Modern Distance Teacher Training in Narrowing the Gap on the Dual Structure Basic Education

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Abstract: With the development of technology, distance education has become an important tool to achieve educational equity. This paper aims to analyze the impact mechanism of modern distance teacher training on narrowing the gap between urban and rural education of China, and put forward a new path to improve the basic education. The research takes the China Education Panel Survey (CEPS) as the data source for analysis and find that the gap between urban and rural basic education does exist, but the academic achievement gap reflected by students at different quantiles is different; Distance teacher training is conducive to improving urban and rural students with different academic performance levels, and it has a higher promotion effect on students with better academic performance in rural areas; Different distance teacher training methods have different effects on students' academic performance, and the effects on mathematics and English subjects are more significant than those on Chinese subjects. Finally, this paper put forward some suggestions for the improvement of modern distance teacher training from the aspects of organization and management, training content, so as to provide a valuable reference for the balanced development of urban and rural education.

Keywords: Distance training; Narrow the gap between urban and rural education; Basic education; Influence mechanism

1. INTRODUCTION

At the beginning of 2019, "China Education Modernization 2035" drew a blueprint for the development of smart campus, digital education resources and artificial intelligence teaching combination based on the development picture of education informatization, which fully reflected the implementation logic from the macro-level education informatization policy to the micro-level to narrow the gap between urban and rural education, and provided a feasible solution to solve the problem of rural education resources [1]. However, how to examine the comprehensive impact brought by the application of information technology based on the practical problems from the microscopic perspective has become a key proposition to be solved urgently at this stage.

At this stage, the academic circles have fully studied the influencing factors related to the differentiation of basic education. Some scholars have calculated the performance of urban and rural basic education in 29 provinces of China through DEA dynamic and static models, and made a prediction before actual intervention to evaluate the basic gap. The results show that this gap does exist, mainly in technological progress and scale efficiency, and the influencing factors involve economic development level, financial freedom, urbanization rate, and poverty level of residents (Yu Xinghou et al., 2019)[2]. Some scholars believe that this gap can be alleviated by improving the distribution of educational resources. Combining distance learning and teaching information technology, we can provide rural teachers with the same educational resources as urban teachers, so that both teachers and students can benefit from the shared educational resources and focus on improving their academic level and educational governance from two aspects: individual internal factors and external environmental factors (Danie, 2021)[3]. At present, there are many ways of distance teacher training, such as online open courses, social network collaborative learning and mobile distance training. These forms have great potential in promoting teachers' quality, improving the quality of learning content, supporting curriculum teaching and improving learning satisfaction. For

example, some scholars reported the enthusiasm and application of MOOC in rural areas (Mower, 2016)[4]. Some scholars have pointed out that mobile distance training has the potential to improve academic level, but there is no evidence that this measure can help narrow the gap between urban and rural basic education and provide equal educational opportunities for all (Syahida et al, 2022)[5].

Despite the surging interest in the role of ICT on reforming education, only limited attention has been given on the influence of modern distance teacher training and lack data support. Therefore, this paper uses CEPS data to explore the impact mechanism of on-site distance teacher training on narrowing this gap.

2. The research design and data sources

2.1 The data sources

The research data comes from the benchmark data of "China Education Panel Survey" (CEPS). This survey collected 19,487 students from 28 counties (districts), 112 schools and 438 classes nationwide, and collected information on family and school resources, teacher training status, students' academic achievements and basic characteristics, families and schools, which met the research needs.

2.2 The research methods

Uqr (unconditional quantile regression). In order to explore the influence mechanism of distance teacher training on students with different academic achievements, this paper adopts UQR regression analysis method to carry out research. UQR mainly uses RIF function to transform data, and divides students with different academic achievements into several points, so that we can analyze the differences in the influence of distance teacher training on students at different points. The main formula is as follows:

$$RIF (S, Q_{\tau}) = Q_{\tau} + \frac{\tau - I (\& Q_{\tau})}{F_{S}(Q_{\tau})}$$

In the formula, RIF is the reconcentration influence function of distribution statistics, S is academic achievement, Q is unconditional quantile, and I is indicative function.

3. The research results and statistics

According to the research hypothesis and CEPS baseline data, the data results are statistically analyzed, and three research questions are answered: the gap between urban and rural basic education; the influence of distance teacher training on narrowing the gap between urban and rural basic education; and the differential influence of different distance teacher training methods on narrowing the gap between urban and rural basic education.

3.1 The descriptive statistics of related variables

In the two samples of urban schools and rural schools, the frequency of distance teacher training in urban schools is significantly higher than that in rural schools, and the scores of three sciences are also significantly higher than that in rural schools, especially the gap in English academic performance. Compared with urban schools in academic and family levels, the proportion of only children in rural schools and the average educational years of parents are significantly lower, and the proportion of family financial difficulties is higher. At the school level, compared with urban schools, the proportion of teachers with bachelor's degree and teachers who graduated from normal schools is lower, and the proportion of top schools is even 0.

Table 1 Descriptive statistics of related variables

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3.2 The gap between urban and rural basic education

This paper explains the gap between urban and rural students at different points through the distribution of their academic achievements. Descriptive statistical results show that compared with urban students, rural students' weighted academic achievements in Chinese, mathematics and English lag behind urban students as a whole, which is similar to previous research results.

3.3 The impact of distance teacher training on narrowing the gap between urban and rural basic education

In this paper, UQR regression analysis is used to measure the influence mechanism of distance teacher training on the academic achievement gap between urban and rural students at different points, as shown in Table 2.

