Education Quality of Rural Preschool Education Institutions based on the NAEYC Evaluation Standard: an Empirical Study of 20 Kindergartens in Cang County of Hebei Province

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ABSTRACT

In this paper, taking the education quality of rural preschool education institutions in Cang County of Hebei Province as the research object, and 20 kindergartens of different educational levels and certification standards in Cang County of Hebei Province as the research samples, five evaluation indexes---teacher-student interaction, curriculum, physical environment, health and safety, and nutrition and diet were constructed according to the evaluation standard of the National Association for the Education of Young Children (NAEYC). A multivariate linear regression analysis evaluation model was built to evaluate the education quality of rural preschool education institutions in Cang County of Hebei Province according to the survey data. Through the data analysis, the problems of interscholastic unbalance of educational resource distribution and education quality, low literacy of teachers, unreasonable curriculum and unqualified private kindergarten in rural preschool education institutions in Cang County of Hebei Province were found, and the solutions of strengthening education resources, improving teacher qualification and teacher training systems, improving the treatment of teachers and strengthening quality supervision were put forward.

Keywords: NAEYC, early childhood education, rural preschool education institutions, education quality

INTRODUCTION

Preschool education institution is an important part of early childhood education, and its education quality will exert an important influence on young children's curiosity, thirst for knowledge, imagination, creativity and other important non-intellectual qualities. At present, the research on the education quality of preschool education institutions has become the focus of attention of domestic scholars.

Foreign scholars mainly study the quality standards, influencing factors, education means, evaluation methods, and education accountability of preschool education, among which, the research on the education quality standard of early childhood institutions by the National Association for the Education of Young Children (NAEYC) is a key content. The aim of the NAEYC is to promote the all-round development of children aged 0-6, and to pay attention to the quality of education and development. It officially implemented the Early Childhood Program Standards and Accreditation Criteria in 2006. After the Criteria were released, the NAEYC regularly releases relevant "Guidance". The NAEYC Early Childhood Education Quality Standards has become an important tool for the evaluation of the education quality of early childhood institutions (Taleb, 2013; Liu, 2012 and 2017).

In addition to the researches on the education quality standards of preschool education institutions, foreign scholars have also carried out researches on the micro factors influencing the education quality, such as early childhood curriculum design, preschool teachers' quality, and teaching environment. For example, Karatas (2017) and Geller (2017) carried out an empirical study on the relationship between preschool teachers' teaching experience and mathematics teaching effect, Paredes (2017) specialized in the study of the relationship between

Contribution of this paper to the literature

- In this paper, the education quality of rural preschool education institutions was regarded as the research object, and 20 kindergartens of different educational levels and certification standards in Cang County of Hebei Province were selected as the research samples. According to the evaluation standard of the National Association for the Education of Young Children (NAEYC), five evaluation indexes were constructed combining with actual situation of preschool education in Cang County. Then, questionnaires of the education quality of preschool education institutions in Cang County were designed to obtain the first-hand data of the education quality of rural preschool education institutions in Cang County. The analysis of reliability and validity of the questionnaire data showed that the research conclusions were scientific and effective.

- A multivariate linear regression analysis evaluation model was built using the modified Evaluation Table for Early Childhood Education Quality of the NAEYC to evaluate the education quality of rural preschool education institutions in Cang County of Hebei Province from five evaluation indexes---teacher-student interaction, curriculum, physical environment, health and safety, and nutrition and diet. Through the data analysis, the problems in the preschool education institutions in Cang County of Hebei Province were found, and the solutions were put forward.

grading system and student effort, Lam and Muldner (2017) has studied the effects of collaboration on learning in the instructional activities, and the effects of instructor participation and class size on student participation was studied by Parks-Stamm et al. (2017).

Some other scholars also conducted a special study of teaching methods, For example, Falloon (2017) and Atapattu (2017) has explored the contribution technology can make to science learning, Chase and Klahr (2017) compared the learning effects of two distinct instructional methods of discovery-oriented and direct instruction methods, Cochrane and Davey (2017) adapted the mixed-methods evaluate the relationship of a healthy exercise, eating, and lifestyle program. In addition, foreign scholars have also carried out a study as the following aspects, such as education accountability (Ballou and Springer, 2017), science reading (Or-Kan, 2017), mobile learning (Gunter, et al., 2017), special obstacle children education (Mayer, 2017) and so on.

