

The Influence of Teacher's Job Satisfaction on Students' Performance: An Empirical Analysis Based on Large-Scale Survey Data of Jiangsu Province

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Abstract: *It is essential to know how teacher's satisfaction affects the performance of students. Using the data of the 2016 Annual Monitoring of the Academic Quality of Students in Basic Education in Jiangsu of China, this study applied a hierarchical linear model to analyze the impact of teacher's satisfaction on the academic performance of elementary students. Results showed that both the self-realized satisfaction with the education work and the relationship between colleagues and students displayed a significant effect on students' performance, whereas the satisfaction with the supervisors and administrative, the rationality of the payment, and the environment for further development did not show a significant impact on students' performance. So based on these data, we suggest that it is critical to create a better self-realized condition for teachers to realize a good relationship with colleagues, and build up an incentive system for them to better stimulate their teaching enthusiasm.*

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HOW to effectively improve students' performance is always the focus of a school. The study by Hattie (2008) demonstrated that teachers play a critical role in improving the performance of students. A low payment to teachers leads to a negative psychological change that in turn affects the learning effect of students (Wang & Wang, 2018; Sun, 2017). School administrative believes that the evaluation of the teaching performance by students is a good way to stimulate teachers to improve their teaching quality and the learning outcomes of students. From the reversed "U-shaped" relationship between teachers' income and their psychological status, i.e., teacher's psychological status improves with the increase of the income, reaches its peak and then starts to decline (Wang & Wang, 2018; Sun, 2017). Besides, plenty of teachers commented that the mismatch between the payment and workload, lack of opportunities for further development, relationship and limited time with family, all lead to less commitment to work (Jin, 2001). These showed that the material stimulation only cannot completely solve the problem of teacher motivation. If the school administrative aims at better performance from teachers, it is a feasible way to meet their psychological needs.

Literature Review

How to effectively improve students' performance is always the focus of a school. The study by Hattie (2008) demonstrated that teachers play a critical role in improving the performance of students. A low payment to teachers leads to a negative psychological change that in turn affects the learning effect of students (Wang & Wang, 2018; Sun, 2017). School administrative believes that the evaluation of the teaching performance by students is a good way to stimulate teachers to improve their teaching quality and the learning outcomes of students. From the reversed "U-shaped" relationship between teachers' income and their psychological status, i.e., teacher's psychological status improves with the increase of the income, reaches its peak and then starts to decline (Wang & Wang, 2018; Sun, 2017). Besides, plenty of teachers commented that the mismatch between the payment and workload, lack of opportunities for further development, relationship and limited time with family, all lead to less commitment to work (Jin, 2001). These showed that the material stimulation only cannot completely solve the problem of teacher motivation. If the school administrative aims at better performance from teachers, it is a feasible way to meet their psychological needs.

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Deci & Ryan's self-determination theory believes that human beings have innate potential for psychological growth and development. However, it does not mean that teachers would exert their potential and realize independent development under any conditions, because people's self-determination is strongly based on the fully satisfaction of the individual needs and environmental information (Deci & Ryan, 1985). The basic psychological need theory, one of the main branches of self-determination theory, explains the need of autonomy indicated that ability and belonging exist across different cultures and contexts (Yan et al, 2003). Cognitive evaluation theory discusses the enhancement of intrinsic motivation caused by social environment such as reward, feedback and communication, and the weakening effect caused by threat, command, stressful evaluation and mandatory target as well (Liu et al., 2003). Therefore, the work performance of teachers may be related to their psychological state and the effective way to improve their performance would be realized through meeting their needs and making them have a positive psychological state.

Teacher's satisfaction with the job reflects a positive identification and experience of the organizational role (Mao & Tang, 2015). The teachers' satisfaction can be promoted through shaping the school culture atmosphere of democracy and cooperative learning (Koh, 1995; Marks & Louis, 1997), and promoting their sense of belonging and work performance (Banerjee, et al. 2017; Chen, 2008; Keaveney & Nelson, 1993). However, Lee et al. (2010) did not find a significant relationship between teacher's satisfaction and student performance with the addition of environmental factors and work atmosphere. Similarly, Iqbal et al. (2016) divided teachers' job satisfaction into six dimensions including income, promotion, work itself, colleague relationship, work environment and supervision behavior, and they also reached a similar conclusion (Iqbal et al., 2016). Although the conclusions were inconsistent, it shows, at least in part, that the relationship between teacher's satisfaction and student performance is influenced by many factors. A meta-analysis found a significant positive correlation between teacher's job satisfaction and student performance with the region and size of the study being important variables (Iaffaldano & Muchinsky, 1985). This again indicated that the effect of teacher's job satisfaction on students' performance varies greatly in different situations, so it is necessary to make specific analyses according to different situations.

