

The Equitable Development of Primary and Secondary Education in Linyi City

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Abstract:Background: primary and secondary education play important roles in promoting educational equity. However, under the influence of multiple complex factors, educational equity is difficult to be effectively guaranteed. Significance: the investigation and analysis of the current situation and causes of educational equity in primary and secondary schools can help to allocate educational resources more rationally, optimize educational financial investment, and reduce educational inequity. Motivation: countermeasures and suggestions are put forward through the analysis of the current situation and causes of educational inequity in Linyi City. Data: teachers and students from 10 primary and middle schools in 5 districts and counties of Linyi City were selected as the survey objects, and the basic information of schools and families, school resources, and students' academic performance were collected. Methods: analysis of variance (ANOVA) and regression analysis were used to explore the impact of educational resource differences on students' academic performance. Results: there were significant differences in students' academic performance under different family conditions, learning conditions, extracurricular tutoring intensity, teachers' teaching ability, and school facilities ($p < 0.01$). The family conditions, learning conditions and teachers' teaching ability had significant effects on the learning performance of primary and secondary school students in Linyi city, and whether the school was located in the city center and the edge of the city also had significant effects on the students' learning performance. Conclusion: differences in family conditions and extra-curricular tutoring intensity lead to educational inequity to a certain extent, and school educational resources partially guarantee educational equity. Suggestions: the countermeasures to solve the inequity of education should be put forward from the aspects of building learning environment and atmosphere, reducing after-school burden and promoting quality education in non-central urban areas.

Keywords: educational equity; primary and secondary schools; compulsory education; educational resources; Linyi, Shandong province

1. INTRODUCTION

Education has always been one of the important ways to promote social mobility and ensure social equity. As China's ruling party, the Communist Party of China (CPC) has made it clear that it will strive to ensure that every child has fair and quality access to education[1]. Among the many reasons leading to the inequity of primary and secondary education, the differences in regional resources, school resources, teachers and family conditions are considered to be the most important ones[2]. Among them, family background is one of the most concerned factors of educational equity, and many studies have focused on the impact of such factors on educational equity in primary and secondary schools. Parents in areas with higher social class can provide more available resources for their children's growth, but the advantages of these resources will not automatically translate into the benefits of children's education[3]. Expanding education supply does not necessarily achieve educational equity, but it is certain that the more resources parents have, the more likely they are to influence their children's education planning and decision-making[4]. From the perspective of schools, China has increased the financial expenditure and investment in compulsory education by vigorously promoting compulsory education in recent decades, which has realized the fairness of education resource allocation in the regional scope to a large extent. However, whether it can ensure the fairness of education quality is still worth studying[5]. In recent years, the novel coronavirus epidemic has also had a negative impact on educational equity, and the issue of educational equity in the context of the epidemic has also attracted widespread attention[6]. In view of the above problems, this paper takes Linyi City of Shandong Province as an example to investigate

the current situation of primary and secondary education equity in this region, and analyzes the main factors leading to educational inequity, so as to provide a basis for improving the quality of school education and ensuring educational equity.

2. Data sources and research methods

2.1 Research objects and survey design

The subjects were teachers, students and school leaders from 10 primary and secondary schools in 5 districts and counties of Linyi City, Shandong Province. The survey sampling and questionnaire design adopted a phased probability proportional sampling method. In the first step, 5 counties (districts) were selected from 3 districts and 9 counties in Linyi City; in the second step, 2 schools were selected from 5 counties (districts). In the third step, one fourth grade class and one eighth grade class were selected from each school; the fourth step, the selected class of students, teachers, school leaders as samples, as the final survey objects. Through the above methods, a total of 1087 students were involved in the survey; 960 samples were retained after removing invalid samples, and the effective rate of the questionnaire was 88.3%. The questionnaire included student questionnaire, teacher questionnaire and school leader questionnaire. The data of the three types of questionnaires could be correlated through the codes of schools and classes to jointly reflect the situation of students' performance, family resources and school resources. From the perspective of gender, boys accounted for 51.6% and girls accounted for 48.4%. In terms of family location, 55.2% of the students were from rural areas and 44.8% from urban areas.

2.2 The Research Methods

1. Descriptive statistics. To analyze the basic data of primary and secondary education equity and related variables in Linyi City, we can provide support for further revealing the key factors affecting the primary and secondary education equity in Linyi City.

2. Analysis of variance. One-way analysis of variance (ANOVA) was carried out to analyze the contribution of various factors to the change of student achievement so as to determine the influence of each factor on the change of student achievement.

