

Research on the Influence of Shadow Education on the Performance of Different Subjects in Junior High School

-- Empirical Analysis based on CEPS (2013-2014)

Shuya Xu*

Institute of Education, Fujian Normal University, Fuzhou, Fujian 350000, China
*1980660173@qq.com

ABSTRACT

The purpose of this study is to describe and evaluate the contribution of shadow education to students ' academic performance through the survey data of the student baseline of the China Education Panel Survey (CEPS), and to understand its impact on the academic performance of different disciplines. Based on the results of data analysis, it provides policy recommendations and practical guidance for the government, schools and families on how to make more effective use of shadow education resources and how to improve and optimize the educational environment. The results show that mathematics and English extracurricular tutoring significantly improve mathematics and English scores, while Chinese is not. The appropriate amount of tutoring on holidays and weekends is positively correlated with performance, but too long tutoring from Monday to Friday leads to a decline in performance, and the length of tutoring is not as long as it is, and the moderation is the best.

KEYWORDS

Shadow Education; Junior High School Students; Academic Achievements; Tutoring Effect.

1. INTRODUCTION

As education continues to evolve, an increasing number of students begin to seek extracurricular tutoring and counseling to meet their needs for high-quality educational resources. Shadow education relies on mainstream school education. Its scale and form follow the development of mainstream education and develop with the needs of students. Compared with mainstream school education, shadow education is based on fees and has higher flexibility. Although it offers the same or similar subjects as the mainstream education system, the knowledge it teaches is more difficult and mainly meets the needs of parents and students for high-quality educational resources. However, in fact, based on the implementation of the " double reduction " policy, domestic policies have formulated a series of restrictive policies for extracurricular tutoring. For example, The " Notice on Further Strengthening the Standardized Management of Off-campus Training Institutions " promulgated by the Ministry of Education clearly states that it is strictly prohibited for primary and secondary schools to organize or force students to participate in any form of paid remedial activities. At the same time, the " Opinions on Further Reducing the Burden of Students ' Homework and Off-campus Training in Compulsory Education " jointly issued by the General Office of the Central Committee of the Communist Party of China and the General Office of the State Council emphasizes that in order to reduce the burden of students ' homework and off-campus training in compulsory education, special emphasis is placed on the prohibition of financing and listing of subject training institutions. It is

listed that shadow education has an impact on many students' daily life, family education expenditure, social stratification and education quality. Whether shadow education can promote students' academic performance needs to be considered and solved urgently. Therefore, it has attracted wide attention from the government, policy makers and academia.

The purpose of this study is to investigate and analyze the empirical data of CEPS (2013-2014) through retrospective research to explore the changes in the performance of different disciplines of junior high school students under the influence of shadow education, and to provide a basis for the educational strategies of specific disciplines according to the conclusions. However, in the preliminary analysis of the relevant data, for the variable of extracurricular tutoring intensity, it was found that ANOVA analysis showed heterogeneity of variance, which violated the basic hypothesis of ANOVA method, so Tamhane's T2 test and Welch's t-test were selected. strictly prohibited.

2. LITERATURE REVIEW

2.1. The Conceptual Interpretation of Shadow Education

Shadow education, colloquially referred to as extracurricular enhancement studies or additional educational pursuits, constitutes an instructional endeavor carried out outside the mainstream education system. Since the 1980s, the research on shadow education at home and abroad has gradually emerged, and reached its peak in the 1990s, which is still active. The concept of "shadow education" was first put forward in 1992. Stevenson (D.L. Stevenson) and Peter (D.P. Becker) conducted an in-depth study of the remedial education of Japanese high school students. Mark Bray is one of the scholars who study extracurricular tutoring. He further defined the concept of shadow education as follows: shadow education is complementary, private and subject-based. It is usually paid by families or individuals to supplement or strengthen school curriculum. Globally, especially in East Asia, shadow education is very common, and almost all high school students will participate in it.