In recent years, domestic scholars have mainly studied and paid more attention to the education quality of preschool education institutions. First of all, Liu (2012) at the Institute of Education Sciences found the quality problems in the current kindergarten education in China by comparative analysis using nearly ten years of data obtained through observation and interviews. Li and Kang (2014) pointed out that the social environment is easy to lead to "primary school--orientation" in kindergarten education, and put forward solutions.

Secondly, Domestic scholars also pay great attention to the evaluation of the education quality of preschool education institutions. For example, Huang and Song (2013) built a Kindergarten Teaching Observation Table by using Wilson's four-step method to attempt to conduct a performance evaluation of the attitude and behavior of kindergarten teachers in classroom interaction. The effects of different interactions on students' sense of community in e-learning environment were studied by Luo Nuan et al. (2017). Si and Qiao (2017) analyzed the relationship between fiscal expenditure and education quality from the perspective of fiscal expenditure performance evaluation of elementary education in China. Zhang (2013) and Lai (2015) have carried out a study on the requirements and configuration of preschool education resources respectively.

In addition, Wang (2013), Zhang (2013), Jiang (2014), He (2015) et al. conducted a research on the Early Childhood Program Standards and Accreditation Criteria of the NAEYC, and introduced them in detail. Xu and Zhang (2017) analyzed the NAEYC Early Childhood Education Quality Evaluation System, and put forward some suggestions for the quality evaluation of preschool education institutions in China.

At present, few researches on the education quality of the preschool education institutions in villages and towns have been conducted at home and abroad. In this paper, taking the education quality of rural preschool education institutions in Cang County of Hebei Province as the research object, and 20 kindergartens of different educational levels and certification standards in Cang County of Hebei Province as the research samples, a multivariate linear regression analysis evaluation model was built to evaluate the education quality of rural preschool education institutions in Cang County of Hebei Province. Through the data analysis, the problems in the preschool education institutions in Cang County of Hebei Province were found, and the solutions were put forward.

EVALUATION INDEX SYSTEM

The NAEYC is an authority of early childhood education in the United States which has developed a number of evaluation criteria of early childhood education quality. The main purpose of the evaluation is to help preschool teachers improve the quality of early childhood education and confirm the high quality early childhood institutions.

Table 1. NAEYC Early Childhood Education Quality Evaluation Scale

First-class evaluation index (code)	Second-class evaluation index (code)
Teacher-student interaction (Z1)	Care for young children (Z11), respect for young children's difference (Z12), cultivation of young children' independence (Z13), appropriate disciplinary manner (Z14), support of emotional development (Z15), use of various teaching strategies (Z16)
Curriculum (Z2)	Safe outdoor activities (Z21), balanced game (Z22), suitable activity materials (Z23), cultivation of young children's sense of identity (Z24), development of young children's skills (Z25), encouragement of reasoning ability (Z26), encouragement of reading and writing ability (Z27), encouragement of artistic creativity (Z28), reasonable and flexible arrangement of curriculum (Z29)
Physical environment (Z3)	Plenty of space (Z31), strong site adaptability (Z32), combination of individual activities and collective activities (Z33), personal storage space (Z34), hazard isolation belt (Z35)
Health and safety (Z4)	Adult supervision (Z41), suitable clothes (Z42), clean area (Z43), hand washing related matters (Z44), anti-skid and non-toxic floor materials (Z45), shockproof materials in playground (Z46), safe placement of large equipment (Z47), safe placement of chemicals and dangerous goods (Z48), pasting of emergency action procedures (Z49)
Nutrition and diet (Z5)	Balanced and nutritional diet (Z51), food safety (Z52), dining environment (Z53)

The NAEYC Early Childhood Education Quality Evaluation Scale included 5 items (65 subitems): teacher-student interaction, curriculum, physical environment, health and safety, and nutrition and diet, and was designed to study the activity room of early childhood institutions, and then to study the education quality of early childhood institutions.

