

Is It Reliable for Physical Education Teacher to be A Head teacher? A Mixed-Method Study*

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Abstract. *To discuss physical education (P.E.) teachers serving as head teachers, it should be reasonable and evidence-based. Previous studies did not provide sufficient scientific evidence to answer this hotly debated question. Therefore, this study first adopted rigorous experimental research methods, focusing on analyzing whether a P.E. teacher serving as a head teacher would affect student performance. On this basis, the robustness of the experimental results was verified through qualitative research. The results showed that a P.E. teacher serving as a head teacher would not adversely affect students' academic performance and maybe more conducive to students' overall development. Based on this conclusion, we further suggested how to improve the appointment and management of head teachers.*

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*: A head teacher, aka Ban Zhu Ren in Chinese, is a teacher who is fully responsible for the learning, health, and life of the students of a class in a school. She/He is the organizer, leader and educator of a class, as well as the coordinator of teaching and education work of all the teachers in a class.

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Question

WHETHER a physical education (P.E.) teacher can serve as a head teacher is not a new question. On the one hand, “non-core subject” teachers, including P.E. teachers, have long been used as head teachers; on the other hand, there has never been any policy or regulation in China that prohibits P.E. teachers from serving as head teachers. However, in reality, “non-core subject teachers,” including P.E. teachers as head teachers, have indeed become a “problem.” In recent years, the topic of P.E. teacher serving as head teacher has become a hot topic of public attention. Students tend to “despise” non-core subjects psychologically, regard non-core subject classes as relaxing time; their teachings of non-core subject teachers are also ignored. It creates numerous obstacles to the class management of non-core subject teachers (Shi, 2021). What is more, parents complained to the local administrative department because the school arranged a P.E. teacher as the head teacher and worried that this would affect the student’s academic performance. Although the government and schools do not support such complaints, the incident itself reflects parents’ anxiety about class management under the fierce academic competition (Zhao, 2020). In this case, merely dismissing the complaint or giving a general explanation is often challenging to eliminate the parents’ doubts; simplistically accusing the parents of “unreasonable” is even more detrimental to the problem’s solution. When dealing with such problems, administrators should not only be rational but also have evidence. If we can come up with more evidence of the effectiveness of P.E. teachers as head teachers, regardless of whether this evidence is in line with our expectations, it will make our decision-making and management based on science, which can dispel doubts and improve class management.

So far, researchers have analyzed the phenomenon of P.E. teachers serving as head teachers. This kind of authors are mostly front-line managers and teachers, and related researches were basically theoretical discussions and experience summaries. In terms of research content and conclusions, most of them discussed the advantages, strategies, and significance of P.E. teachers as head teachers. They thought that the P.E. teacher’s role as a head teacher was a breakthrough P.E. teacher’s spiritual character, life attitude, and sports emotions make the obvious superiority for P.E. teacher to be a head teacher (Qi & Wang, 2020). Some studies also explored from the perspective of moral education and the cultivation of students’ core literacy. It is believed that P.E. teacher as a head teacher helps to shape students’ positive, tenacious and unyielding mental outlook with rich sports emotions, and then cultivate students’ good moral qualities, thereby promoting students’ all-round development (Gong & Zeng, 2020). At the same time, some studies have discussed the shortcomings of P.E. teacher as a head teacher. For example, because the P.E. teachers have fewer class hours, she/he often does not have enough grasp of the classroom situation, and it is difficult to have more in-depth contact and understanding of students. P.E. teachers’ knowledge has limitations, which is not conducive to helping students improve their academic performance. The relatively “weak” status of P.E. teachers is not conducive to coordinating the rela-

relationship with other teachers in the classroom, thereby affecting the authority of class management (Chen, 2014).

What needs to be pointed out is that despite the constant discussion about who the head teacher is, in reality, there is a need to evaluate the effectiveness of P.E. teacher as the head teacher. Nevertheless, so far, there are few rigorous empirical studies on this issue in existing studies. Relevant discussions are mostly experience summaries or value discussions. The lack of rigorous scientific evidence makes it difficult for both researchers and managers to respond effectively to this problem in the class management process. In response to this, this research will analyze the effect of P.E. teacher as a head teacher through an experimental study, supplemented by qualitative research evidence, especially its impact on students' academic performance. While responding to public concerns provide a scientific basis for optimizing head teachers' staffing and improving class management.