2.2. The Influence of Shadow Education on Students' Academic Performance

Whether extracurricular tutoring can really improve students' academic performance is still controversial due to too many influencing factors. There are two main views on the relationship between extracurricular tutoring and academic performance.

The first view is that extracurricular tutoring has a positive impact on students' academic performance. Tutoring may help students master knowledge and skills outside the classroom, supplement and strengthen the lack of school education, so as to improve students' academic performance. Stevenson and Baker's research on Japanese high school students found that shadow education has a positive impact on students' mathematical achievement and college education. And Kenya, Vietnam also reached similar conclusions on the impact of shadow education. Shadow education helps to improve students' academic achievement and increase students' access to university education opportunities. Domestic research also shows that extracurricular tutoring helps to improve students' academic performance, Taking Hangzhou as an example, Yang Danhong draws a conclusion through questionnaire survey and character interview. In terms of the degree of improvement in performance, most students believe that their performance has been improved after tutoring, and only 2.4% of students have not improved their performance after tutoring.

The second view is that extracurricular tutoring has no effect on students' academic performance or that extracurricular tutoring has different effects on students' academic performance in different disciplines. Some Irish scholars found that, there is no significant effect on students' final exam scores with or without after-school tutoring. There are also domestic studies that have found that students who participate in after-school tutoring may face greater learning pressure, anxiety and Insufficient

sleep, etc., which may have a negative impact on their physical and mental health. In addition, some scholars have pointed out that shadow education may lead to the marginalization of school education and weaken the function of school education.

In summary, scholars at home and abroad have extensively discussed the role of shadow education in the academic performance of primary and secondary school students, but the significant conclusions on the impact of junior high school students are still lacking. Based on the existing research on the influence of extracurricular tutoring on the performance of junior high school students, this paper uses the baseline data of CEPS (2013-2014) to carry out retrospective research, and deeply analyzes the specific effect of individual factors of shadow education on the performance of different disciplines, aiming to provide theoretical support for the implementation and optimization of the " double reduction " policy.

3. RESEARCH DESIGN

3.1. Data Sources

The data source is CEPS (China Education Panel Survey), which is responsible for the China Survey and Data Center of Renmin University of China. Based on the 2013-2014 academic year, focusing on the students of grade 7 and grade 9, taking the education level and the floating population ratio as the stratification criteria, 28 county-level units were randomly selected nationwide, and 112 schools and 438 classes were sampled at the school level, covering about 20,000 students for a comprehensive baseline survey.

3.2. Variables

The dependent variable used in this study is the standardized test scores of students in the 2013 high school entrance examination (Chinese, mathematics, English, mean 70, standard deviation 10), and the statistical software SPSS25 is used to analyze the data. In the literature at home and abroad, there is no clear definition of the concept of out-of-school counseling intensity, however, Xie Zhirui investigated the situation of off-campus tutoring for junior high school students in various regions, and found that junior high school students spend an average of 1 to 10 hours a week on extracurricular tutoring. Among them, the make-up time on the three main subjects (Chinese, mathematics, English) is longer, 2-3 hours, and students are also more willing to choose to concentrate on weekends. Accordingly, the variables ' time (hours) of extracurricular tutoring classes from Monday to Friday ' and ' time (hours) of extracurricular tutoring classes on weekends ' are recoded as dummy variables ' extracurricular tutoring intensity from Monday to Friday ' and ' weekend extracurricular tutoring intensity ' (1 = ' moderate (1-4 hours) ', 2 = ' longer (5-8 hours) ', 3 = ' long (9-12 hours) '), and the remaining invalid samples are eliminated. The basic situation and descriptive statistics of the samples are shown in Table 1.