Table 2 UQR measurement results of distance teacher training in narrowing the gap between urban and rural basic education

subjectUrban studentsRural studentsRural studentquantile; fractileQ30Q60Q9 0Q30Q60Q90Chin ese0.164*0.443**0 .533*0.859***0.14 4*0.445**mathem atics0.173**0.314 **0.520**0.126*0. 424**0.597*Engli sh0.291**0.544*0. 437*0.749**0.580 **0.982*Source: The benchmark data of China Education Tracking Survey (CEPS) project; Note: * means P<0.1; * * means P<0.05; * * * means P<0.01.	fractileQ30Q60Q *0.533*0.859*** 314**0.520**0.12 44*0.43 benchmark data (CEPS) pro	Urban studentsRura 90Q30Q60Q90Chi 0.144*0.445**math 26*0.424**0.597*E 7*0.749**0.580**0 of China Education ject; Note: * means P<0.05; * *	al studentquantile; nese0.164*0.443* eematics0.173**0. English0.291**0.5 0.982*Source: The n Tracking Survey P<0.1; * * means * * means P<0.01.	fractileQ30Q60Q **0.533*0.859** *0.314**0.520** *0.544*0.437 benchmark data o (CEPS) proje	Rura 290Q30Q60Q90Chi **0.144*0.445**mi 0.126*0.424**0.59 *0.749**0.580**0. of China Education ect; Note: * means P<0.05; * *	l studentquantile; inese0.164*0.443 athematics0.173* 17*English0.291* 982*Source: The Tracking Survey P<0.1; * * means * means P<0.01.
$\begin{array}{c} \text{quantile;}\\ \text{fractileQ30Q60Q9}\\ \text{OQ30Q60Q90Chin}\\ \text{ese0.164*0.443**0}\\ .533*0.859**0.14\\ 4*0.445**mathem\\ atics0.173*0.314\\ **0.520**0.126*0.\\ 424*0.597*Engli\\ \text{sh0.291**0.544*0.}\\ 437*0.749**0.580\\ **0.982*Source:\\ \text{The benchmark}\\ data of China\\ Education\\ \text{Tracking Survey}\\ (CEPS) \text{ project;}\\ \text{Note: * means}\\ P<0.05; ***\\ \text{means P<0.01.}\\ \end{array}$	Q30Q60Q90Q3 0Q60Q90Chines e0.164*0.443**	Q60Q90Q30Q6 0Q90Chinese0. 164*0.443**0.5 33*0.859***0.1 44*0.445**mat hematics0.173* *0.314**0.520* *0.126*0.424**	Q90Q30Q60Q9 0Chinese0.164*	Q30Q60Q90Ch inese0.164*0.4 43**0.533*0.8 59***0.144*0. 445**mathemat ics0.173**0.31 4**0.520**0.1 26*0.424**0.5 97*English0.29 1**0.544*0.43 7*0.749**0.58 0**0.982*Sour ce: The benchmark data of China Education Tracking Survey (CEPS) project; Note: * means P<0.1; * * means P<0.05; *** means P<0.01.	Q60Q90Chines e0.164*0.443* *0.533*0.859* **0.144*0.445 **mathematics	Q90Chinese0.1 64*0.443**0.5 33*0.859***0. 144*0.445**m athematics0.17 3**0.314**0.5 20**0.126*0.4 24**0.597*En glish0.291**0. 544*0.437*0.7 49**0.580**0. 982*Source: The benchmark data of China Education Tracking Survey (CEPS) project; Note: * means P<0.1; * * means P<0.05; * * * means P<0.01.
Chinese0.164*0.44 3**0.533*0.859** *0.144*0.445**ma	0.164*0.443**0 .533*0.859***0 .144*0.445**ma	0.443**0.533*0 .859***0.144*0 .445**mathema	0.533*0.859***	0.859***0.144 *0.445**mathe matics0.173**0	0.144*0.445**	0.445**mathe matics0.173**

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thematics0.173**0 .314**0.520**0.12 6*0.424**0.597*E nglish0.291**0.54 4*0.437*0.749**0. 580**0.982*Sourc e: The benchmark data of China Education Tracking Survey (CEPS) project; Note: * means P<0.1; * * means P<0.05; * * * means P<0.01.	thematics0.173* *0.314**0.520* *0.126*0.424**	tics0.173**0.31 4**0.520**0.12 6*0.424**0.597 *English0.291* *0.544*0.437*0 .749**0.580**0 .982*Source: The benchmark data of China Education Tracking Survey (CEPS) project; Note: * means P<0.1; * * means P<0.05; * * * means P<0.01.		.314**0.520**		
mathematics0.173 **0.314**0.520**	0.173**0.314**	0.314**0.520**	0.520**0.126*0 .424**0.597*E nglish0.291**0. 544*0.437*0.74 9**0.580**0.98 2*Source: The benchmark data of China Education Tracking Survey (CEPS) project; Note: * means P<0.1; * * means P<0.05; * * * means P<0.01.	0.126*0.424**	0.424**0.597*	0.597*English0 .291**0.544*0. 437*0.749**0. 580**0.982*So urce: The benchmark data of China Education Tracking Survey (CEPS) project; Note: * means P<0.1; * * means P<0.05; * * * means P<0.01.
English0.291**0.5 44*0.437*0.749**	0.291**0.544*0 .437*0.749**0. 580**0.982*So urce: The benchmark data of China Education Tracking Survey (CEPS) project; Note: * means P<0.1; * * means P<0.05; * * * means P<0.01.	0.544*0.437*0. 749**0.580**0. 982*Source: The benchmark data of China Education Tracking Survey (CEPS) project; Note: * means P<0.1; * * means P<0.05; * * * means P<0.01.	0.437*0.749**0 .580**0.982*So urce: The benchmark data of China Education Tracking Survey (CEPS) project; Note: * means P<0.1; * * means P<0.05; * * * means P<0.01.	0.749**0.580* *0.982*Source: The benchmark data of China Education Tracking Survey (CEPS) project; Note: * means P<0.1; * * means P<0.05; * * * means P<0.01.	0.580**0.982*	0.982*Source: The benchmark data of China Education Tracking Survey (CEPS) project; Note: * means P<0.1; * * means P<0.05; * * * means P<0.01.

Source: The benchmark data of China Education Tracking Survey (CEPS) project; Note: * means P<0.1; * * means P<0.05; * * * means P<0.01.