Through the comparison, it was found that many items in the Scale were repeated and can be placed in the same category. For example, 6 subitems in the "health and safety" column were related to hand washing, so they can be put in the same class as "hand washing". According to the correlation between specific subitem description of the Scale and the actual situation of rural preschool education in Cang County of Hebei Province, the Scale was simplified to be a scale including 5 first-class evaluation indexes and 32 second-class evaluation indexes, as shown in **Table 1**.

BUILDING OF MULTIVARIATE LINEAR REFRESSION ANALYSIS EVALUATION MODEL

The multivariate linear regression model is a linear multiple regression model with multiple explanatory variables for revealing the linear relationship between explained variables and other multiple explanatory variables. Under certain statistical fitting criteria, all the parameters in the model were estimated to obtain a multivariate linear regression model, as shown in Equation (1).

$$Y = a + b_1 x_1 + b_2 x_2 + b_3 x_3 + b_4 x_4 + b_5 x_5 \tag{1}$$

Where Y was objective function, a was constant, x_1, x_2……x_5 were correlated independent variables, and b_1, b_2……b_5 were variable correlation influence coefficients, also called regression coefficients.

As the number of the second-class evaluation indexes was different, directly carrying out linear regression will directly influence the weight analysis of the second-class evaluation indexes, thus, centralized compression of the second-class evaluation indexes, i.e. normalization of the second-class evaluation indexes, must be first carried out. Then, linear regression of the evaluation results was carried out, and the regression coefficients obtained can reflect the actual importance of corresponding independent variables. Then, normalization of the evaluation results was carried out by using the least square method, i.e. the optimal function was found by minimizing the sum of squares of errors, and the standardized regression coefficient matrix was solved using matrix operation, as shown in Equation (2).

$$\hat{\beta} = (X^T X)^{-1} XT\, y = \left(\sum x_i x_i^T \right)^{-1} \left(\sum x_i y_i \right) \tag{2}$$

Where β was standard regression coefficient, X was variance matrix, and y was standardized result function. The multivariate linear regression equation was obtained after normalization, thus, suppose the multivariate linear regression equation of the preschool education quality was Equation (3), where β was the standardized regression coefficient of the first-class evaluation indexes.

$$Z_y = \beta_1 Z_1 + \beta_2 Z_2 + \beta_3 Z_3 + \beta_4 Z_4 + \beta_5 Z_5 \tag{3}$$

ANALYSIS OF EVALUATION DATA

Questionnaires were designed according to the built evaluation index system. Two kinds of slightly different questionnaires were designed according to the characteristics of preschool teachers and young children's parents. Since the items in the Scale were divided into three grades, thus, the three-point system was used as the measurement scale of research variables. The specific evaluation scale was: "1 point" indicated "not conform to the standard", "2 points" indicated "partially conform to the standard", and "3 points" indicated "fully conform to the standard".

Selection of Survey Samples

Taking Cang County of Hebei Province as an example, an empirical study of the education quality of rural preschool education institutions was conducted in this paper. As of September 2016, there are 173 public kindergartens in Cang County of Hebei Province. According to the Standard for Classification and Evaluation of Rural Kindergartens in Hebei Province, the rural kindergartens in Cang County were classified into four levels---rural demonstration kindergartens, rural first-class kindergartens, rural second-class kindergartens and rural third-class kindergartens. In this paper, 5 representative rural kindergartens at each level, i.e. a total of 20 rural kindergartens, were selected. Of which, the rural demonstration kindergartens included Cang County Kindergarten (c1), Yuancai Village Kindergarten (c2), Qiangzhuangzi Village Kindergarten (c3), Zilaitun Village Kindergarten (c4), Caozhuangzi Village Kindergarten (c5); the rural first-class kindergartens included Langerkou Village Kindergarten (c6), Houcao Village Kindergarten (c7), Xiguanzhuang Village Kindergarten (c8), Xueguantun Village Kindergarten (c9), and Jun Lei Bilingual Kindergarten (c10); the rural second-class kindergartens included Dabaitou Primary School Kindergarten (c11), Huixiao Kindergarten (c12), Chenyang Kindergarten (c13), Peiyou Kindergarten (c14), and Sunlight Kindergarten (c15); the rural third-class kindergartens included Maguanting Kindergarten (c16), Sunlight Art Kindergarten (c17), Morning Star Kindergarten (c18), Little Ant Kindergarten (c19), and Morning Sunlight Kindergarten (c20). The statistics of the basic information of these 20 rural kindergartens can provide basic data support for the education quality evaluation based on the Scale.