Table 1. Sample basic situation

Variable	Classification	Frequency	Percentage
Sexuality	Males	9875	50.7
	Females	9341	47.9
Did not participate in extracurricular tutorial class	No	9154	47
	Yes	10221	52.5
Participate in mathematics tutoring	No	15457	79.3
	Yes	3918	20.1
Participate in Olympiad mathematics tutorial	No	18609	95.5
	Yes	766	3.9
Participate in Chinese tutorial	No	17247	88.5
	Yes	2128	10.9
Participate in English tutoring	No	14851	76.2
	Yes	4524	23.2
Participate in remedial classes during holidays	No	12949	66.4
	Yes	6378	32.7
Tutoring intensity from Monday to Friday	Moderate (1-4 hours).	2592	13.3
	Longer (5-8 hours)	262	1.3
	Long (9-12 hours)	57	0.3
Weekend extracurricular tutoring intensity	Moderate (1-4 hours)	4357	22.4
	Longer (5-8 hours)	886	4.5
	Long (9-12 hours)	141	0.7

3.3. Sample Distribution Characteristics

From the distribution of the types of extracurricular tutoring, the number of students participating in extracurricular tutoring accounts for 47 % of the total number, of which the number of students participating in English tutoring accounts for the largest proportion, accounting for 23.2 % of the total number, followed by mathematics accounting for 20.1 %, and the lowest is Chinese accounting for 10.9 %. From the perspective of the time and intensity of participating in extracurricular tutoring, the length of extracurricular tutoring classes related to schoolwork on weekends is longer than that of extracurricular tutoring classes related to schoolwork from Monday to Friday, and the number of people participating in tutoring classes during winter and summer vacations accounts for 32.7 % of the total number. The length of tutoring is mainly between 1 and 4 hours.

4. THE INFLUENCE OF SHADOW EDUCATION ON THE PERFORMANCE OF JUNIOR HIGH SCHOOL STUDENTS IN DIFFERENT DISCIPLINES

4.1. Difference Test

The results of t-test of standardized scores in Chinese, mathematics and English mid-term examinations are shown in Table 2, Table 3 and Table 4 respectively. The results of single factor contrast analysis of extracurricular tutoring intensity are shown in table 5.

4.1.1. Sex Differences

Independent sample t-test was conducted on the standardized scores of Chinese, mathematics and English in the three main courses of junior high school students of different genders. The results showed that there were significant differences in Chinese, mathematics and English scores between men and women ($P < 0.01$), and the average scores of the three subjects of women were higher than those of men.

4.1.2. Differences in Whether to Participate in Extracurricular Tutoring Classes

An independent sample t-test was conducted on the standardized scores of the mid-term examination of the three main courses of Chinese, mathematics and English after junior high school students participated in the extracurricular tutoring classes of the corresponding subjects (including the Olympiad). The experimental data show that junior high school students' mathematics scores show a highly significant difference ($P < 0.01$) after participating in the regular mathematics and the Olympiad mathematics remedial classes; similarly, students who participated in English extracurricular tutoring also showed a very significant difference in English scores ($P < 0.01$); for Chinese extracurricular tutoring, although students' scores also showed differences, their significance was slightly lower and still reached a statistically significant level ($P = 0.045 < 0.05$), and the average scores of the three subjects were higher than the average scores of the subjects that did not participate, indicating that participating in the extracurricular tutoring classes of the corresponding subjects had a certain positive effect on the subject scores.

4.1.3. The Difference of Extracurricular Tutoring Intensity

One-way analysis of variance was performed on the total scores of the mid-term examinations after junior high school students participated in different intensity (moderate, long, long) extracurricular tutoring from Monday to Friday. The results of variance homogeneity test showed that $P = 0.419 > 0.05$, rejecting the null hypothesis, indicating the homogeneity of variance of the three groups of samples. The results of ANOVA analysis showed that there were significant differences in the academic performance of junior high school students after participating in different intensities ($P < 0.05$). The results of the post-hoc comparison show that there are significant differences between the results of extracurricular counseling duration of 1 to 4 hours, 5 to 8 hours and the results of extracurricular counseling duration of 9 to 12 hours. The results of extracurricular counseling duration of 9 to 12 hours are lower than the other two extracurricular counseling durations. The results show that the average standardized total score of 5-8 hours of extracurricular tutoring on weekends is significantly different from the other two and higher than the other two hours of extracurricular tutoring. The average standardized total score of 1-4 hours and 5-8 hours of extracurricular tutoring from Monday to Friday is significantly different from the average standardized total score of 9-12 hours of extracurricular tutoring from Monday to Friday, and the former two are higher than the latter.