In China, studies conducted from the perspectives of teachers' working environment, individual characteristics, teacher-student relationship, etc., laid a foundation for the classification of teachers' satisfaction dimensions.(Jiang et al, 2006). Given the lack of direct evidence, it is difficult for administrative to get support in the process of motivating teachers. A small number of empirical studies on the teacher's satisfaction, they used variance analysis or regression analysis, which only analyzes single-layer data and are difficult to solve the problem of data that include nested structure, of which a multi-level data analysis model is a more appropriate method. Our study was based on the large-scale survey data of students' academic performance, and teachers' job satisfaction during the compulsory education in Jiangsu of China in 2016, and we adopted a multi-layer linear model to analyze the relationship between teachers' satisfaction in

different dimensions and students' academic performance. Therefore, this study aimed to answer three basic questions as below:

Q1. What is the relationship between teachers' job satisfaction and students' performance?

Q2. Which aspect of teacher satisfaction can significantly promote student achievement?

Q3. What measures should school administrative take to effectively improve students' performance by improving teachers' job satisfaction?

Methods

In this study, student performance is the explained variable, and the average value of teacher satisfaction at the school level is the explanatory variable. After controlling for relevant factors, the relationship between teacher satisfaction and student performance was analyzed with a hierarchical linear model.

Participants

Since 2006, Jiangsu of China has implemented the monitoring of the academic quality of students in compulsory education stage every two years, and the sample covers the students from Grade three to Grade eight in all cities and districts with the province. The monitoring forms the academic data of students with high quality and relevant influencing factors, which provides the data basis for the implementation of this study. In the monitoring process of 2016, the research group simultaneously issued the questionnaire of teacher satisfaction and student learning status, and obtained the complete data for analysis.

Accordingly, we adopted a two-stage stratified sampling method to collect data. First, the samples were distributed at the county (district) - school level, and then the work satisfaction survey of teachers was carried out at the school level according to the random principle. On this basis, 128,356 valid student samples and 14,466 valid teacher samples from 1,732 elementary schools were obtained via data matching and sorting.

Variables

Student Level Variables

The student performance data were the total scores of elementary school Chinese and mathematics. The other variables included in this study were gender, only-child situation, parental educational background, and family economic situation. The questionnaire considered the family finances as the number of mobile phones, televisions, computers and cars that their families owned. In the calculation, according to the average market price, mobile phones, computers, televisions and cars were assigned to 2,000 CNY (~\$185 USD), 5,000 CNY (~\$711 USD), 8,000 CNY (~\$1,138 USD) and 200,000 CNY (~\$28,448 USD), respectively, and the sum was divided into 3 grades

from low to high. Descriptive statistics of student-level variables are shown in the **Table 1**.

School Level Variables

The school level variables were derived from the teacher satisfaction survey questionnaire. Following the Hendrix questionnaire (Abu-Saad & Hendrix, 1995) that divided the teacher's job satisfaction into five dimensions: leadership and management, development environment, reasonable return, self-fulfillment of education and teaching work, and work relationship, with the Likert five-point method each. Four to five questions were set for each dimension, and the average is calculated by summing the dimensions. The internal consistency value of each dimension was between 0.739-0.938, and the KMO value was between 0.658-0.888, indicating that the questionnaire has good reliability and validity. After obtaining the teacher's personal survey data, the average of the teacher's professional title, teaching age, educational background, daily workload, and satisfaction was calculated by the school to obtain school-level data. Descriptive statistics of school-level variables are shown in the **Table 2**.