The basic information of the 20 kindergartens in Cang County of Hebei Province selected in this paper is shown in **Table 2**. As shown in **Table 2**, the 20 rural kindergartens, as the research samples of this study, covered the four levels of education quality classification of rural preschool education institutions. According to the nature of organizers of the survey samples, the 20 kindergartens were classified into public kindergartens and private kindergartens; according to the qualification of organizers of the survey samples, the 20 rural kindergartens were classified into kindergartens with a "Kindergarten-running License" ("License") and kindergartens without a "Kindergarten-running License" ("License"); the 20 kindergartens were classified into kindergartens with independent kindergarten premise and kindergartens attached to primary school or with leased buildings as their kindergarten premise. Thus, the 20 kindergartens selected in this paper were representative, which can reflect the overall and real situation of the education quality of rural preschool education institutions in Cang County of Hebei Province.

The quality of preschool teachers, the number of preschool teachers and the ratio of preschool teachers to students affected the quality of preschool education. The preschool teachers' educational background not only reflected the quality of the teachers themselves but also the quality of the preschool education. As shown in **Table 2**, except the number of preschool teachers of c1 Kindergarten was more than 100, and the number of students was more than 500, the number of preschool teachers of the rest kindergartens was not more than 30, and the number of students was not more than 300. The ratio of preschool teachers to students of c1 Kindergarten was the lowest, i.e. 1:4.6, and the ratio of preschool teachers to students of c18 Kindergarten was the highest, i.e. 1:31, showing that there was imbalance and polarization in the ratio of preschool teachers to students.

Table 2. Statistics of the basic information of the 20 rural kindergartens in Cang County

Kindergarten	Nature	License	Independent kindergarten premise	Number of preschool teachers and students			Preschool teachers' educational background			
	Public/private	Yes/No	Yes/No	Number of preschool teachers	Number of students	Ratio of preschool teachers to students	Junior middle school	Senior middle school	Technical secondary school	Junior college
c1	Public	Yes	Yes	121	555	1:4.6	5	25	50	41
c2	Public	Yes	Yes	6	102	1:17	0	0	3	3
c3	Public	Yes	No	18	187	1:10.3	2	3	7	6
c4	Public	Yes	Yes	24	255	1:10.6	1	5	13	4
c5	Public	Yes	No	11	136	1:12.3	0	2	7	2
c6	Public	Yes	No	12	158	1:13.1	2	4	4	2
c7	Public	Yes	No	6	80	1:13.3	0	1	5	0
c8	Public	Yes	No	12	146	1:12.1	3	1	8	0
c9	Public	Yes	No	20	197	1:9.9	5	6	7	2
c10	Private	Yes	Yes	20	262	1:13.1	5	3	9	3
c11	Private	Yes	No	11	177	1:16	1	2	6	2
c12	Private	Yes	No	12	139	1:11.5	3	2	5	2
c13	Private	Yes	No	9	110	1:12.2	4	2	3	0
c14	Private	Yes	No	26	211	1:8.1	7	9	9	1
c15	Private	Yes	Yes	24	178	1:7.4	8	11	5	0
c16	Public	Yes	No	2	31	1:15.5	1	0	1	0
c17	Private	Yes	No	5	110	1:22	2	2	1	0
c18	Private	Yes	No	4	124	1:31	3	1	0	0
c19	Private	No	No	5	40	1:8	3	2	0	0
c20	Private	No	No	10	90	1:9	6	4	0	0