From Table 2, it can be seen that students' academic achievements are distributed in three quantiles, namely Q30, Q60 and Q90, which can all be improved through distance teacher training, and with the improvement of quantiles, the promotion of distance teacher training to students' academic achievements is gradually enhanced. In other words, distance teacher training can improve students' academic performance, but it does not mean that the gap between urban and rural education can be narrowed under the same distance training frequency. In addition, distance teacher training has a stronger promotion effect on students with good academic performance, but not on students with poor academic performance.

3.4 The differentiated effects of different distance teacher training methods on narrowing the gap between urban and rural basic education

This paper sorts out different distance teacher training methods, and divides them into three categories: open courses, social networks and mobile internet, and reveals the explanatory power of different distance teacher training methods in narrowing the gap between urban and rural basic education, as shown in Table 3.

Table 3 UQR measurement results of different distance teacher training methods to narrow the gap between urban and rural basic education

International Journal of Science and Engineering Applications Volume 12-Issue 07, 24 – 41, 2023, ISSN:- 2319 - 7560 DOI: 10.7753/IJSEA1207.1004								
estimated value			Ur studentQ30Q pe value1.271** *** power12.14% 78%Sc value1.038** 7*1 power15.04% 03006009	ban studentsRu 60Q90Q30Q60 en courseestima (1.355*1.042** 1.034**Explana (14.99%5.02%5 (1.563**2.955* .830**Explana (11.15%12.98%	rral Q90ChineseO ted 1.013**1.267 atory 5.72%3.29%6. timated *1.832**1.32 tory 67.45%8.11%	Rural studentQ30Q60Q90Q30Q60Q90ChineseO pen courseestimated value1.271**1.355*1.042**1.013**1.267 ***1.034**Explanatory power12.14%14.99%5.02%5.72%3.29%6. 78%Social networkestimated value1.038**1.563**2.955**1.832**1.32 7*1.830**Explanatory power15.04%11.15%12.98%7.45%8.11%		
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	power15.04 %11.15%12 .98%7.45%	Explanatory power15.04 %11.15%12 .98%7.45%	15.04%11.1 5%12.98%7 .45%8.11%	11.15%12.9 8%7.45%8. 11%6.91%	12.98%7.45 %8.11%6.9 1%Mobile Internetesti mated	7.45%8.11 %6.91%Mo bile Internetesti mated	8.11%6.91 %Mobile Internetesti mated value2.0701	6.91% Mobi le Internetesti mated value2.0701

value2.0701	value2.0701	.8731.5962.	.8731.5962.
.8731.5962.	.8731.5962.	1931.5051.	1931.5051.
1931.5051.	1931.5051.	874**Expla	874**Expla
874**Expla	874**Expla	natory	natory
natory	natory	power20.23	power20.23
power20.23	power20.23	%15.54%23	%15.54%23
%15.54%23	%15.54%23	.02%10.07	.02%10.07
.02%10.07	.02%10.07	%9.24%5.1	%9.24%5.1
%9.24%5.1	%9.24%5.1	1% mathem	1%mathem
1%mathem	1% mathem	ancsOpen	ancsOpen
aucsOpen	aucsopen	courseesum	courseesum
ated	ated	aleu voluel 424*	ateu voluo1 424*
value1 424*	ateu voluel 424*	*2 858**2	*2 858**2
*7 858**7	*2 858**2	2.030 2.	2.030*2.
2.030*2.	211**1 865	**7 518**7	**2 518**2
2 5182	**2 518**2	466**Evnl	466**Evnl
466**Expl	466**Expl	anatory	anatory
anatory	anatory	power10.22	power10.22
power10.22	power10.22	%18.61%20	%18.61%20
%18.61%20	%18.61%20	.50%15.71	.50%15.71
.50%15.71	.50%15.71	%17.05%25	%17.05%25
%17.05%25	%17.05%25	.93%Social	.93%Social
.93%Social	.93%Social	networkesti	networkesti
networkesti	networkesti	mated	mated
mated	mated	value2.435*	value2.435*
value2.435*	value2.435*	*1.944*0.9	*1.944*0.9
*1.944*0.9	*1.944*0.9	96***1.797	96***1.797
96***1.797	96***1.797	**1.078**2	**1.078**2
1.0782	**1.078**2	.125*Expla	.125*Expla
.125*Expla	.125*Expla	natory	natory
natory	natory	power15.48	power15.48
power15.48	power15.48	%17.92%20	%17.92%20
%17.92%20	%17.92%20	.98%16.80	.98%16.80
.98%16.80	.98%16.80	%15.97%12	%15.97%12
%15.97%12	%15.97%12	.10%Mobil	.10%Mobil
.10% Mobil	.10% Mobil	e	e
e	e	Internetesti	Internetesti
Internetesti	Internetesti	mated	mated
mated	mated	value1.615*	value1.615*
value1.015*	value1.015* *1.224*2.2	*1.224*2.3	*1.224*2.3
*1.224*2.3 21**2 108*	*1.224*2.3 21**2 108*	×1 540**0	×1 540**0
*1 540**0	*1 540**0	0/1**Evplo	0/1**Evola
0/1**Evpla	0/1**Evnla	natory	natory
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power14 74	power14 74	%20 33%10	%20 33%10
%20.33%10	%20.33%10	18%21.89	18%21.89
.18%21.89	.18%21.89	%25.35%18	%25.35%18
%25.35%18	%25.35%18	.88%Englis	.88%Englis
.88%Englis	.88%Englis	hOpen	hOpen
hOpen	hOpen	courseestim	courseestim
courseestim	courseestim	ated	ated
ated	ated	value2.484*	value2.484*
value2.484*	value2.484*	*1.685*1.1	*1.685*1.1
*1.685*1.1	*1.685*1.1	24*1.613*1	24*1.613*1
24*1.613*1	24*1.613*1	.969*1.430	.969*1.430
.969*1.430	.969*1.430	***Explana	***Explana
***Explana	***Explana	tory	tory
tory	tory	power12.50	power12.50
power12.50	power12.50	%20.31%18	%20.31%18
%20.31%18	%20.31%18	.28%19.14	.28%19.14
.28%19.14	.28%19.14	%31.56%34	%31.56%34
%31.36%34	% 31.36% 34	.80%Social	.80% Social
.00% SOCIAL	.80% Social	networkesti	networkesti
metworkesti	metworkesti	mated	mated
mateu	mateu	value1.024*	value1.024*