Calculation Models

In this study, the control variables of each layer were screened as previous studies did (Mu et al., 2016; Pan & Zhang, 2017; Zhao, 2011) Because we focused on the impact of average teacher satisfaction on the average student score at the school level, which was the impact of teacher satisfaction on the mid-layer intercept; in this case, the random slope model, the coefficient and the standard error in the intercept model analysis were not much different. The inclusion of the random slope had little effect on the coefficient of the second layer variable. Therefore, this study used the zero model, the random effect variance model and the random intercept interpretation model for analysis (Yang, 2006). The model settings are as follows:

Model 1

Student-level equation,

$$Y_{ij} = \beta_{0j} + R_{ij}, R_{ij} \sim N(0, \delta^2) \quad (1)$$

School-level equation,

$$\beta_{0j} = G_{00} + U_{0j}, U_{0j} \sim N(0, \tau^2) \quad (2)$$

Y_{ij} is the total score of the mathematics and literary industry level test of i students in j school, β_{0j} is the total average score of j school, R_{ij} is the random error of individual students, which indicates the difference between the i student of j school and the average grade of school; G_{00} is The overall average score, U_{0j} is the school's random error, indicating the difference between the average school grade and the overall average grade.

Table 1. Definition and Assignment of Students' Level Variables.

Code	Meaning	Assignment	M (SD)	Min (Max)
SCORE	Score	Continuous variables. The sum of a student's Chinese and Math test scores.	1018.32 (172.18)	371.44 (1,456.96)
GENDER	Gender	0: Female; 1: Male.	0.54 (0.5)	0 (1)
CHILD	Only-Child Situation	0: No; 1: Yes.	0.4 (0.49)	0 (1)
EDU_FA	Father's Educational Background	1. Middle school or below; 2. High school (or vocational high school, technical secondary school, technical school);	2.21 (0.93)	1 (4)
EDU_MO	Mother's Educational Background	3. College (or junior college); 4. Postgraduate	2.5 (1)	1 (4)
ECON	Economy Background	There are three levels of household durable goods value. 1. At least 1/3; 2. Medium 1/3; 3. 1/3 at most.	1.75 (0.67)	1 (3)

Model 2

Formula (1) is added to the individual variables of the students to examine their influence on the scores of the students, and the following model is obtained.

Student-level equation,

$$Y_{ij} = \beta_{0j} + \beta_{1j}GENDER + \beta_{2j}CHILD + \beta_{3j}EDU_FA + \beta_{4j}EDU_MO + \beta_{5j}ECO2 + R_{ij}, R_{ij} \sim N(0, \delta^2) \quad (3)$$

School-level equation,

$$\beta_{0j} = G_{0j} + U_{0j}, U_{0j} \sim N(0, \tau^2) \quad (4)$$

$\beta_{1j} \sim \beta_{4j}$ respectively indicate the degree of influence of the student's gender, whether it is the only child, the father's years of education, the mother's years of education and the family's economic situation.

Model 3

In the formula (4), the variables of the five dimensions of the teachers and teachers at the school level were added. The random intercept model in the multi-layer linear model was used here. The only group effect in the model was the random intercept β_{0j} , which indicates the influence of the school-level variables on the average score of the j -th school students. The regression coefficients of the remaining individual levels were set to be fixed.

Table 2. Definition and Assignment of School's Level Variables.				
Code	Meaning	Assignment	M (SD)	Min (Max)
YEAR	Teaching Age	1. 5 years or less; 2. 5-10 years; 3. 11-15 years; 4. 16-20 years; 5. 20 years or more	3.52 (0.9)	1 (5)
TITLE	School Title	1. Elementary school level 2 and below; 2. Elementary school level; 3. Elementary school senior level; 4. Middle school senior level and above	2.34 (0.54)	1 (4)
EDU	Educational Background	1. High school, technical secondary school or middle school; 2. Junior college; 3. Undergraduate; 4. Graduate student (including master's degree in education)	2.79 (0.34)	1 (3.67)
WORKLOAD	Daily Workload	1. 5-7 hours; 2. 8-9 hours; 3. 10-11 hours; 4. 12-13 hours; 5. 14 hours or more	2.21 (0.42)	1 (4.25)
CITY	City Location	0: Township; 1: Urban area	0.52 (0.5)	0 (1)
HOLEDER	Holder	0: Private office; 1: Public office	0.93 (0.26)	0 (1)
LEADERSH	Satisfaction with leadership and management	1. Very dissatisfied; 2. Dissatisfied; 3. Does not matter; 4. Satisfied; 5. Very satisfied	4.25 (0.45)	2.2 (5)
CONDITION	Satisfaction with the development environment		4.2 (0.45)	1.5 (5)
PAYMENT	Satisfaction with the reasonable return		3.44 (0.6)	1.63 (5)
REALIZED	Satisfaction with self-realization of educational work		4.05 (0.42)	2.11 (5)
RELATION	Satisfaction with working relationships		4.36 (0.32)	2.22 (5)

