	1,756,125
Number of students	28,473	35,759	31,458	33,636	34,971	37,484	40,407	54,744	296,932
Number of principals	3,314	4,563	4,182	4,441	4,590	5,121	5,354	5,607	37,172
Number of schools	1,762	2,290	2,109	2,260	2,453	2,695	2,808	2,917	19,294

of the survey team by introducing professionals and strengthening personnel training. A full-time survey and analysis team of more than 150 staff has been built and made an important force in promoting evidence-based reform.

### ***Scientific and Accurate Assessment Tools***

The lack of scientific and accurate assessment tools has always been a factor restricting China's evidence-based reform in education. To solve this problem, the Provincial Teaching research Office not only hires experts to participate in the preparation of questionnaires, but also organizes special personnel to analyze the assessment tools of PISA and other international projects, so as to absorb the theories, experience and methods of those classic assessment projects. Focusing on assessing student core skills and key abilities, the Provincial Teaching research Office first developed complete assessment tools and investigation tools for Chinese, mathematics, English of primary school and Chinese, mathematics, English, physics, biology, geography of junior middle school and produced more than 15,000 survey and analysis reports on education quality in 11 categories. Cutting-edge and innovative, the assessment tools not only have good reliability and validity and high accuracy, but also solve the assessment problems in non-cognitive factors, high order thinking dispositions and other correlative factor scales, in the context of national conditions and teaching conditions, (see **Figure 1**).

Furthermore, Jiangsu Province has developed a comprehensive index system for survey of basic education quality in Jiangsu Province by taking reference from research results of other surveys of education quality at home and abroad (see **Figure 2**). This index system can not only survey students' learning, but also comprehensively analyze correlative factors, processes, mechanisms, and results, respond to the key, difficult and hot issues of educational reform and development, and evaluate the implementation effect of educational policies and measures. Based on these tools and indicators, a complete and accurate survey information system for Jiangsu learning and teaching is created. Being comprehensive, practical and scientific, this system is in the leading position in China, providing accurate and high-quality evidence for the improvement of education quality in Jiangsu.

### ***Follow-Up Educational Experiments and Evidence-Based Reform***

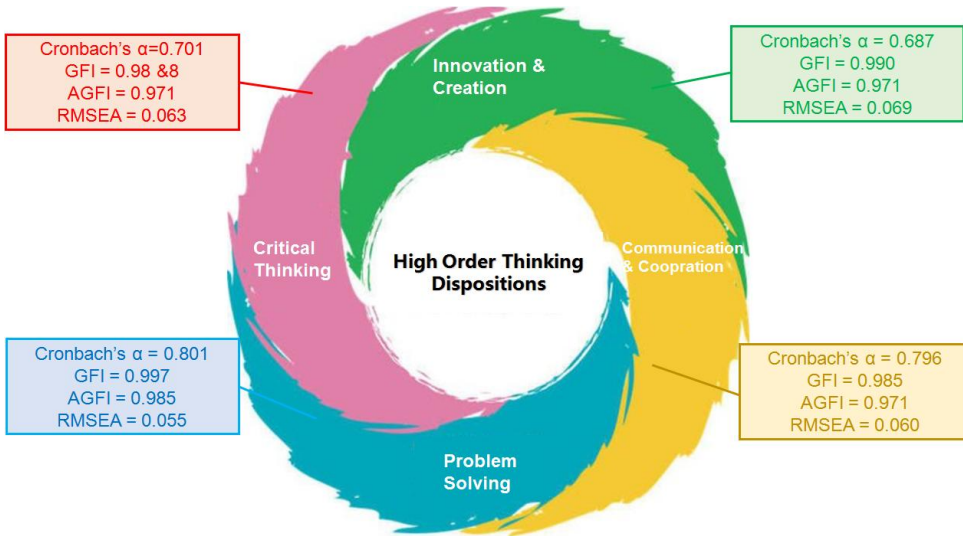


Figure 1. Test Results of Measurement Dimension, Reliability and Validity of High-Order Thinking Disposition Scale for Primary and Middle School Students.