Table 3. Descriptive statistics of the teacher-student interaction (Z1) data

		Z11	Z12	Z13	Z14	Z15	Z16
Mean	Statistic	2.3	2.2	2.35	2.2	2.25	2
	Standard error	0.1638	0.1377	0.15	0.117	0.1602	0.1451
Standard deviation	Statistic	0.7327	0.6156	0.6708	0.5232	0.7164	0.6489
Variance	Statistic	0.537	0.379	0.45	0.274	0.513	0.421

Descriptive Statistics of Questionnaire Data

A total of 150 teacher questionnaires and 200 student questionnaires were issued, the recovery rate was up to 72.1%, and the recovery rate of valid questionnaires was 69.2%. The purpose of descriptive statistics of the questionnaire data was to summarize and describe the whole picture of a set of questionnaire data, so as to better understand the information contained in them. The mean represented the respondents' level of agreement on each item, and the standard deviation and variance represented the deviation extent of the level of agreement of all respondents. The smaller the standard deviation and variance, the more consistent the respondents' level of agreement.

Table 3 showed that the scores of high level kindergartens were relatively high on the whole. There was no big difference in scores of the 20 kindergartens, which were basically in the upper-middle level. It showed that whether public kindergartens or private kindergartens paid great attention to the interaction between teachers and students, cultivated young children's good habits and ability to communicate, supported the development of young children's emotion, built a bridge of communication between teachers and young children, embodying the humanistic care. It was a general progress for the kindergartens in Cang County.

Table 4 showed that the scores were in proportion to the quality of the kindergartens. The kindergartens with independent kindergarten premise had safer outdoor activities. Most of them paid more attention to the cultivation of young children's sense of identity, development of young children's skills and use of suitable activity materials, encouragement of young children's reasoning ability, reading and writing ability, and artistic creativity, but did poorly in the coordination of the timing of classes and games as well as curriculum. There was a big difference between the two kindergartens with a "License" and the kindergartens without a "License", showing that the kindergartens without a "License" did poorly in the physical and mental training and skill development.

Table 4. Descriptive statistics of the curriculum (Z2) data

		Z21	Z22	Z23	Z24	Z25	Z26	Z27	Z28	Z29
Mean	Statistic	1.9500	2.1000	2.6500	2.4000	2.1500	2.7000	1.8500	2.4500	2.0500
	Standard error	0.1698	0.1235	0.1094	0.1338	0.1666	0.1051	0.1666	0.1535	0.1352
Standard deviation	Statistic	0.7592	0.5525	0.4894	0.5982	0.7452	0.4702	0.7452	0.6863	0.6048
Variance	Statistic	0.576	0.305	0.239	0.358	0.555	0.221	0.555	0.471	0.366

Table 5. Descriptive statistics of the physical environment (Z3) data

		Z31	Z32	Z33	Z34	Z35
Mean	Statistic	2.5000	2.1000	2.8500	2.3000	1.9000
	Standard error	0.1539	0.1762	0.0819	0.1277	0.1906
Standard deviation	Statistic	0.6882	0.7881	0.3663	0.5712	0.8522
Variance	Statistic	0.474	0.621	0.134	0.326	0.726

Table 6. Descriptive statistics of the health and safety (Z4) data

		Z41	Z42	Z43	Z44	Z45	Z46	Z47	Z48	Z49
Mean	Statistic	2.2500	2.1000	2.1500	1.9500	2.0500	1.7500	2.2500	2.5000	1.9000
	Standard error	0.1758	0.1906	0.1666	0.1141	0.1698	0.1602	0.1902	0.1539	0.1235
Standard deviation	Statistic	0.7864	0.8522	0.7452	0.5104	0.7592	0.7164	0.8507	0.6882	0.5525
Variance	Statistic	0.618	0.726	0.555	0.261	0.576	0.513	0.724	0.474	0.305

Table 7. Descriptive statistics of the nutrition and diet (Z5) data

	Mean		Standard deviation	Variance
	Statistic	Standard error	Statistic	Statistic
Z51	2.6000	0.1522	0.6806	0.463
Z52	2.4500	0.1535	0.6863	0.471
Z53	2.1500	0.1666	0.7452	0.555