Student-level equation,

$$Y_{ij} = \beta_0j + \beta_1jGENDER + \beta_2jCHILD + \beta_3jEDU_FA + \beta_4jEDU_MO + \beta_5jECO2 + R_{ij}, R_{ij} \sim N(0, \delta^2) \quad (5)$$

School-level equation,

$$\beta_0j = G00 + G01 CITY + G02 YEAR + G03 TITLE + G04 EDU + G05 WORKLOAD + G06 LEADERSH + G07CONDITION + G08PAYMENT + G09REALIZED + G010RELATION + G011HOLEDER + U0j, R_{ij} \sim N(0, \tau^2) \quad (6)$$

$G_{01} \sim G_{011}$ indicate the school area, teacher teaching age, professional title, educational background, daily workload, satisfaction of teachers in five dimensions, and the influence of school nature on student achievement, respectively.

Results and Discussion

Based on the above multi-layer linear model settings, the study obtained the following analysis results as shown in **Table 3**.

Model 1

The results of the model 1 showed that the point estimation of the student-layer variance was 18,765.008, which was significantly higher than the point estimate of the layer two effect variance (12,377.042), indicating that the difference in student achievement is majorly from individual factors, and the difference in student performance between different schools was significant ($\chi^2 = 76,695.007$, $p < 0.001$). The Intra-class-correlation (ICC) was about 0.3974, which indicated that about 40% of students' grades came from the difference of schools. There are invariable inter-group variations that are suitable for multi-layer linear models.

Model 2

Based on the model 1, gender, only-child situation, father education, mother education and economic status were introduced to obtain the random effect covariance model. The analysis showed that these five independent variables significantly affected student achievement ($p < 0.001$). First, the gender factor has a coefficient of -24.55, indicating that female students have a higher academic performance than male students. This is consistent with the findings of Li (2010) and Fortin (2015). They believed that the lack of enthusiasm for boys in the face of "test-oriented education" and the "equality of men and women" in family education investment in the context of the "one-child" policy offer the possibility of outstanding results for girls (Li & Sun, 2012; Zeng, 2000). Second, the only child is more likely to achieve higher grades, because families with multiple children would dilute family resources and more contradictions existed (Nie et al., 2016; Zhen et al., 2014). Again, in the years of parental education, the higher the education level of the father, the higher the student's score, and the mother's education level is negatively correlated with student's performance. The latter conclusion is inconsistent with another study (Liu, 2010) but similar to Hu (2007) conclusion. We proposed that this may be related to the level of anxiety of the highly educated mothers and the academic pressure they imposed on their children. Finally, in terms of family economics, students will have higher grades when they had a better financial situation. Many studies also found that a better family economic situation could provide more educational resources for their children that thereby promoted their school performance (Tao & Yang, 2007; Zhao, 2011).

Table 3. Analysis Results of Two Horizontal Linear Models.

	Model 1	Model 2	Model 3
	Coefficient	Coefficient	Coefficient
Intercept	1,009.47 (2.73)***	967.955 (2.94)***	387.31(45.23)***
Student level			
<i>GENDER</i>		-24.55 (0.79)***	-24.46 (0.79)***
<i>CHILD</i>		32.980 (0.93)***	32.94 (0.92)***
<i>EDU_FA</i>		19.084 (0.584)***	18.86 (0.584)***
<i>EDU_MO</i>		-24.99(0.55)***	-24.86(0.55)***
<i>ECO2</i>		2.67(0.64)***	2.72(0.64)***
<i>Variance Estimation</i>	18,765.008	12,672.128	10,041.41
School level			
<i>YEAR</i>			9.41 (4.17)**
<i>TITLE</i>			-1.77(11.47)
<i>EDU</i>			52.54(8.21)***
<i>WORKLOAD</i>			27.49(5.88)***
<i>LEADERSH</i>			7.68 (9.15)
<i>CONDITION</i>			9.65(8.82)
<i>PAYMENT</i>			-5.71(6.43)
<i>REALIZED</i>			43.58(11.58)***
<i>RELATION</i>			31.29(13.94)**
<i>CITY</i>			12.564(4.86)**
<i>HOLDER</i>			12.55(10.36)
<i>Variance Estimation</i>	12,377.042	17,517.994	17,521.278
ICC	0.3974	0.5803	0.6357

Note: Standard Error (SE) in parentheses; the result of variance estimation is the standardized residual estimate, which is significant at $p < 0.001$ level; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.001$.