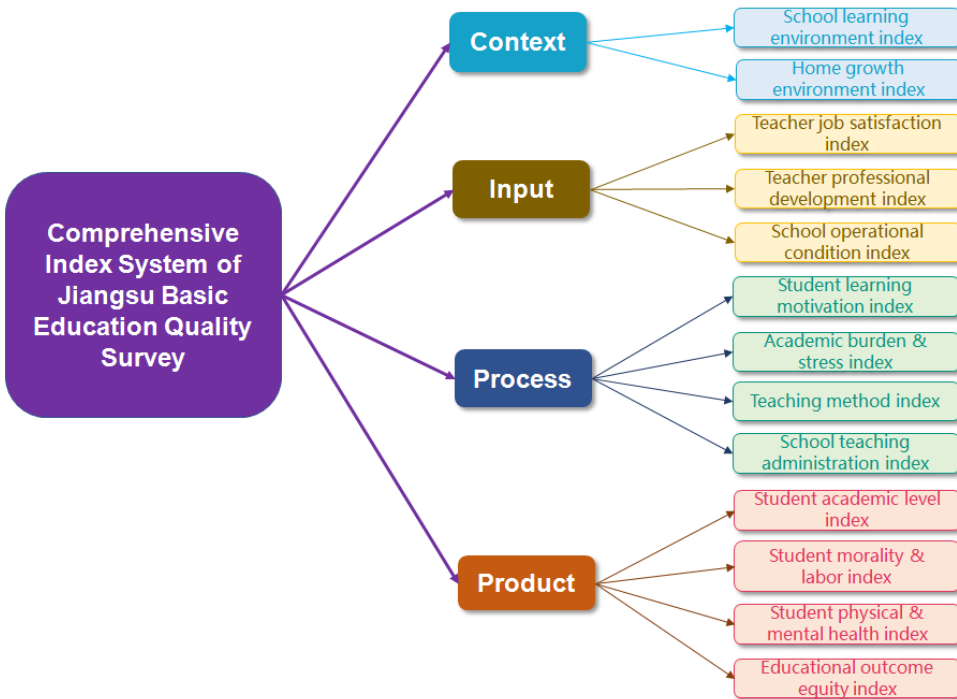


Figure 2. Comprehensive Index System of Basic Education Quality Survey in Jiangsu Province.

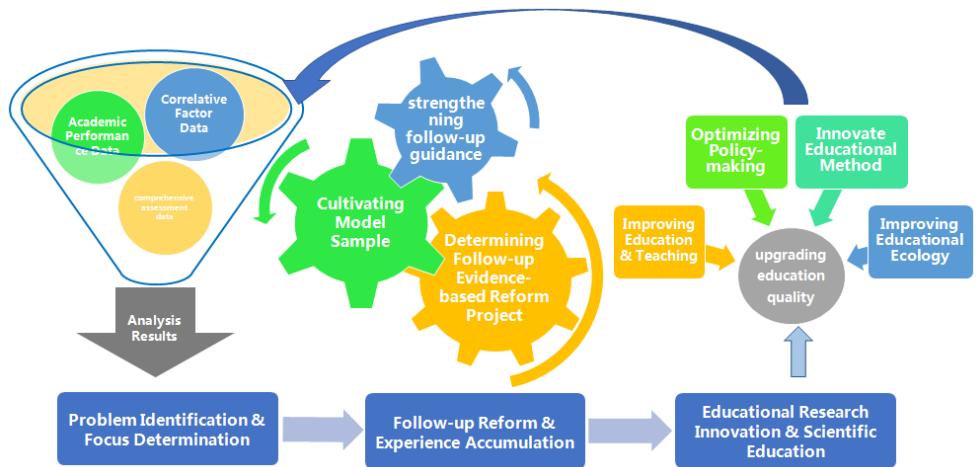


Figure 3. Implementation Model of Follow-Up Evidence-Based Reform.