3. Entropy value method. Due to the large number of questions related to educational equity in the questionnaire, we did not convert all the questions into variables one by one. Instead, we applied entropy method to weighted sum some questions so as to combine the data of multiple questions into one variable[7]. For example, students' learning conditions include three aspects: whether students have independent desks, the number of books in their families, and the situation that students have computers and networks. Therefore, there are three indicators used to evaluate learning conditions, which need to be combined into a comprehensive indicator to evaluate learning conditions by entropy method. The specific steps of entropy method are as follows:

If the data set contains m samples and n indicators, the original data matrix $(x_{ij})_{m \times n}$, x_{ij} can be used to represent the value of the j indicator of the i -th sample, and then all the original data are normalized by using the standardization method of the difference between extreme values, and the obtained index data are standardized positive values with values ranging from 0 to 1. The normalization method is as follows:

$$y_{ij} = \frac{x_{ij} - \min x_{ij}}{\max x_{ij} - \min x_{ij}}$$

After the normalized values of each index are obtained by the above method, the specific gravity p_{ij} of the i -th value of the j -th index can be calculated by the following formula:

$$p_{ij} = \frac{y_{ij}}{\sum_{i=1}^m y_{ij}}$$

If $p_{ij}=0$, then assign p_{ij} to 0.000001 to avoid the denominator being 0. Then, calculate the entropy e_j of the j -th index:

$$e_j = -k \sum_{i=1}^m p_{ij} \ln p_{ij}, k > 0, 0 \leq e_j \leq 1$$

Table 1 Education equity of primary and secondary schools in Linyi City

Issues related to variables options The assignment The number of Accounted for Family financial condition Very rich 580.83% wealthier 495	options The assignment The number of Accounted for Family financial condition Very rich 580.83% wealthier 495	The assignment The number of Accounted for Family financial condition Very rich 580.83% wealthier 495	The number of Accounted for Family financial condition Very rich 580.83% wealthier 495	Accounted for Family financial condition Very rich 580.83% wealthier 495
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Calculate the difference coefficient g_j of index j :

$$g_j = 1 - e_j$$

If the difference of the original index value x_{ij} is smaller, the value of the difference coefficient g_j will be smaller. On this basis, the final weight value w_j of each index can be obtained by further normalizing the obtained difference coefficient:

$$w_j = \frac{g_j}{\sum_{j=1}^n g_j}$$

Using the above index weights to sum the index values of each sample, we can get the comprehensive level v_i of each sample:

$$v_i = \sum_{j=1}^n (w_j \times y_{ij}) \quad (i = 1, 2, \dots, m)$$

4. Multiple regression analysis. Regression analysis is used to analyze the influence of family conditions, after-school services, teachers' ability and school facilities on students' performance, which can explain whether differences in these factors lead to differences in students' performance.

3. The Research Results

3.1 The Current situation of education equity in primary and secondary schools in Linyi City

Table 1 shows students from families with different economic conditions, their learning conditions and their participation in after-school services. It can be seen that the proportion of students from families with "very rich" and "relatively rich" is only 0.83% and 9.90% respectively. The majority of students have a separate desk at home, accounting for 81.77%; 40.83%, 33.23% and 25.83% of the students had more, no more or no less, and no more books at home, respectively. 57.29% of the students had computers and Internet at home; only about 30 to 40 percent of the students participated in after-school tutoring. Table 1 presents the assignments of each variable for subsequent analysis.

	books in the student's homeA lot of517818.54%There are many421422.29%general	homeA lot of517818.54%There are many421422.29%general	homeA lot of517818.54%There are many421422.29%general	of517818.54%There are many421422.29%general
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About 2 to 3 hours	3565.83%	About 3 to 4 hours	3565.83%	About 4 + hours	3565.83%	About 2 to 3 hours	3565.83%
About 3 to 4 hours	4353.65%	About 4 + hours	4353.65%		4353.65%	About 3 to 4 hours	4353.65%
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About 3 to 4 hours	4353.65%	About 4 + hours	5282.92%		4353.65%	About 4 + hours	4353.65%
About 3 to 4 hours	4353.65%	About 4 + hours	5282.92%		4353.65%	About 4 + hours	5282.92%
About 4 + hours	5282.92%		5282.92%		282.92%		2.92%