Model 3

Overall, of the school-level variables, teachers' teaching age ($\beta = 9.41$), education level ($\beta = 52.54$), and daily workload ($\beta = 27.49$) were significantly positively correlated with student achievement ($p > 0.1$). The teacher's title ($p < 0.1$) had no significant effect on student achievement. This showed that as the teaching age grows and the level of education increases, teachers would have more educational experience and knowledge reserves, which will have a positive effect on improving student achievement. The current job title of teachers was related to their actual work and student achievement. There was not much contact with these factors, which is the reason why the indicator is not significant (Xiao, 2013).

Our analysis showed that the more satisfied the teacher with the supervisor and administrative ($\beta = 7.68$), the higher the student's scored, whereas the relationship between the two was not significant ($p > 0.1$). Although good leadership may improve

teachers' job satisfaction, this improvement still needs to interact with institutional culture, teaching confidence and other factors that eventually influence student achievement (Koh et al., 1995). We did not find a significant relationship between teachers' satisfaction with the environment of further development and student achievement, which is agreement with Iqbal's conclusion (Iqbal et al., 2016) but inconsistent with some local studies that demonstrated that in China too much emphasis is made on the professionalism of teachers' morality, rigorous screen-out, painstaking research, demand for social interaction, respect, and self-realization. When their further development had problems, the professional mentality may inactivate the effects of the environment and returns (Zhang, 2011). Our study also found that teachers' self-realization ($\beta = 12.56$) and job relationship satisfaction ($\beta = 12.55$) were significantly positively correlated with student's achievement ($p > 0.1$), which is consistent with Banerjee's conclusion (Banerjee et al., 2015) and domestic research findings. They showed that teachers' special occupational attributes make them have stronger self-fulfillment and belonging feeling. When teachers' self-realization is satisfied, their performance will in turn make a good contribution to the improvement of students' performance (Shi & Wu, 2001).

From the perspective of the survey organizer, the performance of students in public schools was higher, but the difference between the two types of schools was not significant statistically. In terms of urban and rural variables, urban students had higher grades, which are in line with general expectations, because students in urban areas had advantages in resource and thus are more likely to achieve better results relatively (Zhao, 2011).

Conclusion and Suggestion

This study started from the demand of materials and spiritual of teachers, and integrated the five perspectives of autonomy, ability, attribution, remuneration and communication. We found that the satisfaction degree of self-realization and working relationship had a positive relationship with student achievement. It provides not only an empirical basis for teachers to improve their mental state, but also shows the outstanding professional spirit of our teachers. Therefore, the following aspects should be emphasized in the process of teacher management:

First, School Leaders Should Create Self-Realization Conditions for Teachers.

Teachers' satisfaction with self-realization is critical for affecting students' performance, which means that assisting schools to achieve professionalism can help to improve students' performance. School administrative should help teachers deepen their professional understanding, enhance professional enthusiasm, and avoid simple material stimulation and "institutional construction" through value guidance and cultural creation. Considering that professional development is the main content of teachers' self-

realization, schools should provide teachers with better development conditions, such as providing them with more opportunities for on-working learning and school-based training.

Second, Administrative Should Establish Flexible and Diverse Teacher Incentive Models.

Our study showed that, from the point of improving students' performance, the simplification of material incentives is not as effective as enhancing their internal enthusiasm. Supervisors need to regard teachers as groups with emotional needs via abandoning the simple "economic man" hypothesis, and establish a reward system to focus on the professional characteristics of teachers. Emphasis should be put on teacher's high-level needs for social interaction, respect and self-realization, to realize a superior administrative level.

Finally, School Administrative Needs to Create a Good Working Atmosphere with Good Colleague Relationship.

In order to improve student achievement, schools often emphasize on the competitions of classes and classmates. However, our data showed that teachers' satisfaction with a more harmonious relationship with colleagues and students can improve students' performance indicating that schools should not exert excessive pressure on teachers and students. We advocate teamwork among teachers, and create a work atmosphere of unity, and make progress through collective preparation and cooperation. Teachers should teach students in accordance with their aptitude, promote equal exchanges with students, and create conditions to promote understanding among students, parents and the society to maintain the dignity of teachers.

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