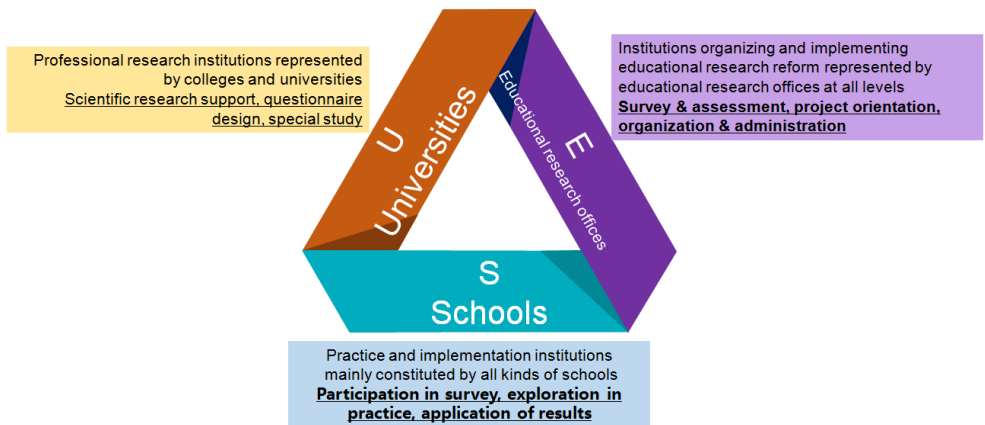


Figure 4. Multi-Party Cooperative Reform Community.

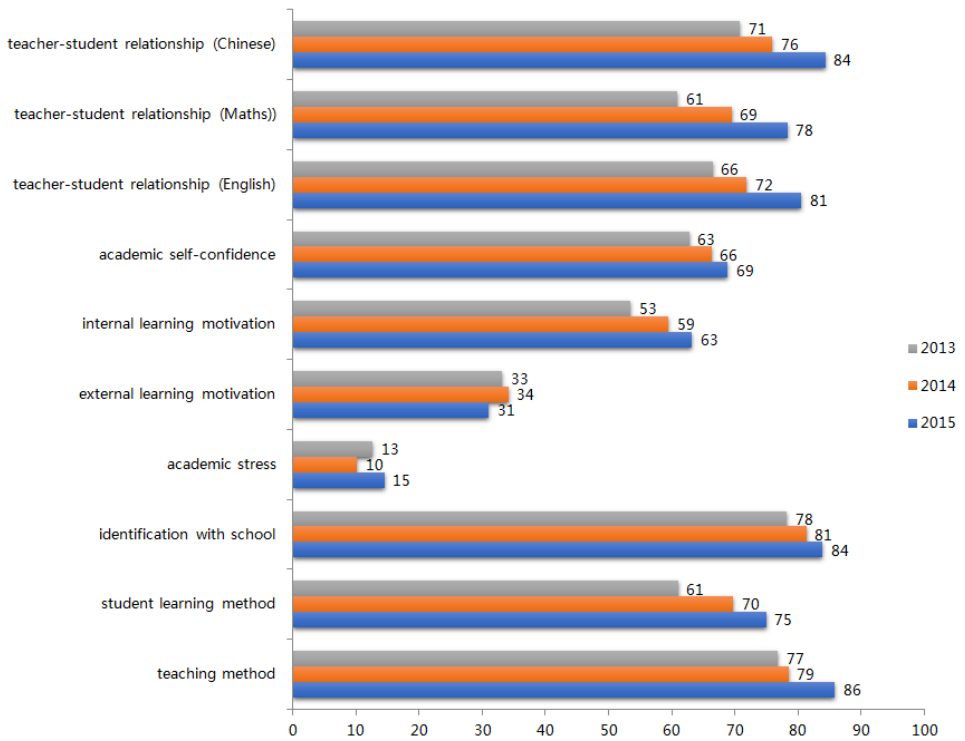
The evidence-based education reform in Jiangsu Province proceeded after the completion of survey. The Provincial Teaching research Office started to address the relevant research findings and to promote their application in the front-line teaching practice, with the purpose of improving the education and teaching quality based on scientific evidence. In this regard, Jiangsu's teaching research system creatively organized and implemented the "follow-up reform" using the academic survey data analysis. The "Follow-up Reform Program Based on Assessment and Analysis" involved 29 projects in the whole province, including 2 entrusted projects by colleges and universities, and 9 projects at each level of district, city, county and school. From 2017, to integrate survey, teaching research and scientific research, follow-up reform projects were included in

