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ORIGINAL ARTICLE

Does Housework Help Improve Academic Performance? An Empirical Analysis on the Influence of Participation in Housework on Academic Performance of Primary and Middle School Students

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Abstract. *At present, even if the education on hard-working spirit has been emphasized increasingly as an important part of practical education in China's education policy, the reality is still far from satisfactory, because many parents do not provide their children with sufficient opportunities to do housework. Previous studies have indicated that the empirical analysis remains to be improved in terms of the relationship between housework and the development of primary and junior high school students. Based on data from the 2020 Monitoring of Students' Academic Quality in Basic Education in Jiangsu Province Study, this study investigates the influence of primary and secondary school students' participation in housework on academic performance by using OLS regression and Coarsened Exact Matching (CEM). The results show that the current proportion of primary and junior high school students involved in housework is not high; however, participating in housework frequently will positively affect the academic performance of primary and junior high school students. Participation in housework in primary school has a greater positive impact on academic performance than that in junior high school. In addition, since excessive academic burden is the main factor hindering primary and junior high school students from being involved in housework, it is necessary to strengthen the publicity of education on hard-working spirit to help people know its importance. Also, we suggest the burden on schoolwork should be reduced to in order to promote more diversified housework related educational opportunities for students.*

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***Keywords**: Participation in Housework, Education on Hard-Working Spirit, Student Academic Achievement, Coarsened Exact Matching, Reducing Burden and Increasing Efficiency*

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Introduction

ENCOURAGING students to perform housework fits well with the goals of China's education. But does time spent on housework limit students' study time, thus being harmful to academic achievement? Chinese education policy has long emphasized "learning from practice", and housework is an important form of rigorous work. Whereas the existing nature of Chinese education requires students to perform mountains of homework, parents tend to protect their children from household work so that they may have more time for academic study. This paper addresses this issue by examining the meaning of housework education, and the effects of housework performance on student academic achievement.

In China, the significance of housework education was early recognized and has been supported by policies promoting a spirit of hard work, an important domain of the great Chinese educator Cai Yuanpei's "Educating Five Domains Simultaneously" (Tang, 2009). These five domains are: Military national education (focusing on the cultivation of the five martial ethics of wisdom, faith, benevolence, courage, and strictness); Materialistic education (advocating a close relationship between education and national economic life); Civic Moral education (advocating love for the motherland and its people, love of labor, love of science, and care for public property); Worldview education (forming students' correct positions, viewpoints, and methods), Aesthetic education (training students' ability to recognize, love, and create beauty), Meanwhile, at the beginning of the founding of New China, the *Common Program of the Chinese People's Political Consultative Conference* listed "love of labor" as one of the "five national merits." In 1950, Junrui Qian, Vice Minister of Education, clearly pointed out in the *Guidelines for Current Educational Construction* that the central policy of the New Democratic Education was to serve workers and peasants and develop production and construction (He, 2009). Since then, with education for hard-working spirit being raised to unprecedented new heights on the political, economic and epistemological range, teaching children how to perform housework has been gradually incorporated into the school's formal teaching plan (Lao, 1998), and has become an important way to shape students' character and the key to their all-round development (Li & Qu, 2018). Since the reform and opening up, the political connotation of education for hard-working spirit has been weakened, but is still considered an essential way to educate people. In recent years, the authorities at all levels have issued a series of policy documents to highlight the role of education on hard-working spirit. In March and July 2020, the Central Committee of the Communist Party of China, the State Council and the Ministry of Education respectively issued the *Opinions on Comprehensively Strengthening Labor Education in Colleges, Primary and Junior High Schools in the New Era* (hereafter referred to as the "*Opinions*") and *The Guidelines for Labor Education in Colleges and Universities* (Hereafter referred to as the "*Outline*"), the status of education for the hard-working spirit has been pushed to new levels.

In sharp contrast with this policy emphasis, however, the current situation of housework education is not satisfactory. For instance, Wang and Xu (2020) conducted questionnaire surveys and on-site interviews with 4,224 students in 6 provinces and cities in the east, central and west part of China. Only 6.6% of the basic education schools set up housework courses, and the higher the school level, the lower the devel-

opment of housework education as well as the satisfaction of students with participation in housework. The proportion of students who never participate in housework in primary school, junior high school and high school accounted for 13.8%, 26.7% and 41.7% respectively (Wang & Xu, 2020). Bao (2013) found that although 83.1% of parents are aware of the necessity of letting their children participate in housework, only 41.8% of them would really require their children to perform it (Bao, 2013). In many cases, apart from "spoiling" their children, the reason parents are reluctant to allow their children to participate more in housework is that they pay more attention to their children's academic performance. To that end, many parents tend to impose greater academic stress on their children through various means (Goh & Kuczynski, 2014). Spare time of young people in China will thus be spent on extracurricular activities, with only limited time devoted to practical educational activities, let alone autonomously planned activity (Wang & Chen, 2015). Changing this situation will likely ensure the implementation of relevant policies and more supportive guidance. Moreover, one question that parents are generally concerned about needs to be answered: Will housework affect children's academic performance?

Literature Review

In fact, the academic circle has long been involved in the issue of housework and youth development. Embodied cognition theory suggests that the body, brain, and environment are unified. This in turn suggests that significant physical activity can improve learning experiences and academic performance (Wang & Ye, 2018). Studies underscore this conclusion with respect to language learning (Lan, Chen & Li, et al., 2015; Mcclelland, Pitt & Stein, 2015; Su & Ye, 2013) and mathematics learning (Ruiter, Loyens & Paas, 2015; Smith, King & Hoyte J, 2014). Marx believed that hard work satisfies the needs of individual survival and contained the main force for helping mankind overcome difficulties and nature. In the process of doing housework, human spiritual development is closely linked with education for hard-working spirit (Huang, 2004), which is identified by some far-reaching empirical studies. In 1989, Jacqueline J. Goodnow, a senior professor in the Faculty of Behavioral Sciences at Macquarie University in Australia, interviewed 45 mothers with children aged 9-11 and found that in addition to cultivating children's sense of responsibility, participation in housework played a vital role in children's socialization, and that different ways of distributing housework had different effects on family relations (Goodnow, 1989). Harvard University professor Robert Waldinger in his 20-year Grant Study argued that people who had housework experience in childhood, even simple housework experience, tended to have more happiness in future life than those without housework experience (George, 2012). Because of this, many countries attach great importance to children's housework and have developed education on hard working spirit methods with various cultural characteristics (Li, 1983; Gu, 2018; Fu & Zhou, 2005; Tan, 2019). Relevant studies have indicated that frequent participation in housework is not only conducive to the improvement of students' academic performance, but also has a positive impact on the development of children's character, habits and non-cognitive abilities. In contrast, lack of housework may bring about many negative effects such as arrogance, laziness, cognitive bias, etc. (Gu, 2021). However, many foreign studies have suggested that in families with

low economic background, housework may not have a positive effect on the growth of children, and have the possibility of making children become "child laborers". In 1990, based on data from the National Household and Household Survey Sampson Lee Blair, a professor in the Department of Sociology at the University of Oklahoma, conducted a series of surveys on children involved in domestic labor under different circumstances and claimed that children in "dual-career families" are especially likely to be more and more served as a source of "alternative labor," which would not only reduce the differences between the role of adults and children in the family, but also have a negative impact on children's happiness and growth (Blair, 1992).

So far, most domestic housework education research is based on theoretical discussions, most of which have focused on the impact of housework education on students' developments and the ways to strengthen and encourage its performance (Chen & Lu, 2021; Xiong, 2021; Yuan & Li, 2021; Yin, 2021). Despite a few rigorous empirical studies, many improvements can be made in terms of data quality, method application, and robustness of conclusions to provide greater support for policies aimed at improving housework education. Our research, therefore, provides more complete empirical analysis aimed at answering the following questions. Firstly, what is the current status of primary and junior high school students in housework? Secondly, how does participation in housework affect the academic performance of primary and junior high school students? Thirdly, what are the factors that influence primary and junior high school students to participate in housework? Finally, a discussion will be given to investigate what measures should be taken to drive primary and junior high school students to participate in housework to promote their overall development.

Research Design and Methods

Data Source and Sample Description

This study selects data from the 2020 Monitoring of Students' Academic Quality in Basic Education in Jiangsu Province, which is implemented every two years. The subjects of the 2020 test were students in the fifth and ninth grades. In addition to an academic test, the survey collects relevant information about school leaders, teachers, parents, and students through questionnaires. Through two-stage stratified sampling, the 2020 survey includes a total of 214,205 fifth-grade students and 147,805 ninth-grade students, a sufficient data source for this study. To ensure the data validity, cases that failed to provide important information or that had obvious response abnormalities were eliminated. Our resulting subsample contains 103,507 primary school and 100,998 junior high school students.

Variable Selection and Description

The variables of this study are described in **Table 1**.

The Dependent Variable

Table 1. Variable Description.

Variable Name	Variable Type	Data Type	Variable Description
Housework Participation Frequency	Core Explanatory variables	Dichotomous variables	Infrequent=0; Regular=1
Gender	Control variable	Dichotomous variables	Male=1; Female=0
Only-Child		Dichotomous variables	Only child=1; Non-only child=0
Urban/ Rural Area		Dichotomous variables	City=1; Countryside=0
Father's Education		Continuous variable	Junior high school and below=9 years; High school (vocational high school, Technical secondary school or technical school)=12; University=16 years; Postgraduate and above=19
Mother's Education		Continuous variable	
Father's Occupation		Continuous variable	Assign expert values to different occupations
Mother's Occupation		Continuous variable	
Family's Economic Status		Continuous variable	Standardized score of household economic situation
Central Region of Jiangsu		Dummy variable	Central Region of Jiangsu=1；Others=0
Southern Region of Jiangsu		Dummy variable	Southern region of Jiangsu=1；Others=0
Student's Residence		Dichotomous variables	On campus=1； Off campus=0
Academic Burden		Continuous variable	The sum of the time on homework and the time on supplementary lessons
Academic Performance (Total)	Explained variable	Continuous variable	Primary school: the average score of total scores in Chinese, mathematics, and English; Junior high school students: the average score of total scores in Chinese, mathematics, English, physics, chemistry, and biology.

The dependent variable of this study is the student's academic performance. Primary school test scores include three subjects: Chinese, mathematics, and English, while junior high school test scores include six subjects: Chinese, mathematics, English, physics, chemistry, and biology. In processing the original scores, we used Multiple Imputation (MI) to estimate missing item values. The Raida criterion will assume that a set of test data only contains random errors, then calculate and process them to obtain the standard deviation, and determine an interval with a certain probability. It is believed that any error exceeding this interval is not a random error but a gross error, which should be eliminated (Zhang & Yuan, 1997). Finally, the mean value of the multiple interpolation results is calculated to obtain the final result of the interpolation.

Core Independent Variables

In this provincial survey, students were asked "How often did you do housework in the last month?" Their responses were measured on a four-point scale ranging from "never" to "always." Items were ranked on a scale, ranging from "Never", "Occasionally", "Very often", to "Always". Because we planned to adopt a matching method to eliminate the influence of sample selection bias and improve the accuracy of analysis, we recoded this item into a dichotomous variable for which responses of "Never" and "Occasionally" were treated as never doing housework and responses of "Occasionally" and

Table 2. Descriptive Statistics for Variables.

	Primary School		Junior High School		Min	Max
	Mean	SD	Mean	SD		
Housework Participation Freq.	0.769	0.422	0.463	0.499	0	1
Gender	0.519	0.500	0.518	0.500	0	1
Only-Child	0.369	0.483	0.466	0.499	0	1
Urban/Rural Area	0.704	0.457	0.703	0.457	0	1
Father's Education	12.987	3.232	11.678	2.854	9	19
Mother's Education	13.164	3.334	11.359	2.795	9	19
Father's Occupation	44.311	20.800	38.874	19.672	0	69
Mother's Occupation	34.515	23.867	30.831	21.209	0	69
Family's Economic Status	0.422	0.137	0.428	0.130	0	1
Central Region of Jiangsu	0.165	0.371	0.161	0.368	0	1
Southern Region of Jiangsu	0.588	0.492	0.575	0.494	0	1
On/Off Campus	0.031	0.172	0.140	0.346	0	1
Academic Burden	3.107	1.871	4.008	2.029	0	9
Academic Performance (Total)	519.083	53.088	512.708	59.704	265.900/276.210	684.220/691.630

"Always" were treated as always doing so. This allowed intervention and control groups to be constructed and analyzed with the matching method.

Control Variables

Variables were included to control for salient student characteristics such as gender, family background, academic burden, residence (on/off campus), and urbanicity. Student family background was estimated based on five variables: father's education level, mother's education level, father's occupation, mother's occupation, and family economic status. Parent education was assigned a value of 1 for junior high or lower, 2 for high school, 3 for university degree, and 4 for post graduate degree. (Regression treats 9, 12, 16, and 19 the same as 1, 2, 3, and 4.) In terms of parent occupations, we refer to the research of Li Chunling, Lu Xueyi, etc., (2005) and use the expert assignment method to assign values to the parents' occupations using professional reputation scores. The specific method ranks the professional prestige of various occupations on a zero to 100 scale. The values in our subsample range from zero to 69. As for family economic status, the family economic conditions are characterized by investigating the amount of family possessions. Taking into account the differences between urban and rural areas, we also include dummy variables of urban and rural areas in the model.

Table 2 reports descriptive statistics for the variables in this study. The table indicates that the proportion of primary students who often participate in housework in the sample is 76.9%, and the proportion of junior high school students who often participate in housework is 46.3%. The average academic burden of junior high school students is 4 hours, while for primary school students, it is 3 hours. The average academic scores of primary and junior high school students were 519.08 and 512.71 respectively.

Model Setting

This research aims to explore the extent to which the frequency of participation in housework can affect students' academic achievement. But because characteristics such as family economic background can affect the analysis results or lead to biased estimates, matching methods are used to eliminate sample selection bias to solve this problem. However, since the commonly used Propensity Score Matching (PSM) has to pass the balance test and the common support domain test, it has higher requirements on the data and often fails to match (Rosenbaum & Rubin, 1983). As far as this study is concerned, the pre-phase analysis indicated that it was impossible to use the PSM method to eliminate possible sample selection bias because it failed to pass the relevant test.