Experimental Methods

Ideas

Although in reality, the influence of head teachers on students is manifold. However, considering that the current public opinion is mainly concerned with the impact of P.E. teacher as a head teacher on student performance, the dependent variable investigated in this study was student academic performance. The core question to be answered was: Will a P.E. teacher acting as a head teacher hurts students' academic performance as some parents worry about? To this end, our primary research idea was to analyze the impact of PE teacher as a head teacher by comparing the academic performance of PE teacher as a head teacher class and non-PE teacher as a head teacher class under the control of related confounding variables.

In this study, since many factors affect student performance, the head teacher candidate is the only one-factor affecting student performance. If the relevant influencing factors are not controlled, the results obtained are not reliable how to eliminate the influence of confounding variables and get more robust conclusions that can reveal causal (rather than related) relationships have always been complicated in social science research. However, experimental research is often a common way to solve this problem. The current leader in evidence-based education research, Professor Robert Slavin of Johns Hopkins University in the United States, believes that well-designed experimental research can control confounding variables and reveal causality. Therefore, it is very suitable for the value judgment of different educational interventions (Slavin, 2020). The basic principle is to construct an experimental group and a control group with small differences in confounding variables and the intervention variables to evaluate the intervention's effect. Because of the samples constructed in this way, there is no significant difference in the confounding variables between the experimental and control groups. If, after the end of the experiment, there is a significant difference between the two groups of experimental results, it can be judged that the intervention variable is most likely to be the cause of the difference (Angrist & Pischke, 2009).

Based on this idea, in the research process, we regard different head teacher candidates as the basis for grouping. The class with P.E. teacher as head teacher is regarded as the experimental group; the class with the non-P.E. teacher as head teacher is regarded as the control group. In the case of well-controlled confounding variables, the influence of P.E. teacher as a head teacher on students' academic performance was investigated by analyzing the difference in academic performance between the two during the experiment period.

Subjects

This research object is the middle school department of Lianyungang Huajie Experimental School Affiliated with Nanjing Normal University. The school is a nine-year consistent private school, of which the middle school has 54 classes and 11 P.E. teachers. The average age of school teachers is about 27 years old, and most teachers have a teaching experience of 4-5 years. The reason for choosing a middle school is that middle school students in China face more significant pressure to enter high school than elementary school students. In this case, schools and parents will be more cautious when facing P.E. teachers as head teachers. Previous studies have also shown that because middle school students are in a rapid physical and mental development stage, teachers' management styles often significantly impact students (Wang et al., 2009).

Since the school is a boarding school, head teachers' workload is relatively large, and most are female teachers. There are often teachers who are unable to undertake class management due to personal or family reasons. In response to this situation, the school has reformed head teacher selection many years ago, boldly enabling P.E. teachers to take up the work of head teachers. At present, except for two female P.E. teachers who are not head teachers due to pregnancy; all other P.E. teachers are head teachers. In the three grades of the middle school, including the graduating class, P.E. teachers serve as head teachers, which provide a good research foundation for this study.

Study Procedures

A well-designed experimental study has stricter standards, including control of pre-test differences and confounding variables, sufficient sample size, and a long experimental period (Cheung & Slavin, 2016). Based on the above research ideas, we will use one academic year to carry out experiments from September 2019 to June 2020. To control the differences between groups, the school randomly sorted students and teachers into classes based on the seventh-grade placement test results and the final results of the eighth and ninth grades of the previous academic year. It aimed to ensure no significant differences in each class's pre-test scores, the teacher's teaching experience, ability, and the students' family background.

During the experiment, we collected five results, including the results of the placement test, the midterm, and the final results of the two semesters. Simultaneously, through interviews, field observations, text and video analysis, and other qualitative

research methods, the head teacher's work materials are obtained to more robustly verify the experimental results and describe their work more comprehensively.

Results

In June 2020, after an academic year of experiments, we obtained the final experimental results. To eliminate the influence of the test paper's difficulty and the distribution of data, we processed the original score of the test and converted it into a percentile. The advantage is that the academic progress or regression of students can be evaluated according to the changes in their percentile grades, so as to eliminate the influence mentioned above caused by different testing tools (Kolen & Brennan, 2014).