There are six variables used to reflect educational equity, which are family conditions, learning conditions, extracurricular tutoring, teachers' teaching ability, school facilities level, and school location. Among them, teachers' teaching ability included teachers' educational background (master's degree or above =4, bachelor's degree =3, self-examination bachelor's degree =2, junior college =1), whether they have received mental health training (yes =1, no =0), teaching age, professional title (senior teacher =4, first level teacher =3, second level teacher =2, third level teacher =1, no professional title =0). The level of school facilities included the size of the school track (200 meters = 1,300 meters = 2,400 meters =3), the availability of related facilities (such as laboratories, computer classrooms, libraries, music rooms, gymnasiums, etc. If yes, add 1 to the number of school facilities), the number of computers used for learning, the number of books, and the financial allocation per student; the school location includes three options: urban center, urban fringe, and rural. Using the entropy method, we calculated the weighted sum value of each index including family condition, learning condition, extracurricular tutoring, teachers' teaching ability and school facilities level. The results of one-way analysis of variance showed that there were significant differences in students' academic performance under different family conditions, learning conditions, extracurricular tutoring intensity, teachers' teaching ability and school facilities level ($p < 0.01$), indicating that the differences in students' family resources and school resources may lead to the inequity of primary and secondary education.

Table 2 Results of analysis of variance

variable	df	Sum of squares	The mean square	FPR(>F)	FPR(>F)	Family conditions	Between groups	PR(>F)
The mean square	4153559.6	4938389.91273	710.000	Within the	group	954496899	1.5345208.587L	earning conditions
Between groups	2740658.4	11370329.20680						

.7950.000	Within the	group	956438189	2.7714583.570E	extra-class	continuation	Between	
270396.36	435198.1826.66	00.001	Within the	group	956505215	4.8195284.681T	each teaching	
2783015.4	39391507.71986	.2490.000	Within the	group	956433953	5.7444539.263L	level of school	
2179779.2	8589889.64217.	3860.000	Within the	group	956494277	1.8985170.263T	he school	
2716549.1	57358274.57977	.7370.000	Within the	group	956440600	2.0254608.789T		

he Analysis of influencing factors of education equity in primary and secondary

schools in Linyi City						
Family conditions Between groups4	Between groups4	4153559.64938389.9127.3710.000	153559.64938389.9127.3710.000	38389.9127.3710.000	7.3710.000	0.000
	Within the group5	9544968991.5345208.587	4968991.5345208.587	5208.587	Learning conditions	Learning conditions
Learning conditions Between groups2	Between groups2	2740658.411370329.20680.795	740658.411370329.206	370329.206	80.795	0.000
	Within the group5	9564381892.7714583.570	4381892.7714583.570	4583.570	Extra-class continuation	Extra-class continuation
Extra-class continuation Between groups2	Between groups2	270396.36435198.1826.6600.0	70396.36435198.1826.6600.0	35198.1826.660	6.6600.0	0.001
	Within the group5	9565052154.8195284.681	5052154.8195284.681	5284.681	Teacher teaching ability	Teacher teaching ability
Teacher teaching ability Between groups2	Between groups2	2783015.439391507.71986.249	783015.439391507.719	391507.719	86.249	0.000
	Within	956433	433953	4539.26	Level of	Level of
Level of school facilities Between groups2	Between groups2	2179779.28589889.642	2179779.28589889.642	179779.2858989.642	7.3860.000	89889.6
	Within the group5	9564942771.8985170.263	9564942771.8985170.263	4942771.8985170.263	4942771.8985170.263	5170.263
The school location	Between groups2	2716549.157358274.57977.737	2716549.157358274.579	716549.157358274.579	358274.579	77.737
	Within the group5	6440602.0254608.789	6440602.0254608.789	440602.0254608.789	440602.0254608.789	4608.789

3.2 The Analysis of influencing factors of education equity in primary and secondary schools in Linyi City

Multiple regression analysis method can further analyze the changes of various factors comprehensively affecting students' performance, and then find out the most influential factors of education equity in primary and secondary schools. The results of regression analysis are shown in Table 3.

Table 3 Regression analysis results

variable	coefstd.e	std.errP	t> t	P> t	[0.025	0.975]
Family conditions	10.05073 .7672.66 80.00817 .4432.65 9Learnin g condition s12.1238	3.7672.6 680.008	2.6680. 00817.4 432.659	0.00817 .4432.6 59Learn ing conditio ns12.12 381.206	17.443	2.659
Learning conditions	12.12381 .20610.0 5509.758	1.20610. 05509.7 5814.49	10.0550	09.7581 4.49Ext ra-class continu ation0.6 271.005	14.49	
Extra-class continuati	0.6271.0 050.6240 .5331.34	1.0050.6 240.533	0.6240. 5331.34 62.6Tea	0.5331. 3462.6	1.3462. 6Teach er teachi	2.6Tea