In response to this problem, we use the Coarsened Exact matching (CEM) method to improve the accuracy of the analysis. CEM's essence is to control the difference between the treatment group and the control group before treatment by matching samples, so that the covariate empirical distribution of the treatment group and the control group are closer. When using the CEM method, the maximum imbalance between the treatment group and the control group can be selected by the researcher in advance, and the variables are grouped according to the researcher's criteria. As such, while retaining basic information, the efficiency of matching is improved, and both the degree of model dependence and the estimation error of average treatment effect are reduced. In this way, the data can be limited within the scope of common support, which conforms to the principle of consistency and is less sensitive to measurement errors. This method has a very important feature, that is, monotonic imbalance boundary, which means based on the criteria for grouping variables in advance, it can ensure matching to improve the balance of the sample, and thus limit the degree of model dependence and the estimation error of average treatment effect. So there is no need to check the balance of covariates after matching, and adjusting the imbalance of one variable will not affect the imbalance of any other variables. CEM can yield a weight variable (Weight) during the matching process without requiring the two groups before and after the matching to be numerically equal. Using CEM can solve sample selection bias while retaining the original samples to the greatest extent, and improve the accuracy of the model for the analysis. (Iacus et al., 2011; Chen & Gu, 2019)

Therefore, this study calculates the weights (cem_weights) through the pan-exact matching method, and includes them in the regression model, so as to control selection bias and reduce the imbalance of feature variables between groups. The characteristic variables used for Coarsened Exact matching are gender, only-child, urban/rural area, parents' maximum years of education, parents' occupational prestige, family economic background level, on/off campus, and student's academic burden. The specific model is shown in equation (1), where AveGradesi is the average academic performance score of the i-th student, β0 is the intercept of the model, Lao2i is whether the i-th student often participates in housework, and Xi is the control variable. β1 and β2 are the regression coefficients of each variable, and εi is the residual.

$$AveGrades_i=\beta_0 + \beta_1 Lao2_i + \beta_2 X_i + \varepsilon_i[cem\_weights] \quad (1)$$

Table 3. Least Squares Regression Results (Dependent Variable: Academic Performance).

Variable	Model 1		Model 2		Model 3		Model 4	
	PS	JHS	PS	JHS	PS	JHS	PS	JHS
Housework Participation Freq.	12.381***	-6.653***	12.546***	-3.103***	11.196***	-1.327***	12.446***	-0.777**
	(0.414)	(0.376)	(0.399)	(0.382)	(0.390)	(0.372)	(0.393)	(0.372)
Gender			-6.911***	-10.089***	-5.465***	-8.289***	-5.114***	-7.902***
			(0.317)	(0.377)	(0.311)	(0.367)	(0.313)	(0.365)
Only-Child			22.299***	16.714***	18.284***	9.302***	17.390***	9.605***
			(0.328)	(0.388)	(0.327)	(0.389)	(0.329)	(0.388)
Urban/ Rural Area			16.249***	16.559***	9.828***	7.800***	8.156***	6.168***
			(0.367)	(0.421)	(0.374)	(0.428)	(0.381)	(0.438)
Central Region of Jiangsu			20.025***	4.225***	16.573***	3.138***	15.869***	4.932***
			(0.525)	(0.607)	(0.522)	(0.594)	(0.528)	(0.614)
Southern Region of Jiangsu			12.982***	3.246***	8.224***	(0.246)	6.592***	-1.080**
			(0.413)	(0.469)	(0.409)	(0.463)	(0.413)	(0.489)
Father's Education					4.259***	4.765***	4.089***	4.659***
					(0.075)	(0.097)	(0.075)	(0.097)
Mother's Education					-1.626***	0.641***	-1.650***	0.554***
					(0.072)	(0.102)	(0.073)	(0.101)
Father's Occupation					0.034***	0.071***	0.017*	0.066***
					(0.009)	(0.012)	(0.009)	(0.012)
Mother's Occupation					0.086***	0.104***	0.078***	0.079***
					(0.008)	(0.010)	(0.008)	(0.010)
Family's Economic Status					67.842***	47.598***	62.050***	42.534***
					(1.328)	(1.659)	(1.351)	(1.662)
On/Off Campus							-18.254***	9.412***
							(1.078)	(0.614)
Academic Burden							2.957***	3.162***
							(0.092)	(0.100)
Constant	509.563***	515.789***	483.359***	498.413***	426.728***	419.638***	425.482***	411.846***
	(0.372)	(0.257)	(0.554)	(0.534)	(0.878)	(1.002)	(0.887)	(1.039)
Sample Size	103507	100,998	98,130	95,719	88,805	89,426	86,454	88,848
Adjusted R^2	0.010	0.003	0.11	0.05	0.209	0.154	0.222	0.165
F	895.55	313.24	1,955.68	865.05	2053.55	1565.6	1831.57	1422.80

*Note: PS: Primary School. JHS: Junior High School. 1. The standard error of the regression coefficient is in parentheses; 2. Significance level：*p<0.1，**p<0.05，***p<0.01*

Regression Results

OLS Regression Results

This research first uses the least squares regression to obtain a benchmark estimate of the impact of students' participation in housework on their academic achievement. The results in **Table 3** show that after controlling students' personal characteristics, family background, residency (on/off campus), and the burden of schoolwork, a significant positive correlation exists among primary school students between housework participation and academic performance. Among junior high students, however, this relationship is significant negative. Instead, there is a significant positive correlation among junior high students between mother's schooling years, on/off campus residency, the burden of schoolwork, and academic performance. It can be seen from Model 4 that compared with the pupils who do not often participate in housework; pupils with frequent housework participation score an average of 12.45 points higher in academic performance. From Model 3 and Model 4, it is found that the father's education level, parents' professional background, and family economic background, all have a significant positive impact on children's academic performance in both elementary and junior high school and family economic background factors have the greatest impact. It is worth noting that although the mother's education level has a significant impact on primary and junior high school students, its direction on primary school students' academic performance is negative, that is, mother's high educational background is not conducive to the improvement of the primary and junior high school students' academic performance.

Regression Results after Controlling the Selection Bias

Because of the influence of sample selection bias, the results of the benchmark regression may have biased estimates. Therefore, this study uses Coarsened Exact matching technology to improve the estimation accuracy of the model. The L1 value (Multivariate Imbalance Measure) generated by the Coarsened Exact matching indicates the degree of imbalance of the data. L1 ranges from 0 to 1, with larger values indicating greater imbalance. Researchers can judge the matching effect according to the changes in L1 value. The more L1 drops, the better the matching effect (Iacus, et al., 2012).

Table 4 shows that after Coarsened Exact matching, 24,117 cases from the primary school sample remained valid as did 43,514 cases from the junior high sample, accounting for 23.3% and 43.1% of the original samples respectively. The L1 value decreased from 0.87 and 0.67 to 0.52 and 0.34, respectively. This shows that while obtaining a better matching effect, more samples are retained in the study (see **Table 4**). The obtained weights (cem_weights) are brought into the regression model for calculation, and the regression results are shown in **Table 5**.

After controlling sample selection bias, doing housework frequently still has a significant positive impact on academic performance among primary school students. While for junior high school students, the correlation between participating in the physical housework frequently and academic performance has changed from negative to positive. Specifically, in the explained variable of student academic performance, the differences caused by other control variables that affect whether students often participate in housework dropped by 1-2 points, indicating that the Coarsened Exact matching technique has corrected the biased estimate of least squares method well. Of particular interest, the regression coefficient of primary school students' academic performance and the frequency of participation in housework become 12.18, while that of junior high

Table 4. Coarsened Exact Matching Results (Dependent Variable: Academic Performance).

	Primary School			Junior High School		
	Infrequently Participate In Housework	Frequently Participate In Housework	Total	Infrequently Participate In Housework	Frequently Participate In Housework	Total
Total Sample	23,917	79,590	103,507	54,224	46,774	100,998
Matched Sample	8,097	16,020	24,117	22,504	21,010	43,514
Unmatched Sample	15,820	63,570	79,390	31,720	25,764	57,484
Before Matching L1	0.87			0.67		
After Matching L1	0.52			0.34		

school students is 1.27.

Among the control variables, for both primary school and junior high school students, girls, only-children, and students from urban area have higher academic performance scores than boys, non-only children, and students from rural area. Regional factors and living on or off campus have different effects on elementary school students and junior high school students. The former only significantly predicts the academic performance of elementary school students, while the latter only significantly predicts the academic performance of junior high school students. It is also worth noting that mother's education level is the only factor in the student's family background that has a significant negative impact on the pupil's academic achievement while other students' family background factors have a positive effect.

Discussion

"Frequent" Housework Appears to be Positively Related to Student Academic Performance.

The study uses the OLS regression model to make regression analysis on the various factors affecting student performance, and follows this with CEM matching to control for possible errors caused by sample selection bias. The matching results show that frequent participation in housework has a significant positive impact on the academic achievements of primary and junior high school students, but a difference exists between elementary school students and junior high school students. This result is mutually confirmed with the researches of Wang (Wang & Xu, 2020), Gu (Gu, 2021), Fang (Fang & Cao, 2021) and others. But actually, we don't know what "frequent" means in terms of hours, this result is based on our own criteria for dividing this frequency of housework participating. And maybe extreme amounts of housework participation might be detrimental. Fang's research also shows that the demarcation point is one hour as for the effect of housework on junior high school students' academic performance.

Table 5. Regression Results after Weighted Coarsened Exact Matching (Dependent Variable: Academic Performance).

	Primary School	Junior High School
Housework Participation Freq.	12.178***	1.272**
	(0.620)	(0.540)
Gender	-5.694***	-7.616***
	(0.591)	(0.549)
Only-Child	15.219***	9.273***
	(0.696)	(0.609)
Urban / Rural Area	5.147***	3.519***
	(0.764)	(0.650)
Central Region Of Jiangsu	19.331***	5.084***
	(1.234)	(0.994)
Southern Region Of Jiangsu	6.135***	-2.639***
	(0.834)	(0.773)
Father's Education	4.239***	4.316***
	(0.220)	(0.207)
Mother's Education	-1.456***	0.762***
	(0.209)	(0.216)
Father's Occupation	0.009	0.095***
	(0.021)	(0.023)
Mother's Occupation	0.078***	0.117***
	(0.018)	(0.020)
Family's Economic Status	75.963***	59.698***
	(3.406)	(3.062)
On/Off Campus	-9.135	12.369***
	(6.143)	(1.028)
Academic Burden	4.020***	3.564***
	(0.228)	(0.183)
Constant	422.436***	405.332***
	(1.627)	(1.684)
Sample Size	22,909	41,184
Adjusted R^2	0.255	0.151
F	603.47	563.77

*Note: 1. The standard error of the regression coefficient is in parentheses; 2. Significance level: *p<0.1, **p<0.05, ***p<0.01*

Doing housework more than one hour will have a negative impact on students' academic achievement (Fang & Cao, 2021). This is also a good area for further research.

Based on our results, the reason why housework is conducive to the improvement of academic performance is that doing housework may affect the development of students' cognitive abilities such as thinking, logic and problem solving. Primary school students, for instance, may rely more on perceptual experience to complete learning tasks (Schmidt et al., 2019). Housework may thus help them understand what they have learned more concretely through hands-on practice (Anna, 2017). For junior high school

Table 6. Binary Logistics Regression Results (Dependent Variable: The Frequency of Participation in Housework).

	Primary School						Junior High School					
	B	**T**	**P**	**OR**	**95%CI**		**B**	**T**	**P**	**OR**	**95%CI**	
Gender	-0.135***	-8.221	0.000	0.874	-0.167	-0.103	0.273***	19.761	0.000	1.314	0.246	0.300
Only-Child	-0.081***	-4.673	0.000	0.922	-0.115	-0.047	-0.213***	-14.616	0.000	0.808	-0.242	-0.185
Urban / Rural Area	-0.022	-1.122	0.262	0.979	-0.060	0.016	-0.125***	-7.822	0.000	0.882	-0.160	-0.094
Central Region of Jiangsu	0.056**	2.061	0.039	1.058	0.003	0.109	0.180***	7.904	0.000	1.197	0.135	0.224
Southern Region of Jiangsu	-0.085***	-4.070	0.000	0.918	-0.126	-0.044	-0.210***	-11.530	0.000	0.813	-0.242	-0.171
Father's School-ing Years	0.023***	6.272	0.000	1.023	0.016	0.030	-0.016***	-4.395	0.000	0.984	-0.023	-0.009
Mother's School-ing Years	0.019***	5.355	0.000	1.018	0.012	0.025	0.012***	3.328	0.001	1.012	0.005	0.020
Father's Occupa-tion	0.001*	1.821	0.069	1.001	-0.000	0.002	-0.004***	-9.263	0.000	0.996	-0.005	-0.003
Mother's Occupa-tion	0.001***	2.912	0.004	1.001	0.000	0.002	0.001*	1.736	0.083	1.000	-0.000	0.001
Family's Econom-ic Status	0.098	1.495	0.135	1.103	-0.031	0.228	-0.166***	-2.808	0.005	0.847	-0.282	-0.050
On/Off Campus	0.016	0.312	0.755	1.016	-0.085	0.117	0.231***	10.411	0.000	1.260	0.188	0.275
Academ-ic Burden	-0.163***	-32.328	0.000	0.850	-0.173	-0.153	-0.072***	-19.139	0.000	0.930	-0.080	-0.065

*Note: 1) The standard error of the regression coefficient is in parentheses; 2) Significance level: *p<0.1, **p<0.05, ***p<0.01*

students (who have more difficulties in schoolwork and more pressure from academic competition), the academic impact of participation in housework appears to involve a more complicated mechanism, so there may be no simple linear positive correlation between the two variables. Our findings lend confidence however to the assumption that "frequent" housework will not hurt their academic performance.