Table 1 shows that at the beginning of the experiment, the performance gap between the experimental group and the control group in each grade was tiny, and all independent sample T-tests were not significant. To measure the difference between the experimental and control groups more accurately, we also calculated the effect size of the difference between the groups based on the results of the independent sample T-test. The reason for estimating the effect size was that the traditional null hypothesis test results were often greatly affected by the sample size, and the effect of independent variables could not be measured. Cohen believed that people often only paid attention to whether the results were "significant." It seems that as long as the p-value was less than 0.05, the study results were valuable. This confused the difference between significance and practical effect. Even if the experimental result was significant, it did not mean that the independent variable's effect was sufficiently "large" (Cohen, 1992). Therefore, the calculation of effect size was first introduced in psychology, and different types of effect sizes were used to express the size of experimental effects. In this study, Cohen's d value was used as the effect size to measure each stage's practical effect.

The specific calculation method is:

$$d = (\bar{y}_1 - \bar{y}_2) / \delta_{pooled} \quad (1)$$

Among them, \bar{y}_1 and \bar{y}_2 are the mean values of the experimental and control groups, respectively, and δ_{pooled} is the pooled variance. The larger the value of d, the more significant the difference between groups caused by the independent variable. Cohen once suggested using 0.2, 0.5, and 0.8 as critical points to distinguish small, medium, and large effect sizes and combine previous research and actual conditions to interpret the observed effects (Zheng et al., 2011). Based on this, we calculated the results of the independent sample T-test of each test and calculated the effect size. The specific calculation results are shown in **Table 1**.

Table 1 shows that the difference between each grade group's effect size is minimal at the pre-test. This means that we have the reasonable control of the pre-test differences. After randomization, there was no significant difference between the experimental group and the control group. The difference between the experimental and control groups was mainly due to the head teacher's different subjects. If there was (or no)

Table 1. Experimental Results of the Influence of Physical Education Teachers as Head Teachers on Student Performance.

	7th Grade					8th Grade					9th Grade				
	Placement Test					Placement Test					Placement Test				
	No.	Avg	SD	T	ES	No.	Avg	SD	T	ES	No.	Avg	SD	T	ES
Exp	202	0.50	0.29	0.07	0.01	125.00	0.50	0.30	-0.13	-0.01	201.00	0.50	0.29	0.05	0.00
Ctrl	805	0.50	0.29			711.00	0.50	0.29			613.00	0.50	0.29		
	2019-2020 School Year First Semester					2019-2020 School Year First Semester					2019-2020 School Year First Semester				
	No.	Avg	SD	T	ES	No.	Avg	SD	T	ES	No.	Avg	SD	T	ES
Exp	199	0.53	0.29	1.67	0.13	131.00	0.46	0.29	-1.84	-0.17	206.00	0.52	0.29	1.19	0.10
Ctrl	861	0.50	0.29			723.00	0.51	0.29			616.00	0.50	0.29		
	2019-2020 School Year End of the First Semester					2019-2020 School Year End of the First Semester					2019-2020 School Year End of the First Semester				
	No.	Avg	SD	T	ES	No.	Avg	SD	T	ES	No.	Avg	SD	T	ES
Exp	197	0.53	0.30	1.70	0.13	129.00	0.48	0.31	-0.92	-0.09	206.00	0.52	0.29	1.29	0.10
Ctrl	854	0.49	0.29			719.00	0.51	0.29			614.00	0.49	0.29		
	2019-2020 School Year Second Semester					2019-2020 School Year Second Semester					2019-2020 School Year Second Semester				
	No.	Avg	SD	T	ES	No.	Avg	SD	T	ES	No.	Avg	SD	T	ES
Exp	195	0.51	0.30	0.53	0.04	124.00	0.46	0.28	-1.74	-0.17	204.00	0.52	0.29	1.10	0.09
Ctrl	836	0.50	0.29			708.00	0.51	0.29			608.00	0.50	0.29		
	2019-2020 School Year End of the Second Semester					2019-2020 School Year End of the Second Semester					2019-2020 School Year End of the Second Semester				
	No.	Avg	SD	T	ES	No.	Avg	SD	T	ES	No.	Avg	SD	T	ES
Exp	196	0.51	0.30	0.44	0.03	126.00	0.46	0.30	-1.58	-0.15	202.00	0.51	0.29	0.72	0.06
Ctrl	838	0.50	0.29			708.00	0.51	0.29			595.00	0.49	0.29		

Note: The T value in the above table results from the independent sample T-test of the experimental group and the control group. The p values corresponding to all T values are more significant than 0.05, which is concise. No p-value is reported in the table. Exp: Experiment; Ctrl: Control; Avg: Average; SD: Standard Deviation; ES: Effect Size; T: T Value.

significant (or insignificant) difference in performance between the experimental and control groups during the experiment or at the end of the experiment, we could judge that the difference in selecting head teacher caused this change.