				value1.624*	value1.624*		
Mobile	estimated					1.5051.874	1.054.00
Internetesti	value2.0701					**Explanat	1.8/4**Exp
mated	.8731.5962.					ory	lanatory
value2.0701	1931.5051.					power20.23	power20.23
.8731.5962.	874**Expla					×15.54%23	%15.54%23
1931.5051.	natory					.02%10.07	.02%10.07
874**Expla	power20.23					%9.24%5.1	%9.24%5.1
natory	%15.54%23					1%mathem	1%mathem
power20.23	.02%10.07					aticsOpen	aticsOpen
×15.54%23	%9.24%5.1					courseestim	courseestim
.02%10.07	1% mathem					ated	
%9.24%5.1	aticsOpen					value1.424*	value1.424*
1%mathem	courseestim					*2.858**2.	*2.858**2.
aticsOpen	ated					211**1.865	211***1.803
courseestim	value1.424*					**2.518**2	***2.318***2
ated	*2.858**2.					.466**Expl	.400**Expl
value1.424*	211**1.865					anatory	anatory
*2.858**2.	**2.518**2					power10.22	power10.22
211**1.865	.466**Expl					%18.61%20	%18.01%20
2.5182	anatory					.50%15.71	.30%13.71
.466**Expl	power10.22					%17.05%25	03% Social
anatory	%18.61%20					.93%Social	.95%S0Clai
power10.22	.50%15.71					networkesti	mated
%18.61%20	%17.05%25					mated	value2 435*
.50%15.71	.93%Social					value2.435*	*1 944*0 9
%17.05%25	networkesti					*1.944*0.9	96***1 797
.93%Social	mated					96***1.797	**1 078**2
networkesti	value2.435*					**1.078**2	125*Evnla
mated	*1.944*0.9					.125*Expla	natory
value2.435*	96***1.797					natory	nower15 48
*1.944*0.9	**1.078**2					power15.48	%17 92%20
96***1.797	.125*Expla					%17.92%20	98%16.80
1.0782	natory	2.0701.873	1.8731.596	1.5962.193	2.1931.505	.98%16.80	%15.97%12
.125*Expla	power15.48	2.0701.075	1.0751.570	1.5702.175	2.1751.505	%15.97%12	10%Mobil
natory	%17.92%20					.10%Mobil	e
power15.48	.98%16.80					e	Internetesti
%17.92%20	%15.97%12					Internetesti	mated
.98%16.80	.10%Mobil					mated	value1.615*
%15.97%12	e					value1.615*	*1.224*2.3
.10%Mobil	Internetesti					*1.224*2.3	21**2.198*
e	mated					21**2.198*	*1.540**0.
Internetesti	value1.615*					*1.540**0.	941**Expla
mated	*1.224*2.3					941**Expla	natory
value1.615*	21**2.198*					natory	power14.74
*1.224*2.3	*1.540**0.					power14./4	°20.33%10
21**2.198*	941**Expla					%20.33%10	.18%21.89
$^{+1.340^{++0.0}}$	natory					.10%21.09	%25.35%18
941 ··· Expla	0 20 33% 10					%23.35%10 88% Englis	.88%Englis
nower14 74	18% 21.80					bOpen	hOpen
04 20 2204 10	.10%21.09					nopen	courseestim
%20.33%10 18%21.80	%23.33%10 88% Englis					ated	ated
.107021.09	hOpen					aleu value2 484*	value2.484*
88% Englis	courseestim					*1 685*1 1	*1.685*1.1
hOpen	ated					2/*1 613*1	24*1.613*1
courseestim	value? 484*					969*1 430	.969*1.430
ated	*1 685*1 1					***Explana	***Explana
value? 484*	24*1 613*1					tory	tory
*1 685*1 1	969*1 430					nower12 50	power12.50
24*1 613*1	***Exnlana					%20 31%18	%20.31%18
.969*1 430	torv					28%1914	.28%19.14
***Explana	power12.50					%31.56%34	%31.56%34
torv	%20.31%18					.86%Social	.86%Social
power12.50	.28%19.14					networkesti	networkesti
%20.31%18	%31.56%34					mated	mated
.28%19.14	.86%Social					value1.624*	value1.624*