Primary and Junior High School Students' Participation in Housework may be Insufficient, as the Burden of Schoolwork has a Significant "Crowding Out" Effect On Housework Participation

Based on the 2020 Monitoring of Students' Academic Quality in Basic Education in Jiangsu Province, the study found that more than 50% of junior high school students and about 30% of elementary school students in Jiangsu Province did not often participate in doing housework, leading one to suspect that their engagement in housework may be insufficient, especially junior high school students. What are the factors that hinder elementary and junior high school students from participating in housework? By using the frequency of participation in housework as the dependent variable, and the relevant influencing factors as the independent variables, we construct a binary logistics model, and get the regression results in **Table 6**. This result clearly shows that for both primary and junior high school students, excessive academic burden is the key factor to prevent the students from doing much housework. There is a significant negative correlation between the schoolwork burden of students and their engagement in housework. This means that the heavier the schoolwork burden, the less time students can spend on housework, therefore the schoolwork burden has a significant "crowding out" effect on housework participation.

Other Factors Affecting Students' Participation in Housework

Our analyses suggest that factors such as gender, only-child, region, urban and rural areas, and family background all have an impact on primary and junior high school students' housework participation and academic performance. Among these, the influence of father's education level on children's housework participation and academic performance is quite thought-provoking. The above results show that, for primary school students, the higher the father's education level and occupation, the higher primary school students' frequency of participation in housework, but for junior high school students, the higher the father's education level and occupation, the lower the frequency of participation in housework. We believe that it may precisely reflect the current status of the father's role in family education. On one hand, a large number of studies have found that there is still a widespread phenomenon in Chinese families of "men managing external affairs and women internal", which means that in family education, fathers often play the role of providing more generous social resources to the family through "outside" work and social activities. On the other hand, because the academic pressure at the junior high school stage is much greater than that at the primary school stage, in the sequence of family resource input, most families tend to focus on aspects that are conducive to the improvement of academic performance at the junior high school stage. In this process, fathers with higher academic qualifications and higher professional levels tend to access more social capital to increase time and energy investment in children and academic performance, thereby forming a "crowding out" effect on housework education. This will undoubtedly have an adverse effect on housework participation in the junior high school stage. In short, the analysis results in Table 6 show that from primary school to junior high school, the change in the focus of family social resource input is more accomplished by the change of the father's role. In the junior high school, the father (who represents family resources) turns more preference towards improving children's academic performance, which has a negative impact on children's housework

participation (Yao & Chen, 2020; Wang, Zhao & Meng, 2015; Zhao, Wang & Liu, 2013).

Research Limitations and Prospects

Housework is an important way to shape personality as well as character, and boost the all-round development of primary and junior high school students. In fact, whether housework can improve academic performance or not, it should be given more attention and appreciation. The focus in this study has been put on the impact of housework on academic performance, for the reason that only a few studies on this issue have been made in China. Besides, if the positive effect of housework on academic performance can be shown, the worries of schools and parents will be relieved, and more parents may realize the importance and value of housework and be willing to let their children to perform it. As far as the present research is concerned, the impact of housework on students' character and personality is not involved, and the discussion on how housework can influence students' development has not been fully investigated. It is argued that this may be more important than the relationship between housework and academic performance, which should be addressed in future research.

Conclusion and Suggestion

The conclusions of this study are more robust and accurate because more detailed and larger scientific data were employed by CEM. The results have shown that the current situation of Chinese primary and junior high school students' participation in housework is not ideal, with 23.1% of elementary school students and 53.7% of junior high school students participating in housework infrequently. In terms of the impact of housework on academic performance, after Coarsened Exact matching, if the students had the similar individual characteristics, family background, and the environment, then primary school students who frequently participate in housework had an average academic score of 12.178 points higher than those who do not often participate in housework; the academic performance of junior high school students was about 1.272 points higher. This shows that frequent participation in housework has a positive effect on the improvement of students' academic performance. Further analysis showed that the student's academic burden had an obvious "crowding out" effect on their participation in housework, and during which process, parents' anxiety about schoolwork is a key factor affecting their children's participation in housework.

Based on the above findings, we hold that to further strengthen the housework education of primary and secondary school students, joint efforts should be made by the society, schools, and parents together to improve students' personalities through housework education and thus achieve the overall development of students.

Strengthen Publicity and Guidance to Enhance People's Awareness of the Importance of Housework Education.

On the one hand, researchers need to provide more reliable evidence to clarify the influencing factors, mechanism of action, and effective implementation path of housework education. On the other hand, the education authorities and schools should further increase publicity and guidance with various channels of communication to clarify the importance of housework education, and help parents raise their awareness of housework education, reduce or eliminate their excessive academic anxiety, and thus actively implement family housework education. In this process, great attention should be paid to how to transfer the academic research results, and guide the parents to change their education concepts and educational models with scientific evidence.

Reduce the Burden of Schoolwork Effectively and Relieve its Squeeze on Housework.

A major problem found in current family's education on hard working spirit was that the overburden of schoolwork would encroach on the time of doing housework. To solve this problem, educational viewpoints should be changed, moreover, how to reduce the excessive academic burden of students effectively is also a key issue. This means that schools should improve teaching efficiency, strengthen homework management, cut down ineffective or noneffective repetitive exercises, and explore the assignment of practical homework to give back after-class time to the students. On the government level, it must reinforce the management of after-school tutoring classes, take actions to combat irregular school-running behaviors, which is focused on blowing up excessive anxiety, and guide teaching and training institutions to offer students more practical housework education courses in order to help schools and families make progress in housework education and promote students' overall development.

Make Full Use of Various Education on Hard Working Spirit Resources to Provide Children With Diversified Opportunities of Housework Education.

Chinese famous educator Xingzhi Tao once said, "The life you live is the education you receive. If you live a lavish life like a young master, even if you read books about hard working every day, you are not considered to be educated by hard working." (Dong, 1991) Only by practicing the life of housework can we implement housework education truly and effectively. Because life covers a wide range of areas, housework education requires the joint efforts of families, schools, and society to provide students with life-oriented, experiential, and interesting housework education resources and opportunities to take part in housework while creating a social atmosphere in which housework is glorious. In this process, more bases should be constructed to experience housework and do social practice by the government and society, and more housework courses should be set up by the school. In addition, students should be encouraged to engage in more housework by the family. Only with the concerted efforts of all parties can we offer more chances of housework education to primary and secondary school students.

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ORIGINAL ARTICLE

A Study of College Students' Foreign Language Anxiety in English Learning Based on the Teaching Model of Sheltered Instruction Observation Protocol

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Abstract*. Foreign language anxiety in English learning has always been a major focus of English teaching research. How to relieve English majors' foreign language anxiety and improve their classroom participation becomes an imperative issue for English teachers. Based on the American teaching model of Sheltered Teaching and Observation Protocol (SIOP), this study explores whether the SIOP teaching model can help relieve English learning anxiety. The experiment on 60 freshmen majoring in business English shows that the SIOP model can relieve students' foreign language learning anxiety and improve their classroom participation. The SIOP teaching model is worth popularizing in business English teaching.*

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Introduction

IN recent years, many language colleges and universities have set up business English major and business English teaching and research has been paid increasing attention. The study of business English is different from that of other English majors, because business English students need to master not only the Basic English language but also the relevant professional knowledge of business and trade, as well as the business culture of different countries. Business English majors who study in local application-oriented universities are educated with more explicit objectives. The importance of students' practical abilities and English language competence as well as their business knowledge is emphasized so that students can serve the local economic and social development after graduation. However, at present, the teaching mode of business English is relatively simplified. Teachers are the dominators in the classroom while students' role as the pro-active learners has not been highlighted, which is disadvantageous for students' active learning and the internalization of subject knowledge. As a result, students are prone to lack of enthusiasm in English learning because of the long-term monotonous and rigid teaching mode, which compromises their participation in the classroom and confidence in foreign language learning. As English is not their mother tongue, once they lose interest in it which they have to learn, they will unconsciously gain foreign language learning anxiety. This is an important issue that foreign language teachers should not dodge. Anxiety is a common phenomenon in foreign language learning in China, and is one of the key psychological variables in language learning (Wang & Wan, 2001).

The American Sheltered Instruction Observation Protocol (SIOP) teaching model is based on the input hypothesis of Krashen's language acquisition theory, Swain's output hypothesis and Cummins' Common Underlying Proficiency (CUP) hypothesis (August & Shanahan, 2006). According to August and Shanahan, the possibility of foreign language learning lies in the fact that the cognitive ability in native language learning can be transferred to second language learning, resulting in the deep sharing of cognitive ability. They insist that the effect of classroom teaching depends on the deep sharing of input language content and on the comprehensibility and interest of input language content and there is a close relationship between language knowledge acquisition and skill acquisition. Other researchers confirmed that the SIOP model is of high reliability and validity (Echevarria, 2007). It focuses on the subject contents, and various sheltering teaching strategies are flexibly used in teaching to combine the learning of subject knowledge with the cultivation of language competence.

One of the major functions of the SIOP model is to alleviate students' anxiety caused by their incompetence in using English. The application of sheltered teaching strategies such as cooperative learning, group learning and peer guidance aims at creating a non-threatening participation classroom environment for students so that they can participate more confidently in English classroom. Students with different language proficiency and cultural background will help one another in group work or even across groups. And in such a friendly environment, they are definitely more confident and participating in class activity (Yin, Wang, & Zhao, 2020). Business English majors aim for both business-related knowledge and English language proficiency in the courses of comprehensive business English, and the SIOP teaching model is aligned with such teaching requirements. This study explores effectiveness of SIOP model in business

English teaching, focusing on whether SIOP model can help ease students' foreign language anxiety and improve their classroom participation.

A Brief Introduction to Sheltered Instruction Observation Protocol (SIOP)

Definition

The Sheltered Instruction Observation Protocol was developed by researchers at the Center for Research on Education, Diversity & Excellence (Short, 2013). It is a validated model of sheltered instruction, which helps teachers plan and deliver lessons that enable learners to develop their English while acquiring academic knowledge. This model makes it easier for students to understand the professional contents in courses taught in English through various teaching strategies and improves students' academic English at the same time (Echevarria & Graves, 2007). The model is called sheltered teaching because various strategies are constantly used to embellish the teaching. A non-threatening sheltered language environment are created for the students; Classroom teaching conforms to English learners' language level, which makes the teaching contents easier to be understood and accepted (August & Shanahan, 2006).

The "decoration" in this teaching model includes providing students with various diagrams, extensive supplementary materials and adapted course content suitable to students' language ability. Meantime, students' listening, speaking, reading and writing skills are honed in interactive and meaningful classroom activities based on scaffolding teaching. What's more, student's critical thinking is developed in discussion, questioning and argument in a non-threatening sheltered learning environment, thanks to cooperative learning, group study and peer guidance (Echevarria et al., 2004).

Components

Eight components are included in the SIOP Model, that is, lesson preparation, background building, comprehensible input, strategy implementation, class interaction, practice and application, lesson delivery, review, and assessment. Each part is equipped with corresponding teaching strategies with elaborations on concrete operation methods as well as teaching evaluation. At the stage of lesson preparation, teachers should explain learning objectives of the course to students clearly to stimulate students' enthusiasm and initiative. It is emphasized that the contents of the course should be aligned with the students' language ability and educational background, and various teaching aids can be used to help students better understand the contents. At the stage of background building, teachers can help students to connect the existing knowledge with the new knowledge, that is, to transfer the existing knowledge and skills in their mother tongue to English learning, to make them think coherently and critically. This process helps students form their own views and perspectives. At the stage of strategy implementation, students are provided with sufficient opportunities to implement a variety of learning strategies, such as cognitive, communicative, emotional learning strategies. With the help and guidance of scaffolding teaching, students' ability of independent thinking and problem-solving can be gradually developed. At the stage of interaction

and application, students are given enough time to think, read, speak, and write. All students are encouraged to participate actively in discussion. Teachers also provide relevant teaching materials or tools to enable students to use their language in group discussions and collaborative activities, to improve their critical thinking and verbal expression. At the stage of review and assessment, teachers evaluate students' performance by observing their classroom interaction and participation in class activities, and also provide timely feedback to individual students for self-reflection (Wu, 2014). SIOP teaching concepts are consistent with the trends of foreign language teaching in China, providing reference for teachers in improving their bilingual teaching skills and implementing English teaching reform. Further efforts are required to localize SIOP teaching model.

Foreign Language Anxiety

According to Horwitz, Horwitz, and Cope (1986), foreign language anxiety is not just a complex emotion derived from fear of foreign language learning, but rather a conceptually distinct variable in foreign language learning related to students' self-concept, beliefs, emotions, and behaviors. Numerous empirical studies indicate that anxiety has a negative impact on language learning and is also a major factor affecting foreign language learning initiative and achievement. Horwitz, Horwitz, and Cope conducted a study and identified three major factors affecting students' anxiety in foreign language classes, that is, communication anxiety, test anxiety and fear of negative evaluation from classmates and teachers. Based on their study, foreign language classroom anxiety scale (FLCAS) was developed to measure the breadth and depth of foreign language anxiety. FLCAS standardized the measurement of language learning anxiety (Guo & Xu, 2014). Since then, teachers worldwide have applied FLCAS to conduct research on foreign language learning anxiety. Many studies show that most foreign language learners have experienced significant foreign language anxiety (FLA), and foreign language learning anxiety has a negative impact on students' foreign language performance (Dewaele & Thirtle, 2009; Dogan & Tuncer, 2016; Horwitz, 2001). Some studies focus on how foreign language anxiety affects students' learning confidence and achievements. In a study of English learners at a London school, Dewaele and Thirtle (2009) gave students two options, either to continue or drop out of foreign language learning. The research showed that students who choose to give up foreign language learning were those who had severe foreign language learning anxiety. Similar results were found in the research by Doğan and Tuncer (2016). They carried out a correlational study to investigate the relationship between foreign language classroom anxiety and foreign language achievement. Participants were engineering students from Turkish universities studying English-required courses. FLCAS was adopted throughout the research and the results showed that there is a negative correlation between classroom anxiety and foreign language achievement.