the subject research projects of primary and secondary schools in Jiangsu Province for the first time. 15 provincial key projects were granted, which were supported and complemented by projects at all levels. A total of 700 projects were set up to encourage and promote all localities and schools to carry on follow-up evidence-based reform. Under the guidance of the Provincial Teaching research Office, Suzhou, Changzhou and other places achieved remarkable outcomes through local academic surveys and follow-up reforms. The Provincial Teaching research Office allocated special funds to support relevant research and reform projects, and invested 22.5 million yuan in recent five years, which effectively guaranteed the smooth progress of the reform (see **Figure 3**). In recent years, the follow-up evidence-based reform in Jiangsu has emphasized the importance of the stability of evidence and the mining of causality and carried out educational intervention experiments of different scales in many places. Further efforts will be made to explore the laws of education and teaching more steadily and deeply and improve the effectiveness and quality of education by adopting the cutting-edge methods and technologies of international evidence-based research.

### ***Multi Party Cooperative Reform Community***

In the long-term exploration, Jiangsu has evolved a reform community consisting of professional researchers from colleges and universities, governmental administrative departments and teaching research institutions, and primary and secondary schools, which complement one another with each party's advantages and share a collaborative relationship (see **Figure 4**). This community takes the improvement of education quality as the first priority, and implements the relevant research results and policy measures, to make sure that research results can really play a part in upgrading the quality of education and teaching. Under the condition of data security, Jiangsu Teaching research Office opens data resources, decentralizes the design authority of survey projects and research topics, and tries to introduce multiple intellectual resources to improve the quality of survey and the effectiveness of the reform.

Therefore, while enhancing the education quality of Jiangsu to a new level, the model of evidence-based reform in education led by teaching research system helps integrate multi party strength in research and practice, enabling quick and effective responses to difficult and hot issues in the process of education reform and development. Before each assessment session, the Provincial Teaching research Office will adjust the methods and contents of assessment and investigation according to the previous research findings and the new problems, new situation and new needs faced by Jiangsu Province. A task force is delegated by the Office to analyze the contents of Pisa and other international authoritative assessment projects, so as to follow the latest progress in the area of international education assessment in terms of student skills, assessment methods, correlative factors and research topics, to better understand and judge the direction of global education reform and development. At the same time, more analysis of Jiangsu educational situation is made to confirm the urgent needs and common concerns of the public. In recent years, to make the survey of basic education quality more targeted and practical, the Office have focused on issues like student burden reduction, effective teaching strategy, educational equity for the underprivileged, student stress



**Figure 5. Follow-Up Reform Outcomes at the School Level: Taking Nanjing Foreign Language School Xianlin Campus as a Case.**

resistance, teacher job satisfaction, student high-order cognitive ability development, educational resources allocation.

## Outcomes of Evidence-Based Reform in Education

After 15 years of exploration, Jiangsu has made remarkable achievements in evidence-based reform in education. The concept and mode of “scientific evidence-based and follow-up reform” have been integrated into all aspects of school teaching reform, and fruitful results have been attained in practice.