%31.56%34	networkesti						
.86%Social	mated						
networkesti	value1.624*						
mated	Explanatory	20 220/ 15 5					
value1.624*	power20.23	20.23%13.3		22 020/ 10 0	10.070/ 0.24		
	×15.54%23	4%25.02%1		25.02%10.0	10.07%9.24	9.24%5.11	5.11% math
	.02%10.07	0.07%9.24		/%9.24%5.	%5.11%mat	%mathemat	ematicsOpe
	%9.24%5.1	%5.11% mat		11% mathe	hematicsOp	icsOpen	n
	1%mathem	hematicsOp		maticsOpen	en	courseestim	courseestim
	aticsOpen	en		courseestim	courseestim	ated	ated
	courseestim	courseestim		ated	ated	value1.424*	value1.424*
	ated	ated		value1.424*	value1.424*	*2.858**2.	*2.858**2.
	value1.424*	value1.424*		*2.858**2.	*2.858**2.	211**1.865	211**1.865
	*2.858**2.	*2.858**2.		211**1.865	211**1.865	**2.518**2	**2.518**2
	211**1.865	211**1.865		**2.518**2	**2.518**2	466**Expl	466**Expl
	2.5182	**2.518**2		.466**Expl	.466**Expl	anatory	anatory
	466**Expl	.466**Expl		anatory	anatory	power10.22	power10.22
	anatory	anatory		power10.22	power10.22	%18.61%20	%18.61%20
	power10.22	power10.22		%18.61%20	%18.61%20	50%15.71	50%15.71
	%18.61%20	%18.61%20		.50%15.71	.50%15.71	%17.05%25	%17.05%25
	50%15.71	.50%15.71		%17.05%25	%17.05%25	93%Social	93%Social
	%17.05%25	%17.05%25		.93%Social	.93%Social	networkesti	networkesti
	03% Social	.93%Social		networkesti	networkesti	mated	mated
	networkesti	networkesti		mated	mated	value? 435*	value? 135*
	mated	mated		value2.435*	value2.435*	*1 044*0 0	*1 0//*0 0
	value2 425*	value2.435*		*1.944*0.9	*1.944*0.9	06***1 707	06***1 707
	*1 044*0 0	*1.944*0.9		96***1.797	96***1.797	30 1./ <i>3</i> / **1 078**0	30 1./3/ **1 079**2
	1.944 0.9 06***1 707	96***1.797		**1.078**2	**1.078**2	125*Evalo	125*Evolo
	90 ¹¹¹ 1./9/	**1.078**2		.125*Expla	.125*Expla	.125 Expla	.123 Expla
	125*Evelo	.125*Expla		natory	natory	natory	natory
	.125*Expla	natory		power15.48	power15.48	power15.48	power15.48
	natory	power15.48		%17.92%20	%17.92%20	%17.92%20	%17.92%20 080/16.80
	power15.48	×17.92%20		.98%16.80	.98%16.80	.98%16.80	.98%16.80
	%17.92%20	.98%16.80		%15.97%12	%15.97%12	%15.97%12	%15.97%12
	.98%16.80	%15.97%12	15.54%23.0	.10%Mobil	.10% Mobil	.10%MOD11	.10%MOD1
	%15.97%12	.10%Mobil	2%10.07%9	e	е	e .	e
	.10%M0011	e	.24%5.11%	Internetesti	Internetesti	Internetesti	Internetesti
	e	Internetesti		mated	mated	mated	mated
	Internetesti	mated		value1.615*	value1.615*	value1.615*	value1.615*
	mated	value1.615*		*1.224*2.3	*1.224*2.3	*1.224*2.3	*1.224*2.3
	value1.615*	*1.224*2.3		21**2.198*	21**2.198*	21**2.198*	21**2.198*
	*1.224*2.3	21**2.198*		*1.540**0.	*1.540**0.	*1.540**0.	*1.540**0.
	21**2.198*	*1.540**0.		941**Expla	941**Expla	941**Expla	941**Expla
	*1.540**0.	941**Expla		natory	natory	natory	natory
	941**Expla	natory		power14.74	power14.74	power14./4	power14.74
	natory	power14.74		¹ %20.33%10	¹ %20.33%10	%20.33%10	%20.33%10
	power14.74	%20.33%10		.18%21.89	.18%21.89	.18%21.89	.18%21.89
	%20.33%10	.18%21.89		%25.35%18	%25.35%18	%25.35%18	%25.35%18
	.18%21.89	%25.35%18		88%Englis	88%Englis	.88%Englis	.88%Englis
	%25.35%18	88%Englis		hOpen	hOpen	hOpen	hOpen
	.88%Englis	hOpen		courseestim	courseestim	courseestim	courseestim
	hOpen	courseestim		ated	ated	ated	ated
	courseestim	ated		value? 484*	value2 484*	value2.484*	value2.484*
	ated	value? 484*		*1 685*1 1	*1 685*1 1	*1.685*1.1	*1.685*1.1
	value2.484*	*1 685*1 1		24*1 613*1	24*1 613*1	24*1.613*1	24*1.613*1
	*1.685*1.1	2/*1 613*1		060*1 /30	060*1 /20	.969*1.430	.969*1.430
	24*1.613*1	969*1.430		***Evnlana	***Evnlana	***Explana	***Explana
		.707 1.450		tory	tory	tory	tory
	.969*1.430	***Evolono					
	.969*1.430 ***Explana	***Explana		nower12 50	nower12.50	power12.50	power12.50
	.969*1.430 ***Explana tory	***Explana tory		power12.50	power12.50	power12.50 %20.31%18	power12.50 %20.31%18
	.969*1.430 ***Explana tory power12.50	***Explana tory power12.50		power12.50 %20.31%18	power12.50 %20.31%18	power12.50 %20.31%18 .28%19.14	power12.50 %20.31%18 .28%19.14
	.969*1.430 ***Explana tory power12.50 %20.31%18	***Explana tory power12.50 %20.31%18 28%10.14		power12.50 %20.31%18 .28%19.14 %31.56%24	power12.50 %20.31%18 .28%19.14 %31.56%24	power12.50 %20.31%18 .28%19.14 %31.56%34	power12.50 %20.31%18 .28%19.14 %31.56%34
	.969*1.430 ***Explana tory power12.50 %20.31%18 .28%19.14	***Explana tory power12.50 %20.31%18 .28%19.14		power12.50 %20.31%18 .28%19.14 %31.56%34	power12.50 %20.31%18 .28%19.14 %31.56%34	power12.50 %20.31%18 .28%19.14 %31.56%34 .86%Social	power12.50 %20.31%18 .28%19.14 %31.56%34 .86%Social
	.969*1.430 ***Explana tory power12.50 %20.31%18 .28%19.14 %31.56%34	***Explana tory power12.50 %20.31%18 .28%19.14 %31.56%34		power12.50 %20.31%18 .28%19.14 %31.56%34 .86%Social	power12.50 %20.31%18 .28%19.14 %31.56%34 .86%Social	power12.50 %20.31%18 .28%19.14 %31.56%34 .86%Social networkesti	power12.50 %20.31%18 .28%19.14 %31.56%34 .86%Social networkesti
	.969*1.430 ***Explana tory power12.50 %20.31%18 .28%19.14 %31.56%34 .86%Social	***Explana tory power12.50 %20.31%18 .28%19.14 %31.56%34 .86%Social potworkocti		power12.50 %20.31%18 .28%19.14 %31.56%34 .86%Social networkesti	power12.50 %20.31%18 .28%19.14 %31.56%34 .86%Social networkesti	power12.50 %20.31%18 .28%19.14 %31.56%34 .86%Social networkesti mated	power12.50 %20.31%18 .28%19.14 %31.56%34 .86%Social networkesti mated
	.969*1.430 ***Explana tory power12.50 %20.31%18 .28%19.14 %31.56%34 .86%Social networkesti	***Explana tory power12.50 %20.31%18 .28%19.14 %31.56%34 .86%Social networkesti		power12.50 %20.31%18 .28%19.14 %31.56%34 .86%Social networkesti mated	power12.50 %20.31%18 .28%19.14 %31.56%34 .86%Social networkesti mated	power12.50 %20.31%18 .28%19.14 %31.56%34 .86%Social networkesti mated value1.624*	power12.50 %20.31%18 .28%19.14 %31.56%34 .86%Social networkesti mated value1.624*
	.969*1.430 ***Explana tory power12.50 %20.31%18 .28%19.14 %31.56%34 .86%Social networkesti mated	***Explana tory power12.50 %20.31%18 .28%19.14 %31.56%34 .86%Social networkesti mated		power12.50 %20.31%18 .28%19.14 %31.56%34 .86%Social networkesti mated value1.624*	power12.50 %20.31%18 .28%19.14 %31.56%34 .86%Social networkesti mated value1.624*	power12.50 %20.31%18 .28%19.14 %31.56%34 .86%Social networkesti mated value1.624*	power12.50 %20.31%18 .28%19.14 %31.56%34 .86%Social networkesti mated value1.624*