In China, current research focuses on whether students' foreign language anxiety can be alleviated under different teaching models. Huang (2021) conducted a study on 210 English students in one semester by means of longitudinal case study, questionnaire survey, and interviews, and reached the results that the use of Flipped Classroom teaching model can significantly alleviate the overall classroom anxiety, expression

anxiety and classroom teaching anxiety, and increase students' confidence in their use of language. Tao and He (2021) conducted a survey of foreign language anxiety among 108 Chinese students and 72 Mexican students in English class from the perspective of language distance and the results showed that Chinese EFL learners have higher foreign language anxiety than Mexican EFL learners. It means that the higher cognitive decoding effort is required for second language learners who have greater language distance. At present, research on the correlation between foreign language anxiety of college English majors and the SIOP teaching model is insufficient in China. It is hoped that this paper will inspire more research on this topic.

Methodology

Research Questions

This study tries to answer the following two questions: i) whether the students' foreign language anxiety can be relieved under the SIOP teaching model; ii) Whether business English majors' classroom participation can be improved under this model.

Participants

Two classes of students, a total of sixty business English majors in Guangxi University of Foreign Languages participated in the study. One of the classes is the experimental class and the other is the control class. Each class has 30 students.

Research Methods and Instruments

Methods

The method of quasi-experimental designs is used in this study. The independent variable is the teaching design and implementation of comprehensive courses for business English majors under the SIOP model; the corresponding dependent variables are business English majors' foreign language learning anxiety and students' classroom participation. In this study, both experimental and control class were taught by the same teacher. In addition, the study tried to avoid the influence and interference of non-experimental factors by ensuring that the two selected classes have the same teaching hours and the same teaching materials. And the only variable experimental factor was different teaching modes: The experimental class was taught with the SIOP teaching model while the control class with the conventional language teaching mode, to examine the effects of the experimental factor on business English majors' English anxiety and classroom participation. The following measures were implemented to guarantee the reliability and validity of this experiment.

Reliability

After questionnaire A was finalized, the reliability was tested in a small scope by retest method. Questionnaire A was retested in 30 students, and$\alpha$was 0.87, which met the standard requirement. In the process of questionnaire design and implementation, the

following measures were taken to ensure the reliability of the questionnaire: (i) The number of questions should be as small as possible and limited to one page; (ii) The language should be as plain and concise as possible. The majority of questions are multiple-choice ones, with a few blank-filling ones; (iii) Anonymous filling in the questionnaires; (iv) Handing out and filling in the questionnaires without teachers' presence.

Validity

After the design of questionnaire, experts were asked to decide whether the questionnaire can cover the research topic and whether it is suitable for the validity test, and the rate of expert identification is 91.72%.
As for questionnaire B, FLCAS has been proved to be of high reliability and validity in many years of teaching and research.

Instruments

Questionnaire A: the Classroom Participation Questionnaire for Business English Majors (the questionnaire is designed to serve research purposes); Questionnaire B: FLCAS developed by E. K. Horwitz, M.B. Horwitz, and J. Cope. FLCAS was compiled in 1986 focusing on communication anxiety, test anxiety and negative evaluation anxiety.

Procedure

This teaching experiment covers three stages. At the first stage, the students of selected classes (experimental class and control class) were asked to fill in the questionnaire A before the implementation of the SIOP teaching model. At the second stage, the two selected classes were taught in different teaching modes. In the experimental class, the SIOP teaching model was integrated with regular teaching so that the SIOP's sheltering strategies were flexibly applied in the whole teaching process according to the teaching contents of specific units and students' learning situation. At this stage, the construction of pre-class background knowledge and the input of comprehensible business knowledge were key tasks. Effective classroom activities were designed to stimulate students' desire for exploration and autonomous learning, which ensure the acquisition of business knowledge and English language competence. In the control class, however, the teaching mode remained conventional. At the third stage, Questionnaire A and questionnaire B were distributed to two selected classes (experimental class and control class) for the second time, to verify the influence of experimental factor in this study: Whether the SIOP model can relieve the students' foreign language anxiety and improve the students' classroom participation.

Data Collection

Questionnaire A and questionnaire B were distributed and collected in the classes of comprehensive business English and the key instructions were explained clearly to ensure the validity of data. 120 questionnaires were distributed, and 120 questionnaires

were collected, which was conducted from October 2020 to December 2020. All statistics and analyses were treated by software SPSS17.

Results and Discussion

The SIOP Model can Relieve the Foreign Language Anxiety of Business English Students.

According to the data collected after the first stage (**Table1**), there was no significant difference in students' English learning anxiety between the two selected classes before adopting different teaching modes. As shown in table 1, differences in test anxiety (t = -1.345) and negative evaluation anxiety (t = -1.321) between the experimental and the control classes were very slight, though the difference in communication anxiety (t = -3.328, MD = 0. 35*) was noticeable. Overall, the foreign language anxiety levels of the two classes were roughly the same. However, the data and sequential analysis at the third stage (**Table 2**) showed great differences in the anxiety level. After the experiment, that is, after the SIOP teaching model implemented, there were significant differences between the two classes in the three factors related to foreign language learning anxiety: communication anxiety (t = 5.873), test anxiety (t = 7.021) and negative evaluation anxiety (t = 5.408). Meanwhile, foreign language anxiety of the experimental class was significantly alleviated: communication anxiety (MD = 0.61*), test anxiety (MD = 0.89*) and negative evaluation anxiety (MD = 0.47*).

The above data indicate that the application of the SIOP model can alleviate students' foreign language learning anxiety in the comprehensive business English courses. The figures of the experimental class in terms of communication anxiety, test anxiety and negative evaluation anxiety were significantly smaller than those of the control class, indicating the experimental class experienced a significant decrease in foreign language anxiety after the SIOP teaching, while the control class underwent increased foreign language anxiety.

Under the SIOP teaching model, thanks to the effective pre-class input, class activities and after-class review, the students' language ability and communication skills in the experimental class were trained in a better way, and their business knowledge was more easily acquired. As a result, their self-confidence and self-consciousness in learning were improved, and their foreign language anxiety in business English learning decreased significantly. Therefore, the application of the SIOP teaching model in business English teaching can alleviate students' foreign language anxiety.

SIOP Model is Helpful to Improve Business English Students' Classroom Participation

Comparative analysis of the data in **Table 3** indicates that the experimental class had slightly higher participation than the control class (MD = 0.25*) before the application of the SIOP teaching model, yet the difference was not significant.

There were significant differences in student's classroom participation (T = -4.789, DF = 96, $p < 0.05$) between the experimental class and control class after adaptation. The experimental class (MD = 0.65*) had significantly higher participation than

Table 1. A Comparison of English Language Anxiety between Experimental and Control Classes at the First Stage.

	Class	N	Mean	SD	t	df	Sig.	MD
Communication Anxiety	Control	30	2.7473	0.53251	-3.328	96	0.001	-0.35254
	Experimental	30	3.2167	0.50023				
Test Anxiety	Control	30	2.4832	0.74864	-1.345	96	0.149	-0.23021
	Experimental	30	2.7431	0.87256				
Negative Evaluation Anxiety	Control	30	2.8715	0.40535	-1.321	96	0.155	-0.12516
	Experimental	30	3.0206	0.45012				

Table 2. A Comparison of English Language Anxiety between Experimental and Control Classes at the Third Stage.

	Class	N	Mean	t	df	Sig.	MD
Communication Anxiety	Control	30	3.5534	5.873	96	0.000	0.61061
	Experimental	30	3.0316				
Test Anxiety	Control	30	3.5353	7.021	96	0.000	0.89897
	Experimental	30	2.6336				
Negative Feedback Anxiety	Control	30	3.3020	5.408	96	0.000	0.47816
	Experimental	30	2.8162				

Table 3. A Comparison of Classroom Participation between Experimental and Control Classes at the First Stage.

	Class	N	Mean	SD	t	df	Sig.	MD
Classroom Participation	Contrast	30	2.6113	0.70521	-2.076	81.306	0.0.30	-0.25134
	Experimental	30	2.8432	0.43103				

Table 4. A Comparison of Classroom Participation between Experimental and Control Classes at the Third Stage.

	Class	N	Mean	SD	t	df	Sig.	MD
Classroom Participation	Contrast	30	2.6032	0.63564	-4.789	96	0.000	-0.65138
	Experimental	30	3.2751	0.70663				

the control class (**Table 4).** In addition, if we compare the data vertically, we can find that there are remarkable differences between the two classes before and after the reform of teaching modes. On the average, after a semester's SIOP teaching, the students' participation of the experimental class has increased significantly, whereas the control class did not show remarkable changes. Therefore, the results prove that the application of SIOP teaching model can effectively improve the classroom participation of business English majors.

Conclusion

Comparative analysis of the above data revealed that students' foreign language anxiety in the experimental class has been alleviated in that semester because of the application of the SI0P teaching model, and those students have also made great progress in their classroom participation. In contrast, the foreign language anxiety of the control class was not relieved under the conventional teaching mode, and the students' classroom participation also remained unchanged, though the two classes were taught by the same teacher, with the same teaching materials and the same teaching time. Thus, this teaching experiment well answers the two questions we set at the beginning of this research. The SIOP teaching model helps relieve business English students' foreign language anxiety and improve their classroom participation. Business English majors can better decode the course contents through relevant learning skills from the SIOP model. Moreover, the repetitive use of SIOP teaching strategies not only enables students to master the declarative knowledge of the subjects, but also develop their language learning skills, curriculum learning strategies and critical thinking (Wu, 2015).

In the context of new liberal arts construction in China, the reform of foreign language education is constantly advancing. In the SIOP teaching model, foreign language teaching can be integrated with knowledge of specialties. While facilitating students' acquisition of the specialized knowledge of the relevant subjects, it can also expand their horizon, and cultivate their cross-cultural competence and global vision. In this model, listening, speaking, reading, writing and translation are treated as a natural and holistic learning process to improve the students' language proficiency (Yuan, 2011). When the SI0P model is applied in business English teaching, it can effectively improve the business English majors' confidence in foreign language learning, foreign language proficiency and comprehensive competence.

There are several limitations to the current study. First, as the sample size is small, the statistical power of the analysis is limited. Second, after completion of this teaching experiment, the researcher did not follow up the 60 Business English majors, and the level of foreign language anxiety in the control class may change to some extent. Therefore, based on the results of this study, the curriculum design and implementation of the SIOP model in business English teaching will be further improved in the follow-up experimental research.

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ARTICLE

Differences in Educational Expectations between Urban and Rural Junior High School Students: Individual, Family, and Social Structures

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Abstract*. This paper studies the current differences in educational expectations between urban and rural students and explores the mechanism from the individual/family and school/society perspectives. The results show significant differences in expectations between rural and urban junior high school students for going on to higher education. In addition, urban students' educational expectations are higher than that of rural and migrant students. These differences are caused by the students' cognitive ability, family background, and school environment, among which the influence of family background is larger than that of cognitive ability, while the effect of the school's hukou structure is the most important influencing factor. The results suggest that building a desirable school education atmosphere, alleviating hukou segregation in schools, and strengthening the integration of widely diverse school populations are important approaches to promoting educational and social equity in China.*

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Introduction

EDUCATION is the main channel for social mobility in modern society due to its important role in alleviating social stratification and promoting social fairness and justice. Following the promulgation of China's reform and opening-up policy, many advances have been made in the Chinese education system, and the overall education level in China has improved significantly. Simultaneously, the imbalance in education development has become increasingly prominent, including the gaps in educational attainment between urban and rural residents, which has attracted much scholarly attention. When measured by objective indicators, such as access to education and total schooling years, rural residents in China have always lagged behind urban residents in their educational achievements (Li, 2014a; Wu, 2011; Wu, 2013). Influenced by the increasingly popular ideological trend of "education is useless" in rural society, some rural young people subjectively deny the value of education. Their reluctance to pursue higher education may further widen the educational gap between urban and rural areas (Li & Wu, 2015).

The low expectations for education of young people in rural China may have long-term consequences for their individual development. In recent years, the far-reaching significance of educational expectations for social equity and justice in China has received little scholarly attention. Chinese society has always been more concerned about "who receives education," than about "who expects to receive education" and "how much education they expect" (Ding & Wang, 2016). Chinese academia has long focused on indicators such as education acquisition and attainment, which measure equity in educational outcomes, but few studies have discussed the indicator of educational expectations, which measures equity in the educational process. Fewer studies have explored the differences in educational expectations between different household registration groups from a micro level. As an important indicator, educational expectations can effectively and stably predict educational and status attainment. If we can understand the generation of individuals' educational expectations, it will be easier for us to explain their educational attainment (Sewell & Hauser, 1972). Therefore, exploring the differences in educational expectations between urban and rural residents provides an ideal breakthrough point to understand the current educational development gap between urban and rural areas, which has important practical significance for Chinese society.

The report of the 19th National Congress of the Communist Party of China underlined the importance of compulsory education in rural areas and proposed strategies to ensure that every child can equally enjoy high-quality education. Important modern social goals include supplying suitable education for all talented people, maximizing the development and use of social human capitals, supporting the welfare of the whole society, giving free rein to individual expertise, and satisfying individual pursuits. Individuals and their families must make wise educational choices to achieve these goals, but society must also provide sufficient educational opportunities to facilitate personal educational decisions.

We used baseline data from the 2013–2014 China Education Panel Survey (CEPS) to discuss the current urban–rural differences in the educational expectations of junior high school students in China. This study explored the influence of students' personal cognitive ability, family background, and socio-structural factors (mainly school segregation caused by the household registration policy [*hukou*]) on the educational expectations of young people with household permanent residence in rural areas. In addition, we examined the role of these factors in narrowing the rural–urban gap in educational expectations. Hopefully, our findings will trigger an extensive discussion of the severe problem of low educational expectations among young rural residents in China and the potential consequences.