**Firstly, the quality of basic education is significantly improved, and student all-round development is promoted.**

At the school level, through survey and assessment, comprehensive and accurate diagnosis of school teaching problems has been made, and remarkable results have been achieved in the follow-up reform in experimental schools such as Nanjing Foreign Language School Xianlin Campus (see **Figure 5**). At the local level, follow-up reform projects are taken seriously in seeking for effective ways to improve the education quality and promote student all-round development. At the provincial level, Jiangsu has made remarkable achievements in previous PISA and relevant national surveys, with continu-

ous improvement of various indicators and steady progress in high-quality and balanced development, which fully indicates that the reform has achieved significant results.

**Secondly, the integration of evidence-based reform into normal teaching and research drives the quality improvement and transformation of grass-roots teaching and research in the province.**

Under the guidance of the Provincial Teaching research Office, all localities carry out evidence-based teaching diagnosis in teaching and research, reform teaching methods, constantly improve teachers' professional skills and teaching quality. Various models of classroom reform have emerged throughout the province, such as Nantong's "Learning-centered Classroom", Xuzhou's "Learning and Presentation Classroom", Yancheng's "Critical Learning Classroom", Suzhou's "Suzhou-style Classroom", Huai'an's "Integrated Learning Classroom", Taizhou's "Micro Classroom", Zhenjiang's "Integrated Classroom".

**Thirdly, the assessment tools of student core skills and key abilities, question designing technology and investigation by questionnaires have been widely used in the whole province.**

Directed by the Provincial Teaching research Office, Changzhou, Yangzhou, Suzhou and other places deepened follow-up reforms by using provincial assessment tools and technologies. After several rounds of training, their standardized framework of survey of academic quality, and question designing skills have become an important reference for academic assessment for all cities in the province and made an important contribution to the improvement of exam question quality in the middle school entrance examination in our province. The popularization of these tools and technologies has greatly improved the quality of educational assessment and reform in Jiangsu, and the relevant exploration and achievements are in the leading position in the country.

**Finally, aimed to improve education quality by survey, the evidence-based reform model of Jiangsu makes a big difference in the country.**

Jiangsu's evidence-based reform in education has attracted extensive attention. Fujian, Hainan, Xinjiang, Sichuan, Qinghai and other provinces have sent personnel to Jiangsu to study and transplant Jiangsu experience to the survey and teaching reform in their own provinces. In recent years, the teaching research staff have published more than 30 papers in authoritative journals at home and abroad, and relevant personnel have been invited to make theme reports at important conferences over the world for many times. China Education Daily and Xinhua news agency reported on Jiangsu's achievements in education reform and interviewed leading research personnel, which was well received. A project team created the "Best Evidence in Brief" website (<http://www.cnbeb.org.cn:81/>). Its official account of WeChat has registered nearly 20 thousand subscribers both at home and abroad and become an important channel for obtaining information on evidence-based research and reform results in education.

## **Discussion: Uniqueness and Universality of China Evidence-Based Education Reform**

Jiangsu, as one of the regions of high socio-economic and educational development levels in China, takes the lead in evidence-based reform in education, in which China's unique teaching research system plays an important role. In the case of Jiangsu, its strong teaching research system has always been the director and motivator of the provincial evidence-based reform in education. Decision-makers' determination to transform the traditional experience-dependent teaching modes to scientific evidence-based education models is the prerequisite for the role of the teaching research system in the reform. Moreover, the strong capacity of resource mobilization, organization and coordination of China's teaching research system lays a solid organizational and institutional foundation for the rapid progress and remarkable effectiveness of this reform.