		estimated	1 101**0 0					
		value1.424*	1.424***2.8	2.858**2.2	0 011**1 0	1.0 (5 *** 0.5		
		*2.858**2	58**2.211*	11**1.865*	2.211**1.8	1.865**2.5	2.518**2.4	
		211**1 865	*1.865**2.	*2 518**2	65**2.518*	18**2.466*	66**Evplan	2.466**Exp
mathamatia		211 1.005	518**2.466	2.J10 2.	*2.466**Ex	*Explanator	otom	lanatory
mathematic	Open	***2.518***2	**Explanat	400***Expla	planatory	v	atory	power10.22
sOpen	courseestim	.466**Expl	orv	natory	nower10.22	power10.22	power10.22	¹ / ₈ / ₁₈ / _{61%} 20
courseestim	otod	anatory	nouver10.22	power10.22	0/18/610/20	0/ 18 610/ 20	%18.61%20	500/ 15 71
ated	ated	power10.22	power10.22	×18.61%20	%18.01%20	%18.01%20	.50%15.71	.30%13.71
value1 424*	value1.424*	¹ / ₈ / ₁₈ / ₆₁ %20	%18.61%20	50%1571	.50%15.71	.50%15.71	%17.05%25	%17.05%25
*7 858**7	*2.858**2.	50% 15 71	.50%15.71	% 17 05% 25	%17.05%25	%17.05%25	03% Social	.93%Social
2.030 2.	211**1.865	.307013.71	%17.05%25	7017.037023	.93%Social	.93%Social	.95%S0Clai	networkesti
211**1.865	**2.518**2	%17.05%25	.93%Social	.93%Social	networkesti	networkesti	networkesti	mated
2.5182	466**Evnl	.93%Social	networkesti	networkesti	mated	mated	mated	value? 435*
.466**Expl	.+00 LAPI	networkesti	motod	mated	value2 425*	value2.425*	value2.435*	*1 044*0 0
anatory	anatory	mated	mated	value2.435*	value2.455*	value2.455*	*1.944*0.9	*1.944*0.9
nower10.22	power10.22	value? 435*	value2.435*	*1 944*0 9	*1.944*0.9	*1.944*0.9	96***1 797	96***1./9/
% 18 61% 20	%18.61%20	*1 0//*0 0	*1.944*0.9	06***1 707	96***1.797	96***1.797	**1 078**7	**1.078**2
7010.017020	.50%15.71	1.744 0.7	96***1.797	90°°°1./97	**1.078**2	**1.078**2	1078°2	.125*Expla
.50%15.71	%17.05%25	96***1./9/	**1.078**2	**1.0/8**2	.125*Expla	.125*Expla	.125*Expla	natory
%17.05%25	93% Social	**1.078**2	125*Expla	.125*Expla	natory	natory	natory	power15.48
.93%Social	notworkosti	.125*Expla	notory	natory	natory	natory	power15.48	04 17 0204 20
networkesti	networkesu	natory	natory	power15.48	power15.48	power15.48	%17.92%20	%17.92%20
mated	mated	power15.48	power15.48	×17.92%20	%17.92%20	%17.92%20	.98%16.80	.98%16.80
value? 135*	value2.435*	% 17 92% 20	%17.92%20	08%16.80	.98%16.80	.98%16.80	%15 97%12	%15.97%12
*1 044*0 0	*1.944*0.9	090/16 90	.98%16.80	0/15 070/12	%15.97%12	%15.97%12	100/ Mabil	.10%Mobil
*1.944*0.9	96***1.797	.98%10.80	%15.97%12	%15.97%12	.10%Mobil	.10% Mobil	.10%MOD11	e
96***1.797	**1 078**2	%15.97%12	10%Mobil	.10% Mobil	e	e	e	Internetesti
1.0782	125*Evala	.10%Mobil	.10/010000	e	Internetecti	Internetesti	Internetesti	mated
.125*Expla	.125 · Expla	e		Internetesti	internetesti	internetesti	mated	1 1 615*
natory	natory	Internetesti	Internetesti	mated	mated	mated	value1.615*	value1.615*
nower15.48	power15.48	mated	mated	value1 615*	value1.615*	value1.615*	*1 224*2 3	*1.224*2.3
power15.40	%17.92%20	mateu	value1.615*	*1 224*2 2	*1.224*2.3	*1.224*2.3	1.22 + 2.3	21**2.198*
%17.92%20	.98%16.80	value1.015*	*1.224*2.3	*1.224*2.3	21**2.198*	21**2.198*	21***2.198*	*1.540**0.
.98%16.80	%15.97%12	*1.224*2.3	21**2.198*	21**2.198*	*1.540**0	*1.540**0	*1.540**0.	941**Expla
%15.97%12	10% Mobil	21**2.198*	*1 5/0**0	*1.540**0.	0/1**Evnla	0/1**Evnla	941**Expla	natory
.10%Mobil	.10%100011	*1.540**0.	0.41**E 1	941**Expla	941 ·· Expla	941 ·· Expla	natory	1474
e	e .	941**Expla	941**Expla	natory	natory	natory	power14.74	power14.74
Internetesti	Internetesti	natory	natory	power14 74	power14.74	power14.74	¹ %20 33%10	%20.33%10
motod	mated	natory	power14.74	04 20 2204 10	%20.33%10	%20.33%10	180/ 21.80	.18%21.89
	value1.615*	power14.74	%20.33%10	%20.33%10	.18%21.89	.18%21.89	.10%21.09	%25.35%18
value1.615*	*1.224*2.3	%20.33%10	.18%21.89	.18%21.89	%25.35%18	%25.35%18	%25.35%18	.88%Englis
*1.224*2.3	21**2 198*	.18%21.89	%25 35%18	%25.35%18	88%Englis	88% Englis	.88%Englis	hOpen
21**2.198*	*1 540**0	%25.35%18	220.55 /010	.88%Englis	hOpen	hOpen	hOpen	aouropostim
*1.540**0.	·1.340···0.	.88%Englis	.00%Engns	hOpen	nopen	nopen	courseestim	courseesum
941**Expla	941**Expla	hOpen	hOpen	courseestim	courseestim	courseestim	ated	ated
natory	natory	courseestim	courseestim	ated	ated	ated	value? 484*	value2.484*
natory	power14.74	otad	ated	ucu voluo2 494*	value2.484*	value2.484*	*1 605*1 1	*1.685*1.1
power14.74	%20.33%10		value2.484*	*1 605*1 1	*1.685*1.1	*1.685*1.1	1.005 1.1	24*1.613*1
%20.33%10	18%21.89	value2.484*	*1.685*1.1	*1.685*1.1	24*1.613*1	24*1.613*1	24*1.613*1	.969*1.430
.18%21.89	%25 35%18	*1.685*1.1	24*1 613*1	24*1.613*1	969*1 430	969*1 430	.969*1.430	***Evnlana
%25.35%18	/025.55/010 990/ En alia	24*1.613*1	24 1.015 1	.969*1.430	.)0) 1.450	.)0) 1.4.00	***Explana	Explaina
.88%Englis	.88%Englis	.969*1.430	.909*1.430	***Explana	Explana	Explana	tory	tory
hOpen	hOpen	***Explana	***Explana	tory	tory	tory	power12.50	power12.50
courseestim	courseestim	tory	tory	nower12.50	power12.50	power12.50	%20.31%18	%20.31%18
	ated	101 y	power12.50	power12.30	%20.31%18	%20.31%18	7020.317010	.28%19.14
ated	value2.484*	power12.50	×20.31%18	%20.31%18	.28%19.14	.28%19.14	.28%19.14	%31.56%34
value2.484*	*1 685*1 1	%20.31%18	28%1914	.28%19.14	%31 56%34	%31 56%34	%31.56%34	86% Social
*1.685*1.1	24*1 612*1	.28%19.14	0/21 560/24	%31.56%34	86% Social	86% Social	.86%Social	notworkosti
24*1.613*1	24*1.015*1	%31.56%34	%51.50%54	.86%Social	.80%500181	.80% Social	networkesti	networkesu
969*1 430	.969*1.430	86%Social	.86%Social	networkesti	networkesti	networkesti	mated	mated
***Evplana	***Explana	networkesti	networkesti	mated	mated	mated	valuel 624*	value1.624*
Explaina	tory	networkesu	mated		value1.624*	value1.624*	value1.024	
tory	power12.50	mated	value1.624*	value1.624*				
power12.50	%20 31%18	value1.624*						
%20.31%18	280/ 10 14	Explanatory	10.22%18.6	18.61%20.5	20.50%15.7		17.05%25.9	25.93%Soci
.28%19.14	.207017.14	power10.22	1%20.50%1	0%15.71%1	1%17.05%2		3%Social	al
%31.56%34	%31.56%34	×18.61%20	5.71%17.05	7.05%25.93	5.93%Socia		networkesti	networkesti
86% Social	.86% Social	50% 15 71	%25 Q2% S	%Social	1		mated	mated
.00/050Cial	networkesti	0/ 17 050/ 25	/020.70700		1 notrus -1t'		mateu	mateu
networkesti	mated	%17.05%25	ocial	networkesti	networkesti	15.71%17.0	value2.435*	value2.435*
mated	value1 674*	.93%Social	networkesti	mated	mated	5%25 93%	*1.944*0.9	*1.944*0.9
value1.624*	, und 1.02T	networkesti	mated	value2.435*	value2.435*	5,025.75/0	96***1.797	96***1.797
		mated	value2.435*	*1.944*0.9	*1.944*0.9		**1.078**2	**1.078**2
		value2.435*	*1.944*0.9	96***1.797	96***1.797		.125*Expla	.125*Expla
		*1 944*0 0	96***1 797	**1 078**7	**1 078**7		natory	natory
		06***1 707	20 1./2/ **1 070***0	1070-2	1070-2		natory	natory
		JO TT 1./J/	······································	.1∠J EXPla	.1∠J EXDIa		power15.48	power15.48