Table 2. t-test results of standardized scores of Chinese mid-term examination

		Number of cases	Average	Standard deviation	F-valued	t-valued
Sexuality	Males	9589	67.1601	10.36922	353.229	0.000**
	Females	9150	73.0591	8.34082		
Whether to participate in Chinese tutoring classes	No	16814	69.9840	9.96413	6.953	0.008**
	Yes	2082	70.4466	9.44361		

Table 3. t-test results of standardized scores of Mathematics mid-term examination

		Number of cases	Average	Standard deviation	F-valued	t-valued
Sexuality	Males	9583	69.4410	10.30645	105.071	0.000**
	Females	9146	70.7031	9.42751		
Whether to participate in mathematics tutoring class	No	15034	69.8699	10.08902	91.910	0.000**
	Yes	3852	70.6593	9.25464		
Whether to participate in olympiad tutoring calss	No	18128	69.9149	9.95084	29.185	0.000**
	Yes	758	72.8049	8.97134		

Table 4. t-test results of standardized scores of english mid-term examination

		Number of cases	Average	Standard deviation	F-valued	t-valued
Sexuality	Males	9590	67.2563	10.34705	521.513	0.000**
	Females	9145	73.0154	8.47428		
Whether to participate in English tutoring classes	No	14457	69.5943	10.15764	160.423	0.000**
	Yes	4434	71.4589	8.97348		

Table 5. Results of one-way anova analysis of variance of extracurricular tutoring intensity

		Number of cases	Average	Standard deviation	F-valued	Obvious
Tutoring intensity from Monday to Friday	Moderate	2528	68.5496	8.63611	4.229	0.027*
	Longer	260	68.6429	8.19586		
	Long	51	65.0276	9.14600		
Weekend extracurricular tutoring intensity	Moderate	4261	70.4308	8.14791	8.479	0.000**
	Longer	865	71.5495	7.69483		
	Long	138	69.3454	9.69522		

Note : * denotes $p < 0.05$, ** denotes $p < 0.01$.

4.2. Regression Analysis

Table 6. The regression results of the influence of extracurricular tutoring and related factors on the academic performance of different disciplines

Variable	Total subject score	Chinese	Mathematics	English
Constant	67.186	66.786	68.847	66.635
Female (male as reference)	0.244**	0.295**	0.064**	0.286**
Participated in extracurricular tutoring classes (no participation as a reference)	0.029**			
Participate in the language tutorial class (did not participate as a reference)		0.007		
Participate in mathematics tutorial class (not to participate in as a reference)			-0.003	
Participate in the olympic mathematics tutorial class (did not participate as a reference)			0.052**	
Participate in English tutorial classes (no participation as a reference)				0.054**
Participate in extra-curricular tutoring classes during holidays (no participation as a reference)	0.084**	0.054**	0.064**	0.048**
Monday to Friday extra-curricular tutoring time is longer (moderate, long for reference)	-0.029**	-0.021**	-0.033**	-0.023**
The length of extra-curricular tutoring from Monday to Friday (moderate and long as a reference)	-0.029**	-0.022**	-0.021**	-0.026**
The weekend extra-curricular tutoring time is longer (moderate, long for reference)	0.028**	0.012	0.026**	0.014
The length of weekend tutoring (moderate, longer as a reference)	0.000	-0.010	0.002	-0.001
F-valued	207.241	282.719	34.622	282.067
Adjusted R square	0.071	0.094	0.014	0.094
standard error	8.36667	9.46272	9.87187	9.46362

Note : * denotes $p < 0.05$, ** denotes $p < 0.01$.