Table 5 showed that the scores of the kindergartens in Cang County were in the middle and lower-middle levels. The safety coefficient of public kindergartens was higher than that of private kindergartens, and the safety coefficient of kindergartens with a "License" was higher than that of kindergartens without a "License". The safety coefficient of kindergartens without a "License" was very low, as the health and safety were difficult to be guaranteed. Thus we can see that the principals and teachers in most of the kindergartens in Cang County paid insufficient attention and the relevant departments didn't put law enforcement and supervision in place because the kindergartens did not have good conditions of running kindergartens as they were located in remote rural areas.

Combined with previous survey data, **Table 6** showed that the kindergartens with independent new kindergarten premise and few students had good physical environment, and the kindergartens attached to primary school or with leased buildings as their school premise had bad physical environment. The kindergartens with independent kindergarten premise generally had plenty of space, strong site adaptability and hazard isolation belt. Most of the kindergartens paid attention to the good combination of individual activities and collective activities, and provided enough personal storage space for young children.

Table 7 showed that the food health and safety were closely related to young children's growth and development. The public kindergartens had the best food nutrition and dining environment, followed by the kindergartens with a "License", the kindergartens without a "License" had the worst food nutrition and dining environment. Most of the kindergartens provided balanced food nutrition for young children, and guaranteed the food health and safety. However, most of the kindergartens had poor dining environment, the reason was that the kindergartens had no separate canteen, but integrated classroom, dormitory and canteen in one due to geographical restrictions. It was worth mentioning that the scores of the kindergartens without a "License" were very low, as the kindergartens had serious food safety concern because the food safety and dining environment were difficult to be guaranteed. For this reason, they should be resolutely banned by the relevant departments.

Reliability and Validity Analysis

Reliability analysis was to analyze the reliability or stability of the Scale. The most commonly used method of testing reliability was α method, as shown in Equation (4), where K was the total sample size of the Scale.

Table 8. Statistics of the Cronbach's α testing the internal consistency of the questionnaires

	Zy	Z1	Z2	Z3	Z4	Z5
Cronbach's α	0.796	0.628	0.763	0.879	0.724	0.635

Table 9. Statistics of the validity test

Variable		Z11-Z16	Z21-Z29	Z31-Z35	Z41-Z49	Z51-Z53
Kaiser-Meyer-Olkin Measurement of Sampling Sufficiency		0.516	0.496	0.663	0.613	0.729
Bartlett's Test of Sphericity	Approximate chi-square	18.660	64.662	31.938	111.168	22.151
	df	15	36	10	36	3
	Sig.	0.230	0.002	0.000	0.000	0.000

Table 10. Summary results of the model

Model	R	R square	Adjusted R square	Estimated standard variance
Standard model	0.984	0.969	0.952	0.82206

Table 11. Statistics results of the objective function

Model	Sum of squares	df	Mean square	F	Sig
Regression	129.052	5	42.761	61.457	0.000
Residual error	6.812	6	0.834		
Total	135.864	11			

$$\alpha = \frac{K}{K-1}\left(1 - \frac{\sum S_i^2}{S^2}\right) \tag{4}$$

Through the calculation, it showed that the Cronbach's α testing the internal consistency of the questionnaires is shown in **Table 8**. In general, the Cronbach's α ranged from 0 to 1, the higher the Cronbach's α, the higher the reliability of the Scale.

The construct validity of the Scale was tested by factor analysis, and the validity analysis was carried out. The validity referred to the accuracy or reliability of the test results. The statistics of the validity test are shown in **Table 9**. The KM0 values were in the range of 0.50-0.70, which showed that the data can be analyzed by factor analysis. Except the second-class evaluation indexes of Z1, the significance of statistics of the Bartlett's Test of Sphericity was 0.00, which showed that the data of this group had a high correlation.