	1.0782	.125*Expla	natory	natory		%17.92%20	%17.92%20
	.125*Expla	natory	power15.48	power15.48		.98%16.80	.98%16.80
	natory	power15.48	%17.92%20	%17.92%20		%15.97%12	%15.97%12
	power15.48	×17.92%20	.98%16.80	.98%16.80		.10%Mobil	.10%Mobil
	%17.92%20	98%16.80	%15.97%12	%15.97%12		e	e
	98%16.80	%15.97%12	10%Mobil	10%Mobil		Internetesti	Internetesti
	0/ 15 070/ 12	100/ Mobil	.10/01/10011	.10/01/10011		matad	metad
	7013.977012 100/M-h:1	.10%10000	e Tata an ata ati	e Tata an at a at:			mateu
	.10%100011	e e	Internetesti	Internetesti		*1 00 4*0 2	value1.015*
	e .	Internetesti	mated	mated		*1.224*2.3	*1.224*2.3
	Internetesti	mated	value1.615*	value1.615*		21**2.198*	21**2.198*
	mated	value1.615*	*1.224*2.3	*1.224*2.3		*1.540**0.	*1.540**0.
	value1.615*	*1.224*2.3	21**2.198*	21**2.198*		941**Expla	941**Expla
	*1.224*2.3	21**2.198*	*1.540**0.	*1.540**0.		natory	natory
	21**2.198*	*1.540**0.	941**Expla	941**Expla		power14.74	power14.74
	*1.540**0.	941**Expla	natory	natory		×20.33%10	[°] 20.33%10
	941**Expla	natory	power14.74	power14.74		.18%21.89	.18%21.89
	natory	power14 74	¹ %2033%10	¹ %20 33%10		%25 35%18	%25 35%18
	power14 74	%20 33%10	18%21.89	18%21.89		88%Englis	88%Englis
	% 20 33% 10	18% 21.80	%25 35%18	%25 35%18		hOpen	hOpen
	120.337010	.107021.09	%23.33%10	920/Englis		nopen	nopen
	.10%21.09	%23.33%18	.00%Engns	.00%Eligits		courseesum	courseesum
	%25.35%18	.88%Englis	nOpen	nOpen		ated	ated
	.88%Englis	hOpen	courseestim	courseestim		value2.484*	value2.484*
	hOpen	courseestim	ated	ated		*1.685*1.1	*1.685*1.1
	courseestim	ated	value2.484*	value2.484*		24*1.613*1	24*1.613*1
	ated	value2.484*	*1.685*1.1	*1.685*1.1		.969*1.430	.969*1.430
	value2.484*	*1.685*1.1	24*1.613*1	24*1.613*1		***Explana	***Explana
	*1.685*1.1	24*1.613*1	.969*1.430	.969*1.430		tory	tory
	24*1.613*1	.969*1.430	***Explana	***Explana		power12.50	power12.50
	969*1 430	***Explana	tory	tory		%20 31%18	%20 31%18
	***Evnlana	tory	nower12.50	nower12.50		28%1014	28% 10 1/
	Explaina	$r_{\rm nouver}$ 12.50	04 20 21 04 18	04 20 2104 18		0/21 560/24	0/21 560/24
	101y	power12.30	%20.31%10 280/10.14	%20.31%10 280/10.14		%51.50%54	%51.50%54
	power12.50	%20.31%18	.28%19.14	.28%19.14		.80%500181	.80% Social
	%20.31%18	.28%19.14	%31.56%34	%31.56%34		networkesti	networkesti
	.28%19.14	%31.56%34	.86%Social	.86% Social		mated	mated
	%31.56%34	.86%Social	networkesti	networkesti		value1.624*	value1.624*
	.86%Social	networkesti	mated	mated			
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means P<0.05; * * * means P<0.01.	* means P<0.01.	* means P<0.01.	P<0.01.				