Theoretical Framework and Literature Review

Over the past 50 years, Western scholars have explored educational expectations from micro and macro perspectives. The micro perspective at the individual and family levels mainly originated from the Wisconsin model, while the Coleman report initiated a macro-level perspective of social structure.

Personal and Family Factors Leading to Educational Expectations

Since the 1950s, the body of research based on the Wisconsin school has accumulated several empirical studies modeling the formation and influencing factors of personal educational and occupational expectations. Early studies have mainly focused on the influence of individual and family factors on the formation of students' individual educational expectations. Gender, cognitive ability, and family socioeconomic status (SES) have been shown to be key factors affecting teenagers' educational expectations (Sewell, Haller, & Straus, 1957). Later studies have tried to control for these three variables in the model when exploring individual educational expectations and status acquisition. In 1967, the Wisconsin school set up a linear regression model to study the influence of gender, cognitive ability, and family SES on individual educational expectations. The school then explored the influence of these four explanatory variables on individual educational attainment (Sewell & Shah, 1967). As a mediating path, educational expectations have been shown to explain a large part of the impact of cognitive ability and family SES on individual educational attainment. Even after controlling for individual cognitive ability and family SES, educational expectations still have an independent and significant effect on educational attainment.

Social Structures and Educational Expectations

Early Wisconsin studies discussed the factors influencing educational expectations, focusing on the process of individual self-selection at the micro level with the assumption that individuals' educational achievements are determined by what they choose to do and how they do it. However, the reality is that individual educational choices are performed within a changing social structure; therefore, individuals' educational achievements are mainly influenced by what society allows them to do (Kerckhoff, 1976). The

main criticism of the early Wisconsin body of research is that the models used are too sociopsychological and ignore the impact of macro-level socio-structural factors on individual educational expectations.

In 1959, Wilson launched a discussion of the influence of social class segregation on students' educational expectations. Wilson showed that even when personal and family backgrounds were controlled for, the social class composition within schools still had a significant impact on individual educational expectations. For example, students who attended schools with a majority of students from the dominant social class usually had higher educational expectations than students in schools with a majority of students from lower social classes (Wilson, 1959). In 1964, the Coleman report discussed ethnic segregation in American schools and found that social class segregation based on the ethnic composition of the school was the most important factor affecting students' academic development besides their family SES. The report found that American schools were ethnically segregated. For example, schools attended by White and ethnic minority groups (mainly Black students) had completely different ethnic composition ratios, and that minority students clustered in schools where students of the same ethnicity were concentrated. This kind of school segregation was detrimental to the academic achievements of minority students (Coleman, 1966).

Socio-structural factors affecting individual educational expectations include the students' living environment, school district and environment, and the institutions and policies in the labor market, which influence the distribution of different social groups in the social stratification system (Sewell, 1963). An important socio-structural factor leading to educational inequality is school segregation based on social groups' residence clusters. Students with different social characteristics gather in different school districts or schools, instead of being evenly distributed within the same school district or among schools. This informal school segregation (also known as school isolation) leads to significant differences in student composition between school districts/schools (Blau, 1977). On the one hand, this social structure will cause disparities in formal institutional arrangements, such as differences in community library facilities, teacher allocation, curricula, and school teaching arrangements. On the other hand, the social structure may also cause differences in informal social mechanisms, such as the local community's normative values, levels of aspiration, school value system, majority behavioral norms, and the school atmosphere created by peer groups. All of these differences affect individual educational expectations, especially for young people. These results are independent of individual abilities and family SES (Rogoff, 1953).

In the late 1960s, the Wisconsin body of research began to consider the impact of socio-structural factors, such as residence segregation, on educational expectations. The community, neighborhood, and school district environments (usually measured by urban–rural division, population size, and SES composition) where individuals live and studies have been found to have a significant effect on their educational and career expectations (Sewell, 1964; Sewell & Armer, 1966). However, when factors such as students' gender, cognitive ability, and family SES are controlled for, the influence of these socio-structural variables decreases greatly, or even disappears. Based on this finding, Sewell, Hauser, Springer, and Hauser (2003) suggested that studies on educational expectations and attainment should focus on common process factors within school districts and schools, rather than background factors between school district and schools.

School segregation is the result of residence division and the underlying phenomenon is the local competition of social groups for the resources and social status represented by schools (Fiel, 2015).

School segregation in the basic education system in China has become a common social phenomenon. The historic policy of "key schools" in China has led to quality differentiation in the public school system, while the "entering school nearby" policy has capitalized on the differentiated educational resources linked to house prices in the school district. Local residents select schools for their children by purchasing houses in high-quality school districts, which lead to the social segregation of school districts. As a result, the wealthy social class helps their children to enter high-quality schools by buying "school district housing," while children from the disadvantaged social class who cannot afford school district housing are forced to enter lower-quality schools. This leads to school segregation based on residence and school district (Feng & Lu, 2010; Zheng & Wang, 2014). This segregation based on household permanent residence (*hukou*) is one of the main forms of school segregation in China. On the one hand, the allocation of students with different *hukou* status is unbalanced among rural and urban regions. The distribution of students' *hukou* status among different regions largely decides the social class composition of these regions. The heterogeneity of social class composition in urban schools is higher than that in rural schools (Liang & Wu, 2016). On the other hand, with the large-scale migration of China's rural population to cities and the continuous adjustment of educational policies for the children of migrant workers, the government allows migrant students in compulsory education to study in places of residence other than their registered household permanent residence. However, China's current educational policy still sets a large threshold for admission and further education for non-local students because of limited urban educational resources. The children of rural migrant workers are often segregated from specific living areas, schools, and school districts because of the high cost of school selection in cities; therefore, they are often concentrated in private schools for migrant children with poor teaching facilities and low-quality teachers. At present, the social classes in China's rural and urban schools are highly segregated. As a result, rural or urban school students with disadvantaged family backgrounds tend to prematurely lose interest in education because of negative peer group influences caused by school segregation.

Summary

Rich empirical data have been accumulated in the mature Western research literature on students' educational expectations and their influencing factors. Personal characteristics, family backgrounds, and school structure have been found to be the main factors that jointly determine students' educational expectations and decisions. The educational stratification literature in China has mainly focused on result-directed indicators, such as educational attainment. The predictive role of educational expectations in educational attainment has not been explored, which ignores its importance as a breakthrough point for understanding the current differences in educational attainment among different groups in China. Most studies of educational expectations have not considered rural–urban differences, and those that have compared the educational expectations of social groups with different *hukou* status at the micro level are even rarer (Ding & Wang,

2016). In exploring the factors influencing educational expectations, such as the early Wisconsin body of research, most studies have focused on the process of individual self-selection and only examined the effects of individual and family backgrounds at the micro level (Liu, Zhang, & Li, 2015; Wang & Shi, 2014; Yang, Yao, & Zhang, 2016). Few studies have explored the effects of macro-level social factors (Liang & Wu, 2016; Wu, Hang & Liu, 2017) and even fewer studies have measured macro and micro factors in addition to their interactions simultaneously (Huang, 2017). Some studies have tended to attribute the differences in educational expectations between urban and rural areas to the uneven distribution of educational resources influenced by educational policies and have not considered the effects of socio-structural factors (e.g., residence and school segregation), which are common concerns in Western studies of educational expectations.

This study used the Wisconsin educational attainment model based on the urban–rural education gap in China in an attempt to close the empirical research gap in Chinese educational expectations and explore the differences in educational expectations between rural and urban junior high school students from macro and micro perspectives.

Research Design

Data

This paper used baseline data from the 2013–2014 CEPS designed and implemented by the National Survey Research Center (NSRC) at Renmin University of China. The project took junior high school students in Grades 7 and 9 as the survey objects and applied a stratified multistage sampling design with probability proportional to size (PPS), in which four sampling units were selected in turn: i.e., county (school district); school; class; and students, parents, head teachers, main subject teachers, and school administrators. In total, 19,487 junior high school students in 438 classrooms from 112 schools in 28 counties (districts) in mainland China were selected in the baseline survey. This study used the data from student, parent, and school questionnaires, which were matched with student and school IDs.

Research Questions and Hypotheses

This study sought to answer the following questions: Are there any significant differences in educational expectations between rural and urban junior high school students? Can the students' personal characteristics, family environment, or socio-structural factors (such as school district/school segregation) explain these differences? Based on these research questions, this study proposed the following research hypotheses:

Hypothesis 1: The educational expectations of rural hukou students are significantly lower than those of urban hukou students.
Hypothesis 2: Individual (such as gender and cognitive ability) and family factors (such as SES) limit the educational expectations of rural hukou students.

Hypothesis 3: Socio-structural factors (such as the school district's environment or school atmosphere) mean that the educational expectations of rural hukou students lag behind those of urban hukou students, even if the students' individual and family factors are controlled for in the model.

Research Model and Variables

We established the following linear regression model to answer these research questions and verify the research hypotheses:

$$EDU\_EXP_{ijp} = \beta_0 + \beta_1 STU\_TYPE_i + \beta_2 \beta_i + \beta_3 SCH_j + \beta_4 CTY_p + \varepsilon_{ijp}$$

- ***Dependent Variable***

In this study, the dependent variable was the educational expectations of junior high school students (EDU_EXP_{ijp})[1]. The CEPS student questionnaire asked junior high school students about their highest expected level of education using the question: "What is the highest degree of education you expect to receive?" Responses to this question had nine options: i.e., drop out, junior high school, technical/vocational senior high school, ordinary senior high school, college degree, Bachelor's degree, Master's degree, and doctoral degree. We recoded this categorical variable to form a dichotomous variable of "whether students expect a Bachelor's degree or higher," where yes = 1 and no = 0.

- ***Independent Variables***

I. Student Type by Urban or Rural Hukou (STU_TYPE_i)

The core explanatory variable of this study was the urban or rural category of students, which was used to examine the effect of registered household permanent residence (hukou) as a socio-structural factor. Due to the large population of migrant workers in China, the registered household permanent residence (*Hukou*)[2] of some students differs from their current place of residence. Therefore, two dimensions could be observed among the students in this study: i.e., their household permanent residence (rural vs. urban hukou) and their place of residence during the survey. The latter dimension included information about individuals' rural–urban mobility. Based on our research needs, we recoded the original student category variable from the CEPS dataset to form a student category variable with three categories: (a) rural students, those with agricultural hukou (registered household permanent residence) from the local county (district); (b) migrant students, those with agricultural hukou from other counties (districts); and (c) urban students, those with nonagricultural hukou in local (district) or other counties (districts). We added dummy variables for the urban and rural student categories to the regression model and used urban students as the reference group to examine the differences in educational expectations between the two types of students.

II. Personal and Family Background Factors (β_i)

Based on the Wisconsin educational attainment model, we first examined the impact of students' personal and family factors on their educational expectations, including gender (male = 1; female = 0) and cognitive ability (the CEPS designed a set of cognitive

ability test questions for junior high school students). The test questions did not involve specific memorization of knowledge related to school curricula, but focused on measuring the students' logical thinking and problem-solving abilities, including three language dimensions (graphics, calculation, and logic) with 11 constructs in total. The original cognitive ability test scores were transformed into standardized scores using item response theory with three parameters, leading to internationally comparable and nationally standardized results. Based on the high-to-low value ranking of this variable, we divided the students into three roughly equal groups to form a cognitive ability variable with three categories: low cognitive ability group = 1; medium cognitive ability group = 2; and high cognitive ability group = 3. Finally, considering family SES, we used factor analysis to transform the variables of both parents' education and occupations, in addition to each family's economic conditions, into common factors to measure family SES. We divided the students into three roughly equal groups based on their high-to-low family SES scores to form a three-category variable to measure family SES: low-SES group = 1; medium-SES group = 2; and high-SES group = 3.

III. Socio-Structural Factors (SCH_j)

To more deeply explore the sources of the differences in educational expectations between urban and rural junior high school students, we chose the following three socio-structural variables at the school district/school level: (a) school location: township and rural areas = 1, marginal urban areas and urban–rural fringe = 2; and cities/counties' central urban areas = 3; (b) proportion of students in schools with agricultural hukou; and (c) proportion of students in schools with local county (district) hukou. There was a high degree of consistency between residence and school segregation; therefore, the school location variable could be used to examine the influence of the school district environment on students' educational expectations. The proportion of students in schools with agricultural hukou and the proportion of students in schools with local county (district) hukou measured the influence of peer groups on the students' educational expectations.

- ***Control Variables***

To improve the quality of our model, we also controlled for other factors that may affect students' educational expectations at different levels: age, ethnicity (1 = ethnic minority, 0 = Han nationality), number of siblings at the individual/family level; school properties (1 = public school, 2 = private school), school quality ranking (1 = poor to medium, 2 = upper middle, 3 = the best) at the school level, and district/county fixed effects (CTY_p) at the district/county level.

The distribution of the main variables used in the study for the urban or rural student category variable is shown in **Table 1**.

The proportion of students with low cognitive ability or low family SES was much higher among rural and migrant student groups than among urban students. In contrast, students with high cognitive ability or high SES were clustered in the urban student group. Rural junior high school students were mostly clustered in rural schools, while urban junior high school students were mostly clustered in central city schools and migrant junior high school students were distributed among schools in both urban and rural areas.

Table 1. Distribution of the Main Variables for Rural and Urban Students.

Variable	Rural Students	Migrant Students	Urban Students
Male	51.57%	53.57%	50.98%
Cognitive ability: Low	39.68%	35.29%	26.73%
Cognitive ability: Medium	34.46%	34.04%	32.07%
Cognitive ability: High	25.86%	30.67%	41.20%
SES: Low	49.85%	37.40%	16.38%
SES: Medium	31.75%	37.22%	33.95%
SES: High	18.40%	25.37%	49.67%
School location: Township/rural area	56.57%	28.33%	19.07%
School location: Urban–rural fringe	25.06%	35.88%	22.64%
School location: Central urban area	18.37%	35.79%	58.30%
Proportion of students in schools with agricultural *hukou*	0.729 (0.173)	0.538 (0.237)	0.377 (0.259)
Proportion of students in schools with local county (district) *hukou*	0.901 (0.132)	0.605 (0.243)	0.798 (0.172)

Note: The standard deviation of the mean is presented in brackets. SES, socioeconomic status.