The results in **Table 1** show that the difference between the experimental group and the control group's previous examination results is not apparent in the entire experiment process. Among them, when the seventh grade was divided into classes, the experimental group had a fragile performance advantage compared to the control group; the ninth grade experimental group and the control group had almost the same performance, and the effect sizes of the two grades were 0.01 and 0, respectively. By the end of the study in June 2020, the independent sample T-test results of the two grades were still not significant, and the effect sizes had become 0.03 and 0.06, respectively, indicating that the experimental group where the P.E. teacher served as head teacher had further expanded its performance advantage compared with the control group, but the expansion of such advantages were fragile and did not show statistical significance. In the

pre-test of the eighth grade, the experimental group had an extremely weak disadvantage compared with the control group, and the difference was also not significant ($T = -0.13, p > 0.05$). At the end of the study, the effect size of the eighth grade changed from -0.01 to -0.15 , indicating that the performance disadvantage of the experimental group was getting bigger, but it was still tiny, and the performance difference with the control group was still not significant ($T = -1.58, p > 0.05$).

Further Verification and Discussion of Experimental Results

This study indicates no adverse effect on student performance in this experimental school due to the large number of P.E. teachers being used as head teachers. Compared with previous theoretical discussions, this study was based on a relatively rigorous experimental design, which provided a scientific basis for answering the question “Is it reliable for P.E. teacher to serve as a head teacher?” However, as some scholars have pointed out, although experimental research can accurately assess intervention variables’ effects and make causal inferences, it is challenging to demonstrate educational practice’s richness (Lather, 2004). Although we have evaluated the effect of P.E. teacher as a head teacher through experimental research, we still have no way to answer under what circumstances and why P.E. teacher as a head teacher will help students grow? In response to such problems in social science research, researchers are paying more attention to the application of mixed-method research. It is hoped that through the comprehensive application of quantitative research and qualitative research, the advantages of both can be fully utilized to provide more robust evidence for research problems (Creswell & Clark, 2017). While implementing the experiment, this study also collected relevant qualitative data to verify the experimental results’ reliability further.

Before and during the experiment’s implementation, we conducted interviews with school-level leaders of the experimental school, P.E. teacher as a head teacher, and randomly selected students through semi-structured interviews. The interview’s main questions focused on the school’s class management system and measures, the work mode of the P.E. teacher as a head teacher, and the effectiveness of class management work. The basic situation of the interviewees is shown in **Table 2**.

Through such interviews, we hope to characterize further the work characteristics and internal mechanism of P.E. teachers as head teachers. In fact, not many schools use P.E. teachers as head teachers on a large scale like the experimental school observed in this research. There are many reasons why this school can do this and achieved good results:

First, the school does not treat P.E. teachers differently in terms of management philosophy. It fully trusts P.E. teachers and provides them with opportunities to manage classes to achieve better development.

P.E. teacher was initially used as a head teacher to solve the head teacher shortage caused by female teachers’ pregnancy and childbirth. In the beginning, the school was under much pressure. Fortunately, the initial attempts have achieved good

Table 2. Basic Situation of Interviewees.