on0.6271. 0050.624	62.6Tea cher teaching ability1.4 8050.197		cher teachin g ability1. 48050.1 977.513		teachin g ability1 .48050. 1977.5 1301.8 671.09 4Level of school facilitie s0.030 30.120. 2530.8 010.26 60.205	ng ability
Teacher teaching ability1.4 8050.197	1.48050. 1977.513	0.1977.5 1301.86 71.094L evel of school facilities	7.51301 .8671.0 94Level of school facilitie s0.0303	01.8671 .094Le vel of school facilitie s0.0303	1.8671. 094Le vel of school facilitie s0.030 30.120. 2530.8 010.26 60.205	1.094
Level of school facilities0. 03030.12	0.03030. 120.2530 .8010.26 60.205T he city center13. 24786.45 12.0540. 0425.907	0.120.25 30.8010. 2660.20 5The city center13 .24786.4 512.054	0.2530. 8010.26 60.205	0.8010. 2660.20 5The city center1 3.24786 .4512.0 205The city center1 3.2478	0.2660. 205The city center1 3.2478	0.205
The city center13.2 4786.451	13.24786 .4512.05 9070.589	6.4512.0 540.042 5.9070.5 89The edge of the city26.5 4485.67 34.6790	2.0540. 0425.90 70.589	0.0425. 9070.58 9The edge of the city26.5 4485.67 34.6790	25.907	0.589
The edge of the city26.54 485.6734. 679037.6 7915.411	26.54485 .6734.67 9037.679	5.6734.6 79037.6 7915.41 1R- squared0 .284Adj. R- squared0 .279Nu mber of samples	4.67903 7.67915 .411R- squared	037.679	37.679	15.411
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<p>279Number of samples959The results of regression analysis showed that the R square value was 0.284, the adjusted R square value was 0.279, and the F value was 53.90. The regression coefficient were -10.0507, -12.1238 and -1.4805, respectively. Whether the school was located in the city center and the city edge also had a significant impact on the student's performance, the regression coefficient were -13.2478 and -26.5448, respectively. However, extracurricular tutoring and the</p>	<p>samples959The results of regression analysis showed that the R square value was 0.284, the adjusted R square value was 0.279, and the F value was 53.90. The regression coefficient were -10.0507, -12.1238 and -1.4805, respectively. Whether the school was located in the city center and the city edge also had a significant impact on the student's performance, the regression coefficient were -13.2478 and -26.5448, respectively. However, extracurricular tutoring and the</p>						<p>ce.</p>	<p>level of school facilities have no significant impact on students' performance.</p>						
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4. CONCLUSIONS

4.1 Research Conclusion

(1) Family conditions and extracurricular services have a partial impact on educational equity

Families at the upper levels of student achievement score is higher, for the family condition the middle and lower levels of students, family, of the best students in the relatively low average grades, family condition in the students and other student's grade point average differ from water about 20-30 points, suggesting that family economic conditions on the education fair is to have certain influence. Students with upper-middle level family conditions are more likely to get better grades than students with lower-middle level family conditions. At the same time, students from the most advantaged families did the worst, suggesting that good family conditions do not necessarily lead to good grades for students from such families. The average score of students with good learning conditions is about 40 points higher than that of students with medium learning conditions, and about 50 points higher than that of students with poor learning conditions, indicating that learning conditions have a great impact on educational inequity. The transformation of good family conditions into good learning conditions requires certain conditions, such as the attention of parents, the purchase of relevant learning facilities and the construction of learning environment. In addition, extracurricular services do not lead to the inequity of primary and secondary education, but the intensity of extracurricular tutoring has a certain impact on the inequity of education. The average score of students who participate in the middle and high level of extracurricular tutoring is more than 250 points, which is about 20 points higher than that of students with low level of tutoring. Although the impact of extracurricular tutoring on educational equity is not significant, extracurricular services do have a positive impact on academic performance, especially between students who participate in tutoring and those who do not.

(2) School educational resources partially guarantee educational equity

The average score of the students whose school facilities were "medium" and "good" was above 260, while the average score of the students whose school facilities were "poor" was only 237.48. The average score of the students whose school facilities level is medium or above is more than 20 points higher than that of the students whose school facilities level is poor. The school facilities mainly include teaching, sports,

learning activities and cultural facilities. Students with poor facilities can only meet the basic learning needs of students, while it is difficult to meet the diverse needs of students in other aspects such as experiments, computer learning, sports activities and cultural entertainment. As the basic educational resources, school facilities play important roles in the process of ensuring educational equity. It is shown that as long as the facilities in the school are not too poor, the difference in the average score of students is not very significant. There are great differences in the level of school facilities between urban centers, urban fringes and rural areas. The scores for school facilities in the city center range from 40 to 88, and those in the city fringe range from 11 to 67. Scores for school facilities in rural areas range from 26 to 32. All of these indicate that schools in urban areas have better facilities. However, students in schools in rural and central urban areas scored higher on average than those in schools in peripheral urban areas. The level of facilities in schools in the urban fringes is uneven, which may be the main reason for the lower average score of students in the urban fringes. In addition, the higher the teaching ability of the teachers, the lower the students' scores, which may be related to the fact that the teachers with strong ability pay more attention to quality education, while the teachers with poor teaching ability may pay more attention to exam-oriented education and improve the students' scores.