EMPIRICAL RESULTS

By collating the results of the teacher-student interaction, curriculum, physical environment, health and safety, and nutrition and diet in the questionnaires, a multivariate linear regression analysis was carried out with SPSS. Then, the summary results of the model, statistics results of the objective function and summary results of the standard regression coefficients were output, as shown in **Table 10**.

Table 10 showed that the complex correlation coefficient of the objective function and each independent variable was 0.984, the coefficient of determination was 0.969, the adjusted coefficient of determination was 0.952, and the estimated standard variance of the regression equation was 0. 82206. According to the **Table 10**, the target result fit test can be carried out. Because there were 5 independent variables in the regression equation, the adjusted coefficient of determination should be consulted. The adjusted coefficient of determination was 0.952, which was close to 1, so the result had high goodness of fit. More parts of the objective function variables were analyzed by the model, but few parts of the objective function variables were not analyzed by the model. The statistics results of the objective function are shown in **Table 11**.

Table 11 showed that the total sum of squares of deviations of the objective function was 135.864, the regression sum of squares and mean square were 129.052 and 42.761, respectively, the residual sum of squares and square were 0.812 and 0.834, respectively, the observed value of the F test statistics was 61.457, and the corresponding probability p was approximately 0. According to the results of **Table 11**, the confidence test of the standard regression equation can be carried out. The standard deviation of the selected significance confidence was 0.05. The probability p was less than the standard difference of confidence, so for the significance confidence test of the standard regression equation, the null hypothesis was invalid. Thus, the standard regression coefficients were null when they were different, then the linear relationship between the objective function and independent variables was significant, and the linear model was reliable and effective.

Finally, the standard regression coefficient results were summarized in a table. The partial regression coefficient and standard deviation of partial regression coefficient in the table were the standard deviation of regression

Table 12. Summary results of the standard regression coefficients

Variable code	Partial regression coefficient	Standard deviation of partial regression coefficient	Standardized partial regression coefficient	Observed value of the regression coefficient	Probability corresponding to the regression coefficient
Z_1	0.503	0.21	1.059	11.425	0.000
Z_2	0.487	0.39	1.002	6.341	0.000
Z_3	0.265	0.18	0.601	4.971	0.011
Z_4	0.113	0.12	0.385	3.182	0.019
Z_5	0.082	0.09	0.213	2.071	0.033

coefficient and regression coefficient of each independent variable in the multivariate linear standard regression equation, and the observed value was the statistics under the sample size, The probability corresponding to the regression coefficient was the significant level in the multivariate linear regression analysis.

According to the data in **Table 12**, the confidence test of the regression coefficient of each variable can be analyzed to determine the multicollinearity of multivariate regression of the standard regression equation. The standard deviation of the selected confidence was 0.05, and the probability corresponding to each regression coefficient was less than the standard difference of confidence, so for the significance confidence test of the standard regression equation, the null hypothesis was invalid. Thus, the standard regression coefficients were null when they were different, then the linear relationship between the objective function and independent variables was significant.

On the basis of the results of the multivariate linear regression analysis evaluation model, the multivariate linear canonical regression equation can be obtained by SPSS analysis, as shown in Equation (5).

$$Z_y = 0.503Z_1 + 0.487Z_2 + 0.265Z_3 + 0.113Z_4 + 0.082Z_5 \tag{5}$$

From the Equation (5), we can see that the factors influencing the quality of preschool education were ranked as follows from the most important to least: teacher-student interaction (Z_1), curriculum (Z_2), physical environment (Z_3), health and safety (Z_4), and nutrition and diet (Z_5). Although the nutrition and diet had the least influence on the education quality of preschool education institutions in Cang County of Hebei Province, its importance in influencing young children's health and life safety cannot be ignored.

DISCUSSION AND CONCLUSION

According to the results of the data analysis, the following conclusions can be drawn:

First, the interaction between teachers and students had become a major factor influencing the education quality of preschool education institutions in Cang County. Most of the kindergartens paid attention to the teacher-student interaction, cultivation of young children' personality and emotion, training of practical ability, and nutritional and balanced diet, but some kindergartens neglected the cultivation of young children's emotion and interaction between teachers and students; some kindergartens had problems in educational philosophy, so they had "primary school--orientation" in kindergarten education.