Table 2. Descriptive Statistics for the Educational Expectations of Urban and Rural Junior High School Students.

	Male			Female			Overall		
Category	Mean (SD)	%	Sample Size	Mean (SD)	%	Sample Size	Mean (SD)	%	Sample Size
Rural	15.746 (3.709)	53.62%	4,129	16.326 (3.260)	64.93%	3,972	16.041 (3.507)	59.17%	8,101
Migrant	15.767 (3.678)	55.14%	1,119	16.443 (3.173)	68.45%	1,008	16.077 (3.465)	61.45%	2,127
Urban	16.725 (3.523)	68.58%	4,224	17.179 (3.067)	78.78%	4,184	16.951 (3.311)	73.66%	8,408
Overall	16.192 (3.654)	60.47%	9,742	16.729 (3.190)	71.64%	9,164	16.456 (3.444)	65.96%	18,636

Note: The mean and standard deviation (SD) describe the average level and difference in educational expectations of junior high school students, respectively. The percentage describes junior high school students who expected to obtain a Bachelor's degree or higher.

In the schools attended by the rural student group in our study, more than 70% of the students came from rural areas and about 90% were registered in the local county. More than half of the students in the schools attended by the migrant student group in our study had rural household registration. About 60% of these students were registered in the local county/district, while in the schools attended by the urban student group in

our study, only one third of the students were from rural areas and nearly 80% were registered in the local county/district.

Results

Descriptive Statistical Analysis

Without adding any control variables to our model, the proportion of junior high school students who expected to obtain a Bachelor's degree or higher showed a monotonically increasing trend among rural and urban students (**Table 2**). That is, rural junior high school students were less likely than migrant junior high school students to expect to obtain a bachelor's degree, while migrant junior high school students had lower expectations than urban junior high school students. Comparable results were obtained from the male and female samples, which is consistent with Hypothesis 1.

Difference Test: Individual and Family Factors

To verify the influence of individual and family factors on the differences in educational expectations between urban and rural junior high school students, we tested the significance of the differences in the mean values of their educational expectations. The results are reported by the students' cognitive ability and family SES.

- ***Cognitive Ability***

Table 3 presents the pretest (difference-test) results, which took urban junior high school students as the reference group and reported the difference in the proportions of rural and migrant junior high school students and urban junior high school students expecting to obtain a bachelor's degree or higher. The z-test results showed the level of significance.

The results for the differences in educational expectations between urban and rural junior high school students without cognitive ability are shown in the bottom row of Table 3 for the full sample. The proportion of rural and migrant junior high school students who expected to obtain a bachelor's degree or higher were significantly lower than that of urban junior high school students. After grouping the students by cognitive ability, although the differences in educational expectations between urban and rural junior high school students were somewhat smaller, they did not disappear completely. There were still significant differences in educational expectations between urban and rural areas within each cognitive ability group. Specifically, for male students, the differences in educational expectations between urban and rural areas in the low cognitive ability group were reduced greatly, while obvious differences were observed in the educational expectations between urban and rural areas in the medium cognitive ability group. Interestingly, the differences in educational expectations between migrant and urban junior high school students in the high cognitive ability group were reduced significantly. These results showed that the experience of urban life and the school environment had a positive effect on the educational expectations of rural young people with high cognitive ability. The results for the female sample showed that the differences in educational expectations between urban and rural students in the medium and

Table 3. Effects of Individual and Family Factors on the Educational Expectations of Obtaining a Bachelor's Degree or Higher among Urban and Rural Junior High School Students.

Variable			Male		Female	
			Rural	Migrant	Rural	Migrant
Cognitive Ability	Low	Percentage	0.407 (0.012)	0.394 (0.024)	0.524 (0.013)	0.543 (0.028)
		Pretest	*diff.* = −0.084	*diff.* = −0.098	*diff.* = −0.092	*diff.* = −0.073
			z = −4.436***	*z* = −3.455***	*z* = −4.597***	*z* = −2.333***
		Sample size	1,591	419	1,572	328
	Medium	Percentage	0.546 (0.013)	0.544 (0.026)	0.686 (0.012)	0.712 (0.024)
		Pretest	*diff.* = −0.140	*diff.* = −0.141	*diff.* = −0.087	*diff.* = −0.061
			z = −7.478***	*z* = −5.015***	*z* = −5.174***	*z* = −2.396***
		Sample size	1,422	364	1,391	358
	High	Percentage	0.708 (0.014)	0.756 (0.023)	0.795 (0.013)	0.798 (0.022)
		Pretest	*diff.* = −0.114	*diff.* = −0.065	*diff.* = −0.104	*diff.* = −0.101
			z = −7.091***	*z* = −2.801***	*z* = −7.644***	*z* = −5.197***
		Sample size	1,116	336	1,009	322
SES	Low	Percentage	0.512 (0.011)	0.547 (0.025)	0.627 (0.011)	0.669 (0.024)
		Pretest	*diff.* = 0.006	*diff.* = 0.041	*diff.* = −0.003	*diff.* = 0.039
			z = 0.250	*z* = 1.299	*z* = −0.122	*z* = 1.303
		Sample size	1,944	411	2,104	393
	Medium	Percentage	0.574 (0.013)	0.550 (0.025)	0.691 (0.013)	0.706 (0.023)
		Pretest	*diff.* = −0.057	*diff.* = −0.082	*diff.* = −0.071	*diff.* = −0.056
			z = −3.113***	*z* = −3.000***	*z* = −4.096***	*z* = −2.259**
		Sample size	1,396	404	1,201	388
	High	Percentage	0.527 (0.018)	0.559 (0.028)	0.643 (0.019)	0.674 (0.031)
		Pretest	*diff.* = −0.251	*diff.* = −0.219	*diff.* = −0.218	*diff.* = −0.187
			z = −13.266***	*z* = −8.251***	*z* = −12.376***	*z* = −7.334***
		Sample size	789	304	667	227
Full sample		Percentage	0.536 (0.008)	0.551 (0.015)	0.649 (0.008)	0.685 (0.015)
		Pretest	*diff.* = −0.150	*diff.* = −0.134	*diff.* = −0.138	*diff.* = −0.103
			z = −14.031***	*z* = −8.428***	*z* = −13.926***	*z* = −6.968***
		Sample size	4,129	1,119	3,972	1,008

*Note: 1. The reference group for the mean difference test in the table includes all urban students; 2. * p < 0.1, ** p < 0.05, *** p < 0.01.*

low cognitive ability groups were smaller, but the differences in educational expectations between urban and rural students in the high cognitive ability group showed little change compared with the full sample results.

The above results indicated that the observed differences in educational expectations between urban and rural junior high school students were not entirely due to

their differing cognitive abilities. After controlling for cognitive ability, significant differences in educational expectations were still observed among rural and urban junior high school students with high cognitive ability. A possible reason for this finding is that some rural hukou students hope to live and work in rural areas in the future and the educational requirements for positions in the rural labor market are lower than those of the urban labor market, which may affect these students' judgment of the value and role of education. Therefore, we further tested the difference in educational expectations between rural junior high school students in the high cognitive ability group who want to stay in rural areas or small towns and those who want to stay in big cities or abroad to verify our findings. The results showed that the educational expectations of rural students who plan to live in big cities were significantly higher than those of their counterparts who plan to live in rural areas or small towns (*diff.* = −0.209, z = −9.394), although both student groups were in the high cognitive ability group. Another possible reason is that even if they work in cities, most rural hukou residents can only enter the secondary labor market, in which education qualifications have a very limited effect on their social mobility opportunities. This may also affect rural students' judgment of the value and role of education, and subsequently their educational expectations (Li & Wu, 2015).

- ***Family Background***

The bottom row of Table 3 for the full sample presents the results for the test of the differences in educational expectations between urban and rural junior high school students without grouping the students by family SES. The proportion of rural and migrant junior high school students who expected to obtain a bachelor's degree or higher were significantly lower than that of urban junior high school students. After grouping the students according to their family background, the differences in educational expectations between rural and migrant junior high school students and urban junior high school students with low SES were no longer significant regardless of gender. In other words, family SES explained the lower educational expectations of rural and migrant junior high school students from disadvantaged families. Although the differences in educational expectations between rural and migrant junior high school students and urban junior high school students with medium family SES were still significant, they were smaller than for the low SES group. Compared with the above results for cognitive ability, family background factors explained the differences in educational expectations between urban and rural junior high school students better than cognitive ability factors. However, it should be noted that the differences in educational expectations between rural and migrant junior high school students and urban junior high school students from advantaged family backgrounds increased compared with the results for the full sample. This result showed that the overall differences in educational expectations between urban and rural junior high school students were mainly reflected in the advantaged social class, reflecting the heterogeneity of the influence of family SES on the educational expectations of these students. That is, the positive influence of family background on urban students was greater than on rural and migrant students. A possible reason is that as the rural economy in China develops and parents of rural students increase their income and professional status gradually, they may still not know how to use their family capital to create a good educational atmosphere within the family. Such

an atmosphere would help their children to form higher educational expectations compared with children of urban parents. Compared with rural families, Liu, Zhang, and Li (2015) found that urban parents' participation in their children's education is more helpful in increasing young people's educational expectations. To verify this result, we selected the "parental involvement" variable to measure the degree of activation of family capital and tested the difference in the degree of parental involvement between urban and rural junior high school students with advantaged family backgrounds. The results showed that the involvement of parents of rural junior high school students was significantly lower than that of parents of urban junior high school students (*diff.* = −0.521, t = −18.191), despite their similar family SES, while the differences in the degree of parental involvement between urban and rural students with poor family backgrounds were not significant.

- ***Linear Regression Analysis: Socio-structural Factors***

The results of the previous difference test showed that students' personal and family factors, including gender, cognitive ability, and family SES, could explain only part of the differences in educational expectations between urban and rural junior high school students. Therefore, we established a linear regression model to further explore the influence of socio-structural factors, including the type of school district (urban vs. rural) and the household registration structure of school populations, on the level of and differences in educational expectations between urban and rural junior high school students.

Model 1 in **Table 4** was a baseline model containing the control variables, which was used to test the differences in educational expectations between urban and rural junior high school students. The results showed that the proportion of rural and migrant junior high school students who expected to obtain a Bachelor's degree or higher was significantly lower than that of urban students. Specifically, rural and migrant junior high school students respectively had 4.6% and 5.3% lower educational expectations than did urban junior high school students. Models 2–5 controlled for the students' gender, gender and cognitive ability, gender and family background, and the three variables simultaneously, respectively. After controlling for individual and family factors, the difference in the proportion of students who expected to obtain a Bachelor's degree or higher between rural and migrant junior high students decreased, but did not disappear completely, which further verified the results of the previous difference test.

In the next step, we explored the socio-structural factors that influence the difference in educational expectations between urban and rural junior high school students. Based on Model 5, Model 6 added the first socio-structural factor, that is, the urban/rural properties of the school districts. The proportion of junior high school students who expected to obtain a bachelor's degree or higher in the urban–rural fringe and the central urban areas was 5.4% and 6.8% higher than that in villages and towns, respectively. However, the addition of this variable to the model did not significantly change the significance of the differences in educational expectations between urban and rural junior high school students. This indicated that the school district environment had little influence on the differences in educational expectations between urban and rural junior high school students. This result is similar to early Wisconsin studies of the influence of residential segmentation on educational expectations. Based on Model 5, Model 7 added the se-

Table 4. Regression Analysis of the Factors Influencing Whether Urban and Rural junior High School Students Expected to Obtain a Bachelor's Degree or Higher.

Explanatory Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Rural Students	−0.046 *** (0.009)	−0.045 *** (0.009)	−0.039 *** (0.008)	−0.034 *** (0.009)	−0.029 *** (0.008)	−0.022 *** (0.008)	−0.008 (0.009)	−0.032 *** (0.008)
Migrant Students	−0.053 *** 0.012)	−0.048 *** (0.012)	−0.039 *** (0.012)	−0.038 *** (0.012)	−0.030 ** (0.012)	−0.029 ** (0.012)	−0.017* (0.012)	−0.019 (0.012)
Male		−0.112 *** (0.007)	−0.110 *** (0.006)	−0.113 *** (0.007)	−0.111 *** (0.006)	−0.111 *** (0.006)	−0.111 *** (0.006)	−0.111 *** (0.006)
Cognitive Ability: Medium			0.117 *** (0.008)		0.118 *** (0.008)	0.115 *** (0.008)	0.115 *** (0.008)	0.117 *** (0.008)
Cognitive Ability: High			0.249 *** (0.008)		0.248 *** (0.008)	0.245 *** (0.008)	0.243 *** (0.008)	0.246 *** (0.008)
Ses: Medium				0.022 *** (0.009)	0.017 ** (0.008)	0.013 (0.008)	0.012 (0.008)	0.017 ** (0.008)
Ses: High				0.064 *** (0.009)	0.060 *** (0.009)	0.056 *** (0.009)	0.052 *** (0.009)	0.059 *** (0.009)
School Location: Urban–Rural Fringe						0.054 *** (0.011)		
School Location: Central Urban Area						0.068 *** (0.012)		
Proportion of Students in School with Agricultural *Hukou*							−0.216 *** (0.025)	
Proportion of Students in Schools with Local County (District) *Hukou*								0.116 *** (0.030)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District/County Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.064	0.076	0.111	0.078	0.113	0.115	0.117	0.114
Sample Size	18,636	18,636	18,636	18,636	18,636	18,636	18,636	18,636

*Note: 1. Robust standard errors are presented in brackets; 2. * p < 0.1, ** p < 0.05, *** p < 0.01; 3. The reference group for the cognitive ability dummy variable is the low ability sample and the reference group for the SES dummy variable is the low-SES sample. The reference group for the school location type dummy variable is township and rural areas.*

cond socio-structural factor used in this study, i.e., the proportion of students with agricultural household registration in schools. Compared with the urban/rural residence category variable, this school structural factor better explained the educational expectations of junior high school students. Specifically, for every 1% increase in the proportion of students with agricultural household registration in schools, the proportion of junior high school students who expected to obtain a Bachelor's degree or higher decreased by 21.6%. Moreover, the addition of this variable made the originally significant differences in educational expectations between rural and urban junior high school students completely disappear and greatly reduced the differences in educational expectations between migrant and urban junior high school students. After controlling for the

students' individual and family factors, the proportion of peers with similar experiences of rural life within the schools attended by rural junior high school students largely explained the observed disadvantages in the educational expectations of rural junior high school students. If rural students with similar demographic characteristics and family background to urban students enter schools with a high proportion of urban students, their initial disadvantages in educational expectations will be reduced greatly. Based on Model 5, Model 8 added the third socio-structural factor of this study, i.e., the proportion of students in schools with residence registration in the local county/district. This variable had a strong and significant impact on the educational expectations of junior high school students. Specifically, for every 1% increase in the proportion of students in school with local registered household permanent residence, the proportion of students expecting to obtain a bachelor's degree or higher increased by 11.6%. The addition of this school structural variable in the model eliminated the originally significant differences in educational expectations between migrant and urban junior high school students. After controlling for individual and family factors, the proportion of peers with similar experiences of rural–urban migration in the schools attended by migrant junior high school students largely explained the observed disadvantages in their educational expectations. If migrant students with similar demographic characteristics and family background to urban students enter schools with a high proportion of local students, their initial disadvantages in educational expectations will be greatly reduced.