4.2 Discussion and suggestions

First of all, more favorable learning conditions should be created for primary and secondary school students to ensure that students can get a good education in a better learning environment and atmosphere. The investment in students is directly proportional to their academic performance and output[8] Increasing investment in learning environment and atmosphere can help students obtain more favorable learning conditions so as to better guarantee educational equity.

Secondly, it is necessary to reduce the after-class burden for students, avoid making students participate in all kinds of remedial activities after class, and make students in the process of high-intensity extracurricular learning. East Asian countries pay attention to educational investment, so many students receive extracurricular tutoring services purchased by their parents outside of school, which leads to fierce competition among students[9]. In the past two years, the Chinese government has issued policy documents on regulating the development of off-campus training institutions and reducing the burden on students in compulsory education, which has had a positive effect on reducing the burden on students[10].

Finally, we should strengthen the construction of educational infrastructure and the promotion of quality education in primary and secondary schools in the urban fringe and rural areas, so as to promote the more comprehensive development of students in non-central urban areas. For a long time, in order to catch up with the education level of the schools in the central urban areas, the non-central urban schools in China have focused on the exam-oriented education[11]. Therefore, they pay more attention to improving students' performance, but neglect to cultivate students' quality and comprehensive ability in other aspects. In order to solve this problem, while the construction of educational infrastructure is strengthened, quality-oriented education should be further promoted in the urban fringe and rural areas, so that students can obtain the same all-round development opportunities as those in the central cities.

5. REFERENCES

- [1] Strive to provide fair and quality education for every child. *China Higher Education*, 2017(22):26-27.]
- [2] Kang Wenyan, Liu Hui, Li Dexian. [2] Kang W Y, Liu H, Li D X. The connotation, dilemma and transcendence of process equity in primary and secondary education in China [J]. *Basic Education Curriculum*, 2019(15):33-40. (in Chinese)
- [3] Zhang Heping, Zhang Qinggen, Yin Xia. [3] Family capital, out-of-school training and educational opportunity equity [J]. *Educational Academic Monthly*, 2021(02):3-11.]
- [4] Rolleston C, Iyer P. Beyond the basics: Access and equity in the expansion of post-compulsory schooling in Vietnam[J]. *International Journal of Educational Development*, 2019, 66: 223-233.
- [5] Li Xiangyun, Tong Zefeng. [5] [Li X Y, Dong Z F. How Much Financial Input is needed to develop fair and Quality Compulsory Education -- A case study of primary schools in B and W counties. *Macro Quality Research*, 222,10(04):118-128.]
- [6] Shi Y, Pyne K, Kulophas D, et al. Exploring equity in educational policies and interventions in primary and secondary education in the context of public health emergencies: A systematic literature review[J]. *International Journal of Educational Research*, 2022, 111: 101911.
- [7] Ren Z. Evaluation Method of Port Enterprise Product Quality Based on Entropy Weight TOPSIS[J]. *Journal of Coastal Research*, 2020, 103(SI): 766-769.
- [8] Zhou G, Zhang F, Fei Y. Research on the development efficiency of educational science and technology in China: an approach from three-stage DEA Malmquist model[J]. *Technology Analysis & Strategic Management*, 2022: 1-16.
- [9] Wiseman A W. Does Inequality Stay in the Shadow? The Cross-national Effects of Educational Equity on Private Tutoring and Student Achievement[J]. *International Journal of Educational Research*, 2021, 109: 101808.
- [10] Gao R, He T, Liao Y, et al. An investigation on the academic burden of Chinese students ranging from primary schools to universities based on a word association test in Guangdong Province[J]. *International Journal of Environmental Research and Public Health*, 2022, 19 (4) : 2481.
- [11] Yin Y M, Mu G M. Examination-oriented or quality-oriented? A question for fellows of an alternative teacher preparation program in China[J]. *The Australian Educational Researcher*, 2022, 49 (4) : 727-742.