Source: The benchmark data of China Education Tracking Survey (CEPS) project; Note: * means P<0.1; * * means P<0.05; * * * means P<0.01.

From Table 3, it can be seen that the frequency of distance training for rural teachers is significantly lower than that of urban teachers, and the efficiency of transforming students' academic performance into improvement is not as good as that of urban students. Specifically, there are significant differences in the effects of different distance training methods on the academic performance of urban and rural students, and this difference is also heterogeneous in different disciplines and different points. For example, in the Q90 scores of urban students, the explanation of open courses, social networks and mobile internet for the improvement of students' academic performance in mathematics and English is significantly higher than that for the improvement of Chinese academic performance.

4. CONCLUSIONS

First, the gap between urban and rural basic education does exist, but the academic achievement gap reflected by students at different quantiles is different. First of all, urban students' scores in Chinese, mathematics and English at any score point are significantly higher than their corresponding rural students; Secondly, the gap between urban and rural students' academic performance has gradually widened with the increase of the scores; Finally, the academic gap between urban and rural students is heterogeneous in different disciplines, that is, the academic performance of English is generally greater than that of Chinese and mathematics. It can be concluded that the academic achievement gap between urban and rural students is particularly prominent among those with better academic achievements, and it is mostly reflected in English subjects.

Secondly, distance teacher training is beneficial to improve urban and rural students with different academic performance levels, and it has a higher promotion effect on students with better academic performance in rural areas, rather than those with poor academic performance in rural areas. On the one hand, the influence of distance teacher training on the gap between urban and rural students is consistent, and the same training frequency is helpful to improve students' academic performance; On the other hand, in the academic performance of rural students, the positive effect of distance teacher training on students in Q90 is significantly higher than that of students in Q30 and Q60, that is, distance teacher training can not bring significant positive effects to rural students with lower academic performance. It can be concluded that distance teacher training can promote the academic performance of urban and rural students, and the effect on urban students is significantly higher than that on rural students at the same training frequency, so it cannot be

directly explained that distance teacher training can narrow the gap between urban and rural education, and further research is needed to verify this conclusion.

Thirdly, the effects of different distance teacher training methods on students' academic performance are different, and the effects on mathematics and English subjects are more significant than those on Chinese subjects. First of all, according to the different characteristics of urban and rural student groups, we should adopt differentiated distance teacher training methods, so as to achieve better results; Secondly, for teachers of different disciplines, we should also adopt differentiated distance teacher training methods. On the whole, the training effect of open courses is significantly higher than that of social networks and mobile internet; Finally, at different points, different distance teacher training methods have different explanations for improving students' academic performance, so different training methods should be adopted according to students' academic level. From this, we can draw a conclusion: when developing distance teacher training, we should dynamically apply open courses, social networks and mobile internet training methods according to students' academic level and different subject categories.

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