Discussion, Conclusion, and Policy Implications

Based on baseline data from the 2013–2014 CEPS, this study explored the current differences in educational expectations between urban and rural high school students and their influencing factors in China. Micro-level individual/family factors and macro-level socio-structural factors jointly determined the educational expectations of junior high school students and the different educational expectations between urban and rural areas.

First, the significant differences in educational expectations between rural and migrant junior high school students and their expectations for receiving higher education were significantly lower than those of urban junior high school students. Cognitive ability and family background only explained a small part of the differences in educational expectations between urban and rural junior high school students, with family background being more important than cognitive ability. The household registration structure (hukou composition) of the schools explained most of the differences in educational expectations between urban and rural junior high school students.

The government and all sectors of society should be concerned about the low educational expectations of young people in rural Chinese society identified in this study. First, with the rapid development of urbanization in China, young people will increasingly leave the countryside to find jobs in cities. When these young people compete with urban residents for work, their low educational expectations may hinder their career development. Opportunities for people with rural household registration status to become urban citizens are extremely limited. Indeed, this factor has been shown to have a significantly positive correlation with individuals' education level (Li, 2014b). Rural young people with low academic qualifications may become migrant workers in labor-

intensive industries in the future, such as the manufacturing, construction, and service industries, where they have to take jobs with poor working conditions, low salaries, and low social status. Therefore, they may struggle to truly integrate into urban society (China Population and Family Planning Commission, 2010). In their future careers, most rural young people with low educational expectations will have to face this obstacle, which is difficult to overcome. Second, China is vigorously implementing a national rural revitalization strategy, in which economic developments and infrastructure construction in rural areas lead to increasingly higher requirements for experts in agricultural scientific knowledge and technology. However, the Chinese education system must be developed to cultivate the necessary expertise. Young people with hukou who do not go to work in cities but continue to live and work in rural areas may also be hindered in their rural career development because of their lower educational expectations.

Second, the results of this study showed that the difference in cognitive ability based on innate inheritance was not the main reason for the differences in educational expectations between urban and rural junior high school students in China. Conversely, a nurturing home environment (such as parental involvement) based on family SES (including parental education, occupation, and income) limited the expectations of rural students to receive higher education. Rural students' family background constraints made it difficult for them to make rational educational choices based on their own abilities. Today, science and technology are increasingly becoming decisive forces for socioeconomic development in global market competition. To maintain an advantage in global science and technology competition, China greatly needs well-educated experts in professional fields such as engineering, physics, and biology. However, if talented young people with high cognitive abilities from rural areas do not have correspondingly high educational expectations, it will be difficult for them to obtain the necessary education and training opportunities for desirable social occupations in the future. Thus, these young people will be unable to realize their full potential. This potential "talent loss" crisis will lead to wasted human resources in rural areas of China, which will affect the maximization of social welfare (Sewell, 1963).

Third, the environment of the school district where junior high school students live had little influence on their educational expectations. However, school segmentation based on registered household permanent residence, which is typically observed in the characteristics of peer groups within a school, had a major influence on the educational expectations of students with rural hukou. The total proportion of rural students with local registered household permanent residence greatly restricted their educational expectations, while the proportion of students with non-local registered household permanent residence in schools also greatly restricted migrant students' educational expectations. In China, segregation based on school institutions and policies is an intermediary mechanism in which macro-level socio-structural factors and micro-level family backgrounds work together on individuals' educational decision-making. Students with similar disadvantaged backgrounds tend to cluster in similarly poor schools or even within the same class, which leads to a corresponding segregation in the allocation of teachers, curricula, and teaching arrangements in schools. In addition, the school atmosphere created by most peer groups will differ. These differences may have an impact on the educational expectations of every young person in the school. It is difficult for Chinese schools to provide sufficient educational incentives for higher education to

rural and migrant students because of school segregation caused by household registration institutions, which greatly inhibits their educational expectations.

The results of this study have the following implications for solving the problem of differences in educational expectations and attainment between Chinese urban and rural areas in the future. First, actively including educational guidance and career planning courses or programs in rural schools will effectively help to reduce the brain drain crisis in rural Chinese society. To bridge the gap in educational development between rural and urban areas, the Chinese government and policy makers must not only consider the problem of uneven distribution of educational resources (such as school facilities, materials, curricula, teachers, and management) but also pay attention to creating and improving the educational atmosphere of schools, so that schools can cultivate their students' educational expectations. Schools must provide rural students with information about educational opportunities and the value and future returns of higher education. Schools must also help their students obtain the required knowledge for their future career development, such as understanding the types of jobs they are suitable for and the educational qualification requirements for these jobs. This would prevent rural students from misjudging the value of education, leading them to think that "education is useless."

Any educational and vocational guidance also requires the participation of parents; therefore, rural parents should be helped to obtain more information and knowledge about educational and vocational opportunities to better help their children make rational educational decisions. Gradually alleviating and ending school segregation based on household registration will enhance the integration of widely diverse school populations, which will be an important channel for promoting educational and social equity in China. The government influences the educational decisions of individuals and their families through its educational policies. The finding of this study regarding the relationship between household registration segregation in junior high schools and the differences in educational expectations between urban and rural areas in China provides an empirical basis for the re-evaluation of current educational policies and their consequences. The composition and structure of the household registration system in urban schools are helpful to improve their students' educational expectations, while the household registration structure and composition of schools attended by rural students have a negative impact on their students' educational expectations (Kahlenberg, 2012). Therefore, it is important to promote the fairness of educational opportunities by reducing the degree of school segregation caused by the hukou household registration policy and increasing the diversity and heterogeneity of students' identities and backgrounds within schools to help vulnerable rural students obtain the same opportunities as urban students to enter urban schools with higher SES. In this respect, the reform of the existing household registration system in China must be deepened continually to weaken and gradually eliminate the restriction of household registration on the education of rural and migrant children. However, various forms of school quality differentiation must be eliminated to promote the balance of educational resources between regions, between urban and rural areas, and between schools.

Notes:

1. *The subscripts i, j, and p in the model represent the individual/family, school, and district/county levels, respectively.*
2. *The CEPS dataset divided the student sample into eight types based on information about their household permanent residence (hukou type, rural vs. urban), the province where they live, and whether they live with their parents.*

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NEWSLETTER

How do Class Size and Teacher's Academic Qualifications Affect Students' Academic Performance? An International Comparative study based on PISA 2018 Results

By Yao, H., Hu, Y. Z., & Ma, L. C.
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THE study, published in *Tsinghua Journal of Education*, uses PISA2018 results of 15-year-old middle school students from four provincial administrative regions in China (Beijing, Shanghai, Jiangsu, and Guangdong) , and other OECD countries as analysis sample to explore the differences in the distribution characteristics of class size and teacher academic qualifications between the four regions of China and OECD countries, and the impact of class size, teacher academic qualifications and their interaction terms on student academic performance. Multi-level linearity Model is adopted in the analysis. The results of the study are as follows.

- There are remarkable differences in the distribution characteristics of class sizes and teacher academic qualifications in middle schools between China and OECD countries. Class size in China is relatively larger than that of OECD countries. In terms of teacher education qualifications, the proportion of teachers with a master's degree in OECD countries is higher than China. In terms of the distribution of teacher academic qualifications corresponding to different class sizes, the distribution curve of class sizes and teachers' academic qualifications in OECD countries follows the rule of large classes with low teacher academic qualifications and small classes with high teacher academic qualifications, while the distribution curve in the four regions in China presents irregular wave patterns.
- Reducing class size and upgrading teacher academic qualifications will help improve student performance. When the class size of the four regions in China is reduced from more than 50 students to 41-45 students and 46-50 students, the improvement in student academic performance is significant; When the class size in OECD countries is reduced from more than 50 students to 16-20 students, or 26-30 students, or 31-35 students, students can improve their performance effectively. In terms of the impact of teachers' academic

qualifications on student performance, every 10% increase in the proportion of the master's degree in the faculty will result in an average increase of 10.2 points in mathematics scores for students in the four regions of China, and an average increase of 5.6 points for students in OECD countries.

- A quadratic test of class size in OECD countries indicates that class size has a non-linear relationship with the improvement of student academic performance, and the best marginal benefit range for measuring the impact of class size on student performance is 21-30 students per class.
- The interaction between class size and teacher academic qualifications is tested, and it is found that class size and teacher academic qualifications have a "mutually independent" effect on student academic performance in China, while in OECD countries, they have a "mutually substituting" effect on student academic performance. Both have their own specific role thresholds.

The research results indicate that the benefits of reducing class size and upgrading teachers' academic qualifications are not only reflected in student performance improvement, but also in the development of students' non-cognitive abilities. Reducing class size helps to regulate student behavior and enhance students' emotional skills. Upgrading teacher academic qualifications can also promote pertinent instructions according to students' peculiarities and guide individual students to achieve distinctive and diversified development. These benefits beyond academic achievements deserve further studying.

In benchmarking the relevant indicators of OECD countries to promote the development of education in China, it is necessary to consider China's economic development level as a upper-middle-income country, the scarcity of high-quality educational resources and the unbalanced development of education at the current stage. Under the principle of steady change and gradual advancement, empirical models based on large sample data should be built to measure the marginal costs and marginal benefits of different programs to formulate a more scientific and efficient strategy for the high-quality development of compulsory education.

Source: Tsinghua Journal of Education, 2021(5):40-54.

NEWSLETTER

Who Matters, Teacher or Parents?

By Zhao, N. N., Li, W. T., Chen, X. H., & Chen, F. M.
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PUBLISHED in *Tsinghua Journal of Education*, the study examines the influence of parents and teachers on students' academic performance in Chinese through a survey of more than 4,000 students in grades 3 to 6. Based on the achievement goal theory, this study constructs a theoretical model of the relationship between students' perceived achievement goals and their academic achievements in Chinese and takes learning style as a mediator variable to explore the influence of students' perceived achievement goals from teachers and parents on their academic achievements in Chinese. The research question of this study is: How do students' perceived achievement goals from parents (Including acquisition goals, referring to students' perceived parental hopes that they should develop new skills, improve their abilities and acquire new knowledge; Results goals, referring to students' perceived high parental standards in terms of scores and rankings) and achievement goals from teachers (Including acquisition goals, referring to the students' perception that the objective of learning emphasized by teachers is to cultivate skills and abilities; Avoidance goals, referring to the students' perception of teachers' request for their avoidance to show low ability; Targeted goals, referring to students' perceived requests for high performance from teachers to exhibit their abilities and talent) affect students' academic performance in Chinese?

Research Methods:

This study takes more than 4,000 students in grades 3-6 as sample, using students' academic achievements in Chinese, learning style, goal perception and family factors as research tools, to explore the impact of parents' and teachers' goals perceived by students on their learning style and academic achievements in Chinese and the mediating effect of learning style.

Research Results:

- Correlation analysis among variables indicates: (i) There is a significant positive correlation between students' academic achievements in Chinese and surface learning style, parents' expectations, teachers' acquisition goal, teachers' targeted goal and parents' results goal at the level of 0.01. (ii) There is a significant

negative correlation between students' academic achievements in Chinese and physical capital and teachers' avoidance goal at 0.01 level. There is a significant positive correlation between students' academic achievements in Chinese and deep learning style, and a significant negative correlation between students' academic achievement in Chinese and cultural capital at 0.05 level.

- This study uses structural equation model to model variables that affect students' academic performance and draws the following conclusions: Surface learning style ($\beta = 0.175$, $P < 0.001$) and perceived acquisition goals from teachers ($\beta = 0.148$, $P < 0.001$) have significant positive influence on students' academic achievements in Chinese. Students' perceived parental acquisition goals ($\beta = -0.101$, $P < 0.05$) have a significant negative impact on students' academic achievements in Chinese. Students' perception of acquisition goal from teachers ($\beta = 0.211$, $P < 0.001$) and parental acquisition goal ($\beta = 0.63$, $P < 0.001$) have a significant positive impact on surface learning style. There is an interaction between students' perceived parental acquisition goal and perceived acquisition goal from teachers ($\beta=0.506$, $P <0.001$). Parents' expectations interact with students' perception of acquisition goal from teachers ($\beta = 0.171$, $P < 0.001$). Parents' expectations have a significant positive effect on students' perceived parental acquisition goal ($\beta = 0.157$, $P < 0.001$), surface learning style ($\beta = 0.071$, $P < 0.001$) and academic achievements in Chinese ($\beta = 0.111$, $P < 0.001$). Students' perception of acquisition goal from teachers and parental acquisition goal has an impact on academic achievements in Chinese through the mediating effect of surface learning style.
- There are two ways to influence students' academic performance in Chinese, and the results of the effect test are as follows: i) Teachers' acquisition goal → students' surface learning style → academic performance in Chinese, the effect value is 0.037, 99% confidence interval is [0.015, 0.054]; ii) Parental acquisition goal → students' surface learning style →academic achievements in Chinese, the effect value is 0.11, 99% confidence interval is [0.045, 0.16]. The results indicate that the two paths are not completely valid mediation effect, and acquisition goals from teachers have a more direct impact on students' academic achievements in Chinese than parental acquisition goal.