Second, the kindergartens with independent kindergarten premise in Cang County had high safety coefficient and good physical environment, and the kindergartens attached to primary school or with leased buildings as their kindergarten premise in Cang County had serious safety concern and bad physical environment. In particular, the private kindergartens without a "License" were at the bottom in the score ranking, because the teaching equipment was not complete, and the teaching environment was bad, and there was serious safety concern, and the young children's health cannot be guaranteed, and the curriculum was not reasonable.

Third, the overall education level of Cang County was low, the educational resources were not balanced, and the education quality was uneven. For example, the education quality of public kindergartens was higher than that of private kindergartens, the education quality of kindergartens with a "License" was higher than that of kindergartens without a "License", and the education quality of kindergartens close to Cang County was higher than that of kindergartens far from Cang County, which led to the educational inequity of preschool education institutions in Cang County, and this educational inequity continued to deepen.

Fourth, the preschool teachers' personal quality directly affected the emotional communication between teachers and students. The overall quality of preschool teachers in Cang County was low as almost all of them did not have a bachelor degree or above, meanwhile, the ratio of teachers to students was not moderate, facing an acute shortage of teachers. With the implementation of the two-child policy, the number of preschool children in Cang County surged, but the number of increased teachers was far behind it. The number of preschool children was large, while the number of preschool teachers was small, so the average teaching resources for each student became

fewer, which was bound to lower the overall education quality of Cang County, and to lead to more crowded kindergarten.

Through the investigation and analysis of the education quality of preschool education institutions in Cang County, the problems of interscholastic unbalance of educational resource distribution and education quality, low literacy of teachers, unreasonable curriculum and system construction in the preschool education institutions in Cang County of Hebei Province were found. These problems are also common problems in preschool education in other regions, especially rural preschool education in China. To improve the quality of preschool education, the following suggestions were put forward:

First, strengthen the investment in financial resources. The government should increase funding to improve the conditions of running kindergartens, especially financially support the qualified private kindergartens to improve their campus environment, teaching equipment, and education quality, which is the guarantee to narrow the gap between private kindergartens and public kindergartens. In addition, the regions where conditions permit should incorporate the preschool education into compulsory education security as soon as possible, and constantly improve the status and treatment of kindergarten teachers. The county (city, district) where conditions permit should provide financial subsidy.

Second, strengthen the construction of teachers. High quality teachers are the fundamental guarantee to improve the quality of education. First, fully implement the professional standards for preschool teachers, strictly implement the kindergarten teacher qualification system; second, improve the kindergarten principal and preschool teacher training system, and give priority to the rural private kindergartens.

Third, improve the construction of curriculum. Kindergarten leaders and teachers should establish a scientific concept of early childhood education. For example, they should reasonably arrange curriculum activities, carry out activities conducive to young children's physical and mental development, build a sound relationship between learning time and play time, and avoid spoon-feeding education according to the characteristics of young children's physical and mental development. In addition, the special geographical environment of countryside also provides good conditions for young children to learn and have close contact with nature. The rural kindergartens can make use of the advantages of rural environment to create a study life with "agricultural flavor".

Fourth, strengthen the supervision and management of preschool education institutions. Educational management departments should carry out classified management and classified guidance for preschool education institutions. Strictly carry out the access system for private kindergartens, and issue the kindergarten-running license according to relevant provisions. The relevant departments should make rectification on kindergartens without a kindergarten-running license according to law, and shut down the kindergartens according to law if they cannot meet the standard of running kindergartens after rectification. The relevant departments should order the kindergartens with unqualified kindergarten premise to make rectification, and shut down the kindergartens with severe unqualified kindergarten premise according to law. In addition, improve and implement the kindergarten annual inspection system. For example, order the kindergartens with safety concern to make rectification within the stipulated time, and disqualify their annual inspection and withdraw their kindergarten-running license if their rectification was not qualified.

All efforts are made to let the children have a good childhood and smooth transition to primary school life.

ACKNOWLEDGEMENTS

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