As mentioned earlier, China's teaching research system is not only a conglomerate of research institutions, but also performs the administrative and organizational function in teaching and scientific research. In the process of evidence-based reform in education in Jiangsu, massive human and financial resources are required in both organizing large-scale provincial academic survey and setting up follow-up reform projects. The establishment of an academic survey system covering the whole province, the compilation of a complete package of scientific assessment tools, the promotion of large-scale intervention experiments within the province, and the formation of evidence-based education policymaking and implementation mechanisms, within just 15 years, depend entirely on the strong force of such a system. Local educational departments, whether they support evidence-based reform in education or not, must keep in line with the overall arrangement under this system, which ensures the effective promotion of reform. Once the effect of the reform at the initial stage is confirmed, such a system can help carry out large-scale verifying experiments and then further deepen the reform.

In fact, China teaching research system as a whole has always had such a powerful capacity, yet undoubtedly, some of the reforms it initiated previously could not reach the goals as expected or be verified of their effects. The success of Jiangsu's evidence-based education reform is attributed to the strong organization and coordination abilities of its teaching research system, yet more to the value orientation and action path determined by the teaching research system led by the Provincial Teaching research Office. During the 15 years of exploration, the reform has consistently been based on solid scientific research, to ensure the correctness of reform direction and the effectiveness of reform measures.

Jiangsu's education reform and experiment are of great significance to the promotion of China's evidence-based reform in education and innovation of teaching research approach, in that the follow-up evidence-based reform in Jiangsu takes scientific evidence as the basis of reform and practice, through which long-standing problems with China's education reform such as lack of scientific approach and poor effectiveness can be solved. The survey of basic education quality in Jiangsu and the relevant analysis provide the reform with full support of scientific research. Directed by laws of education, the reform can overcome blindness and achieve the expected results.

Moreover, the follow-up evidence-based reform uses reform experimental projects as media in applying survey results fully into practical work, thereby dissolving the separation between professional research and practical work. Such follow-up reforms start with scientific research, and then apply it to practical work, and in turn draw research subject matter from practical work, thereby to form a promotion path of reform combining theory with practice, resulting in the pertinence and effectiveness of scientific research, and the strengthened guidance on practical work.

It should be noted that the great achievements made in the Jiangsu evidence-based reform in education is significantly conditioned by China's unique teaching research system and its powerful strength. In a sense, the path of China's evidence-based reform in education can hardly be replicated by other countries. However, emphasis on scientific survey tools, multi-party cooperation in reform and gradual expansion of reform scope from pilot experiments to popularization are universal experience in line with laws of educational development.

## **Challenges and Prospects**

Despite the remarkable results achieved by the follow-up evidence-based reform of Jiangsu supported by the survey of educational quality, the reform is still facing several challenges and has a long way to go when looking into the future.

**Firstly, data conditions need to be further improved and vertical tracking data covering more subjects are to be built.**

The lack of vertical tracking data has been constraints to China teaching research and the progress of evidence-based reform in education. A comprehensive and scientific vertical tracking database is essential infrastructure in further push for such reform.

**Secondly, the progress of global evidence-based research should be followed, and more cutting-edge and scientific analysis technology be introduced.**

With the technological and scientifically advancement, more cutting-edge technology and methodology have been applied to the educational survey and the evidence-based reform. China's evidence-based reform in education should draw more investment of energy and effort in the future, keep pace with global cutting-edge technology and localize educational innovation, in the push for intelligence-oriented development in this field.

**Lastly, the follow-up reform should be reinforced, and closer combination of scientific evidence and practical work be advocated.**

In the future, more flexible and innovative follow-up measures are needed to further strengthen the promotion, publicity and application of evidence and improve the effectiveness of evidence use.

**Note:**

1. The project team began to develop the high order thinking disposition scale for primary and middle school students in 2016. Referring to similar studies at home and abroad, after testing trials of nearly 100,000 samples in more than 2 years, an assessment tool with high reliability and validity was obtained and applied to the provincial survey in 2018. The assessment results are good. The above figure shows the confirmatory factor assessment results. The assessment tool takes the lead in solving the technical problem of high order thinking disposition assessment in provincial survey and has high academic value and practical application value.

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