Based on the above analysis, the following conclusions are reached: i) Achievement goals from teachers and parents can predict students' academic achievements in Chinese. However, whether there are other mediating variables needs to be further examined. ii) Compared with parents, teachers have a

stronger direct influence on students' academic performance, which suggests that in improving students' academic performance, teachers should take the initiative. iii) Compared with teachers, parents have stronger influence on students' motivations and strategies, which suggests that parents should play a more direct and important role in the cultivation of students' learning styles. Their influence on students is implicit and internalized, focusing on thoughts, behaviors, and methods. iv) Surprisingly, parental acquisition goals have a significant negative impact on students' academic performance in Chinese, which may be attributed to the fact that emphasis on academic achievements can cause excessive stress to children. Further research is needed in this regard. v) There should be a clear division of responsibility between parents and teachers in home-school partnership to achieve students' healthy and comprehensive development.

Source: Tsinghua Journal of Education, 2021; 42(4):130-140.

NEWSLETTER

Mathematics Anxiety and its Impact on Academic Achievement: Research on the Impact Mechanism Based on a Large-scale Assessment in Province Z

By He, S. Q. & Qi, C., X.
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THE study (published in *Educational Research and Experiment*) surveyed 42644 eighth-grade students from 11 prefecture-level cities in Province Z. It evaluates the eighth graders' academic performance in mathematics by measuring their cognitive abilities in learning, understanding, and application in the study of Algebra, Graphics and Geometry, and Statistics and Probability. Manifestations of mathematics anxiety and its impact on student academic achievements are examined. The Mathematics Anxiety Questionnaire includes four dimensions, namely, class anxiety, homework anxiety, problem-solving anxiety, and test anxiety.

Research Results:

- Analysis of students' propensities in the four dimensions of mathematics anxiety indicates that students have the highest propensity for test anxiety, lower one for class anxiety, and the lowest for homework and problem-solving anxiety.
- In terms of gender differences in student mathematics anxiety, girls have higher levels of class anxiety and test anxiety than boys, and boys have higher levels of homework anxiety than girls. In terms of regional differences in student mathematics anxiety, the more backward the economy and education of the region, the higher the level of student mathematics anxiety. From the perspective of different school types, students in public schools experience higher levels of mathematics anxiety than those in private schools. Academic levels are closely related to mathematics anxiety levels in that students with lower academic levels tend to report higher levels of homework anxiety and problem-solving anxiety, and those with narrow passes in exams undergo the highest levels of class anxiety and test anxiety.
- In this study, class anxiety and problem-solving anxiety are independent variables, homework anxiety and test anxiety inter-

mediary variables, and student academic performance in mathematics the dependent variable for path analysis. The results show that both class anxiety and problem-solving anxiety intensify homework anxiety and test anxiety, resulting in negative impacts on student academic performance in mathematics. Nevertheless, test anxiety has a weak positive effect on student academic performance in mathematics.

Given the negative influence of mathematics anxiety on student academic performance in mathematics, appropriate teaching methods should be adopted to help students alleviate and eliminate this negative academic mood. In addition, parents' and teachers' anxiety about mathematics will also aggravate students' mathematics anxiety. Therefore, teachers and parents should avoid influencing students negatively with their own mathematics anxiety. Students with low academic levels should be given more help and encouragement. Student homework burden should be kept at a proper level so that students can learn in a pleasant atmosphere.

Source: Educational Research and Experiment, 2020(2):82-89.

NEWSLETTER

Can After-school Service in Primary and Secondary Schools Promote Educational Equity?

By Zhang, W. P., Fu, D., Li, W., & Zen, X.
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PUBLISHED in *China Educational Technology*, the study analyzes the survey data of primary and secondary school students from 32 counties (districts) in 6 provinces (autonomous regions) in China. By using descriptive statistics, Chi-square test, Propensity Score Matching (PSM) and regression analysis, it examines the differences among students from low, middle, and high income families, to determine if after-school service can promote endowment equity, procedure equity and outcome equity in education in China This will provide valid evidence for optimization of after-school service program in China.

Research results

- After-school service has insignificant effects on endowment equity in education. According to the Chi-square test, the overall proportion of students participating in after-school service is not high, and there are significant differences in the proportions of students from low, middle and high income families participating in after-school services (χ^2 =146.942, $p < 0.001$). Specifically, the proportion of students from low-income families participating in after-school service is the lowest, and the participation rate is positively related to family economic conditions. This may have something to do with the limitations of after-school service as quasi-public goods.
- After-school service has moderate effects on procedure equity in education. Results of Chi-square test indicate that there is no significant difference in demands for after-school service in compulsory subjects (χ^2 = 1.577, P = 0.455>0.05) and interest development (χ^2 = 0.738, P = 0.691>0.05). Nevertheless, there is significant difference in demands for after-school service in competence education (χ^2 = 25.272, P < 0.001), which is more likely to be accepted by high income households. This may be related to family economic conditions and school conditions, for middle and low

income families can hardly afford after-school service in art and science, and it is difficult for rural schools to conduct art and science courses due to limited human and equipment resources.

- After-school service has significant effects on outcome equity in education. According to the results of PSM, students who attend after-school service have better academic performance than those who do not. Meanwhile, results of regression analysis also indicate that after-school service helps narrow the gap in academic performance caused by different household economic conditions. Thus, after-school service reduces the inequality in educational outcomes among students from different socio-economic backgrounds.

Based on the research results, the author holds that the nature of after-school service as non-public goods determines its limitations in promoting educational equity. However, since after-school service is provided by schools, it helps make up for the inequality caused by family conditions to a certain extent. Therefore, it is necessary to expand the scope of after-school service to ensure it is available to students from low-income families. Schools should be encouraged to invest more in after-school service in competence education and after-school service should play a more important role in reducing students' homework and extracurricular training burden.

Source: China Educational Technology, 2021(11):16-23.

NEWSLETTER

Effects of Problem-based Learning on Student Problem-solving Skills

By Wang, H. J., Cao, L., & He, M. Z.
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TO explore the effect of problem-based learning on student problem-solving skills, this study conducted a meta-analysis of 34 experimental or quasi-experimental studies in China and other countries and tried to answer the following questions: 1) Compared with traditional teaching methods, does problem-based learning affect student problem-solving skills more significantly? 2) In problem-based learning, how do the education levels, teaching periods, disciplines, teaching settings, and assessment tools impact student problem-solving skills?

The results of the study:

The random effect model is used to aggregate the effect indicators, and the combined effect size of problem-based learning on student problem-solving skills is 0.66, the 95% confidence interval is 0.46 - 0.87, and $p < 0.05$, indicating that the research has reached a statistically significant level, and that the overall effect of problem-based learning on student problem-solving skills is at a moderately high level.

Detailed analyses:

As students at different education levels have different cognitive characteristics, this study analyzes four groups of students from elementary school, junior secondary school, senior secondary school, and university, and finds that the combined effect size is 0.47, 0.84, 1.27, and 0.45 for elementary school, junior secondary school, senior secondary school, and university students respectively. The combined effect values at different education levels are all positive, indicating that problem-based learning has a positive impact on students at all stages. The effect is the most significant on senior secondary school students, and weaker on elementary school and university students and above.

In terms of education periods, the effect size is 0.62, 1.01, and 0.59 for 0-2 months, 2-4 months, and more than 4 months respectively. Problem-based learning has a positive effect on student's problem-solving skills in all the three periods. The effect is most remarkable when the education period is

controlled in 2-4 months, and the effect is relatively weak in 0-2 months or for more than 4 months.

From the perspective of disciplines, the effect size is 1.18 for Mathematics, 1.05 for Nursing, 0.78 for Chemistry, 0.76 for Sports, 0.57 for Physics, 0.51 for Science, 0.48 for Robots, 0.28 for Education, and 0.42 for others, indicating that problem-based learning has the most significant positive effect in mathematics, physics, chemistry, nursing, and sports, while its effect in education and other subjects is relatively weak.

This study involves three types of teaching settings, that is, ordinary classrooms, laboratories, mixed indoor and outdoor locations. The combined effect size is 0.72 in ordinary classrooms, the 0.44 in laboratories, and 0.67 in mixed indoor and outdoor locations. It shows that the implementation of problem-based learning in ordinary classrooms has the greatest positive effect on students' problem-solving skills.

From the perspective of assessment tools, the study divides the literature sample into three categories by questionnaire method, self-diagnostic tests, and teacher-made objective assessments. The effect size is 0.91, 0.38 and 0.82 respectively. A student problem-solving skill has nothing to do with assessment tools, but the results obtained by different assessment tools differ.

Based on analysis results, the research puts forward the following suggestions: i) Design problem-based learning according to students' cognitive characteristics at different education levels. ii) Optimize the application of problem-based learning in various disciplines, iii) Incorporate virtual technology and diversify the teaching settings. iv) Integrate multiple assessment methods and tools.

Source: Open Education Research, 2021; 27(5):91-98.

NEWSLETTER

Differences in Instruction Efficacy between On-Campus and Online Teaching

By Yang, C., Cheng, B. D., & Zheng, Y.
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THE study, published in *China Higher Education Research*, takes 1,630 undergraduates enrolled in 2019 and 2020 in University X as analysis sample. It conducts an empirical analysis of differences in instruction efficacy between on-campus and online teaching from the perspectives of class interaction, teaching atmosphere and student characteristics, and examines the influencing mechanism of online teaching efficacy. The propensity score matching method (PSM) is employed to analyze the differences in instruction efficacy and the degree of difference. In addition, the Poisson regression model is used to examine the factors influencing online teaching efficacy. The findings are as follows.

- There is a significant difference in instruction efficacy between on-campus and online teaching. The teaching patterns have a moderately strong influence on the test scores. Other interfering factors controlled, the online group score an average of 3.84 points lower than the on-campus group.
- Class interaction is an important factor affecting the instruction efficacy, and the intensity of interaction has a significant positive impact on grades. Teachers can significantly improve the efficacy of online teaching by adopting various interactive methods such as audio and video live broadcasting and increasing the frequency of interaction with students.
- The characteristics of teaching soft environment have certain influence on instruction efficacy. It is found that the efficacy of online teaching in experimental class is stronger than that in ordinary classes. Moreover, the relevance of the courses to students' majors has a significant impact on their academic performance. In other words, students are more likely to have better academic performance in courses with higher relevance to their majors than in those with lower relevance to their majors.

- Instruction efficacy is also affected by the individual characteristics. For instance, the efficacy of online teaching is lower for students in remote areas than for average peers, limited by the underdeveloped network infrastructure; It is also weaker for foreign students than for the average.
- Statistically, teaching software, teachers' experience, students' genders and the ways of enrollment (whether enrolled by uniform exams) and other factors have no significant impact on students' academic achievements.

Based on the research findings, the study suggests that at the undergraduate education level, online teaching should be applied cautiously rather than replacing on-campus teaching completely; Try not to select students in remote areas as subjects for online teaching experiment as they may have difficulty in adapting themselves to comprehensively electronized teaching; In online teaching, teacher-student interaction should be attached more importance to form a decentralized two-way communication pattern and the relatively equal teacher-student relationship typical in network teaching be fully utilized to promote students' exploration ability in their pro-active pursuit of knowledge.

Source: China Higher Education Research, 2021(12):23-29.

NEWSLETTER

Parental Involvement, Confidence in the Future, and Adolescent Development: A Comparative Analysis of Native and Migrant Adolescents

By Wu, W., & Li, J. L.
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THE study, published in *Education & Economy*, is based on Coleman's social capital theory, and takes the 7th graders at the baseline and 8th graders in the second-phase survey in the follow-up educational survey in China as analysis sample. It uses seemingly unrelated regression (SUR) analysis to study the impact of parental involvement on native and migrant adolescents' cognitive ability, psychology and behavior. The sub sample regression analysis and Z-test are used to explore the impact of family participation in education on the development of native and migrant adolescents. Finally, through the chain mediating effect analysis, this study examines the potential mediating effect of confidence in the future on parental involvement and adolescent development. The results are summarized as follows.

- SUR analysis results indicate that parental involvement is closely related to adolescents' cognitive, psychological, and behavioral development. Parent-child communication positively predicts adolescents' cognitive ability and reduces psychological and behavioral problems. Parental supervision can also reduce children's psychological and behavior problems. Home-school contact negatively predicts adolescents' cognitive ability and positively predicts their psychological and behavioral problems, which might be a result of adolescents' reactive behavior and resistance to excessive parental intervention.
- The results of sample regression analysis and Z-test show that parental involvement has a remarkable impact on the development of both native and migrant adolescents, and there is no significant difference in the impact effect. There are some differences in the effect of parental involvement only among migrant adolescents. Parent-child communication can reduce the psychological and behavioral problems of both local and migrant adolescents, but it can only improve the cognitive ability of local adolescents;

Home-school contact negatively predicts the cognitive ability of native adolescents and has no significant impact on that of migrant adolescents.

- Chain mediated effect analysis results indicate that parental involvement significantly affects adolescents' and parents' confidence in the future. Parents can participate in adolescents' education through parent-child communication, parental supervision, and home-school contact to exert positive impact on native and migrant adolescents' confidence in the future.

Given the above analyses, the study suggests that more attention should be paid to the role of parental participation and the guiding role of schools in parental participation given full play; Foreign experience in providing educational compensation programs to vulnerable families, especially migrant families can be used as reference; Advancing supporting reforms and lowering the threshold of urban compulsory education will also help change the pessimistic attitude of disadvantaged parents towards their children's future.

Source: Education And Economy, 2021(5):66-76.

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