The results of regression analysis show that the model is statistically significant. Table 2 shows that when gender is controlled, the regression model can be constructed as follows :

$$Y1 = 0.029X1 + 0.084X6 - 0.029X7 - 0.029X8 + 0.028X9 + 0.000X10 + 67.186$$

$$Y2 = 0.007X2 + 0.054X6 - 0.021X7 - 0.022X8 + 0.012X9 - 0.010X10 + 66.786$$

$$Y3 = -0.003X3 + 0.052X4 + 0.064X6 - 0.033X7 - 0.021X8 + 0.026X9 + 0.002X10 + 68.847$$

$$Y4 = 0.054X5 + 0.048X6 - 0.023X7 - 0.026X8 + 0.014X9 - 0.001X10 + 66.635$$

(Y1, Y2, Y3 and Y4 are the total score of the subject, Chinese score, mathematics score and English score respectively ; x1 is to participate in extracurricular tutoring group, X2 is to participate in Chinese tutoring group, X3 is to participate in mathematics tutoring group, X4 is to participate in mathematics tutoring group, X5 is to participate in English tutoring group, X6 for the holiday to participate in extra-curricular tutoring group, X7 for Monday to Friday extra-curricular tutoring longer group, X8 for Monday to Friday extra-curricular tutoring longer group, X9 for the weekend extra-curricular tutoring longer group, X10 for the weekend extra-curricular tutoring longer group).

In the case of controlling other variables, the number of Olympiad, the extra-curricular tutoring of English subjects, the time period of participating in tutoring, and the length of participating in tutoring all have a significant impact on the subject performance. The effect of ordinary mathematics single subject tutoring and Chinese single subject tutoring on performance improvement is not significant. The reason why junior high school students have a significant impact on mathematics performance is mainly due to the exploratory nature of the supplementary tutoring, the limitations of ordinary mathematics tutoring, and the unique individual differences of students in the subject of mathematics. General mathematics tutoring may adopt traditional teaching methods, such as teaching, practice, etc., while ignoring the cultivation of students' thinking ability and innovation ability. This single teaching method may not fully stimulate students' potential and creativity. In contrast, the mathematics tutorial not only focuses on problem-solving skills, but also emphasizes the cultivation of students' logical thinking, innovative thinking and problem-solving ability. This kind of deep thinking training can help students form more flexible and efficient problem-solving strategies, so as to gain an advantage in mathematics learning. In addition, the calculation, number theory, geometry, stroke, application problems and other sections involved in the Olympiad are closely related to many knowledge points of junior high school mathematics. For Chinese, a subject that requires long-term accumulation of cultural knowledge, short-term extracurricular tutoring may not play a role in cultivating excellence.

Compared with participating in extracurricular tutoring from Monday to Friday, junior high school students participating in extracurricular tutoring on weekends and holidays can significantly improve their academic performance. The reason for the analysis may be that Monday to Friday is the main time period for school learning, and students need to focus on completing the school's academic tasks. Weekends and holidays are important periods for students to rest and regain their energy. During this period, participating in extracurricular tutoring can provide students with more learning time and opportunities on the basis of not affecting daily learning, so that they can better grasp and consolidate subject knowledge. At the same time, from the regression equation, it can be seen that the longer the tutoring time, the smaller the significance of the subject performance, and even a negative correlation, indicating that the longer the tutoring time will make students feel bored and tired, thereby reducing the learning efficiency and affecting the learning in school. Students are only making up for the sheep.

5. RESEARCH CONCLUSIONS AND IMPLICATIONS

Based on the baseline data of CEPS (2013-2014), this paper discusses the influence of tutorial class participation, time period and time length on students' academic performance through linear regression analysis. The results show that : mathematics and English extracurricular tutoring have significantly improved performance, while Chinese is not ; the appropriate amount of tutoring in holidays and weekends is positively correlated with performance, but the effect of workday tutoring is opposite, and the length of tutoring is too long but unfavorable, suggesting that moderate tutoring is beneficial, and excessive tutoring is counterproductive.

Based on the research conclusion of the influence of extracurricular tutoring on students' performance in different disciplines, this paper puts forward relevant suggestions from the three levels of government, school and family to improve the performance of junior high school students in different disciplines.

First of all, the government should not completely veto extracurricular tutoring or extracurricular tutoring institutions, and should standardize extracurricular tutoring. For subjects such as mathematics and English, the government can encourage and provide guidance, so that compliant extracurricular tutoring institutions can focus on the high-quality teaching of these subjects. Regular evaluation and supervision mechanisms for extracurricular tutoring institutions should be established to ensure that their teaching activities meet policy requirements and do not exceed reasonable thresholds. For illegal institutions, corresponding penalties or bans should be given.

Secondly, schools can provide personalized learning suggestions and counseling programs based on students' learning situations and needs. For students who need additional help, appropriate extracurricular tutoring resources can be recommended, but reasonable tutoring duration and frequency should be clearly informed. In addition, schools should strengthen communication and cooperation with parents and pay attention to students' learning and growth.

Finally, parents should clearly define the reasonable role of extracurricular tutoring. The results of the study show that participating in extracurricular intensive training in the field of mathematics and English has a clear effect on the significant improvement of students' academic performance. However, excessive pursuit of subject diversity and extended tutoring time will interfere with students' learning efficiency at school, resulting in a decline in performance. Therefore, parents need to carefully plan the subject scope and time allocation of children's participation in extracurricular tutoring, and at the same time recognize that extracurricular tutoring should be mainly used as a way to 'make up for deficiencies' rather than 'accelerate improvement'. This means that extracurricular tutoring is more suitable for students who encounter difficulties in certain disciplines or are at a competitive disadvantage in learning to help them narrow the gap and achieve balanced development.

REFERENCES

- [1] Stevenson D L, Baker D P. Shadow education and allocation in formal schooling: Transition to university in Japan[J]. *American Journal of sociology*, 1992, 97(6): 1639-1657.
- [2] Bray T M. The shadow education system: Private tutoring and its implications for planners[M]. UNESCO International Institute for Educational Planning., 1999.
- [3] Stevenson D L, Baker D P. Shadow education and allocation in formal schooling: Transition to university in Japan[J]. *American Journal of sociology*, 1992, 97(6): 1639-1657.
- [4] Buchmann, C.. Getting ahead in Kenya: Social capital, shadow education, and achievement[J]. *Schooling and Social Capital in Diverse Cultures*, 2002, (13): 133-159
- [5] Dang, H-A.. The Determinants and Impact of Private Tutoring Classes in Vietnam[J]. *Economics of Education Review*, 2007, 26(6): 683-698
- [6] Yang Danhong. Analysis and research on the effectiveness of extracurricular tutoring for junior high school students and its influencing factors [D].Hangzhou Normal University, 2023.DOI : 10.27076 / d.cnki.ghzsc.2023.000319.
- [7] Smyth E. Buying your way into college? Private tuition and the transition to higher education in Ireland[J]. *Oxford review of education*, 2009, 35(1): 1-22.
- [8] Zhao Qingyi, Wu Yingfa. ' Wangzi Chenglong ' and Adolescent Sleep Deprivation-An Empirical Study Based on CEPS2014-2015 [J].*China Youth Study*, 2023, (07) : 15-25.DOI : 10.19633 / j.cnki.11-2579 / d.2023.0087.
- [9] Xie Zhirui.Current research on the current situation of off-campus tutoring for junior high school students in China and its impact on academic performance [D].East China Normal University, 2015.