Serial Number	Identity	Description	Interview Time
XLD01-03	School Leader	Including the school principal, the deputy principal in charge, and the school director	Completed many times. It takes about 40-80 minutes per person, for a total of about 160 minutes.
BZR01-11	Head Teacher	A physical education teacher serving as a head teacher	20-30 minutes per person, totaling about 270 minutes. Some of the interviewed class teachers provided written materials.
XS01-18	Student	Six people were randomly interviewed in each grade, from the first to the third grade.	10-15 minutes per person, about 200 minutes in total.

results. This makes us more confident in appointing P.E. teachers as head teachers, from the initial passive response to the active arrangement. On the one hand, it solves the problem of head teacher shortage; on the other hand, it also dramatically mobilizes PE teachers' enthusiasm to work and provides more for the development of "non-core subject" teachers, including PE teachers. Letting all P.E. teachers serve as head teachers has become routine management of head teachers in our school. (XLD01)

In 2020, the first pacesetter head teacher selection, the school had a total of seven head teachers selected, of which there are four P.E. teachers. These P.E. teachers stood out from head teachers' work and become role models for head teachers throughout the school. (XLD03)

Second, this school also adopts a series of management measures such as formulating and implementing the head teacher work standards, establishing head teacher work files, forming a class management and work team led by the chief head teacher and strengthening head teacher work evaluation and incentives to ensure that all head teachers can complete their work tasks with high quality.

In the long-term management practice, we have realized that which subject the head teacher teaches is not a decisive factor in determining the head teacher's performance. Instead, it needs to rely on a complete set of head teacher management systems so that anyone can achieve the expected results in the position of the head teacher. Regarding the P.E. teacher as the head teacher, in terms of system design, we strive to ensure the head teacher's core position in the class management process and give the head teacher greater weight in class management. Simultaneously, to prevent head teachers from using their powers to allocate more time to their subjects, in the design of the incentive system, we adopt a way of rewarding the team and not individuals for class management. That is, no matter how good the head teacher's subject is, it is useless. Only when the class work is promoted as a whole, and the students develop in a balanced manner in all aspects, the class management team will be rewarded. (XLD01, XLD02)

We attach great importance to the regular management of head teachers. Since the teachers in our school are relatively young, they generally have the problem of inexperience in class work. In response to this, on the one hand, we adopt the old-fashioned and model-setting approach to promote the growth of head teachers. On the other hand, we have established a complete standardization process for head teacher work to ensure that no matter who serves as a head teacher, we will ensure the “bottom line” as long as we follow this standard” achievement. There will be no severe deviations in class management due to individual differences in head teachers. (XLD03)

Third, the school organized a large number of targeted training so that P.E. teachers could obtain the support of relevant management knowledge and skills through learning and training before and after taking on the head teacher position.

In addition to regular full-staff training and expert lectures, we will implement the “Head teacher Qinglan Project” in a voluntary and designated manner within one month of the beginning of each new school year, based on the configuration of the class management team. Through targeted assistance from experienced head teachers, we can improve young head teachers’ working abilities and accelerate their professional growth. P.E. teacher will encounter various problems in the actual class management work. The school has a dedicated person to collect the difficulties and confusions encountered by head teachers in class management by grades, summarize and sort out common problems; use head teacher studios, seminars, and other forms to conduct discussions. In this way, the head teacher can effectively solve the problem through multi-party consultation. (XLD03)

Finally, in the field investigation process, we also found the unique phenomenon of P.E. teachers as head teachers mentioned in the previous literature. For example, we found that the classes managed by P.E. teachers pay more attention to sports activities, the ways of teacher-student interaction are more flexible and diverse, and the class atmosphere and teacher-student relationship are more harmonious (XS01-18). This means that in addition to grades, a P.E. teacher acting as a head teacher can also bring more benefits to students for all-round development. This may also be the reason why the P.E. teacher’s class performance as a head teacher did not fall behind (Zhou et al., 2018).

Children like sports. As a head teacher, P.E. teacher makes it easier to give play to their professional skills and talents, win the recognition and love of children, and create a good teacher-student relationship and class atmosphere. (BZR03, BZR05)

P.E. teacher as a head teacher has advantages. Because P.E. teacher does not need to correct homework, the pressure of schoolwork is not as tremendous as the core subject teacher. This gives us more energy to pay attention to students and put more time and energy into class management. (BZR01, BZR02, BZR11)

P.E. teacher serves as a head teacher because it rarely forms a competitive relationship with other teachers in performance appraisal, appraisal, and title promotion, so it is easier to coordinate the teacher’s relationship. Moreover, because P.E. teacher is relatively abundant in time and energetic, she/he often invests more in home-school cooperation. Over the years, no one of our school’s parents questioned the P.E. teach-

er's role as a head teacher, and parents have highly recognized this management measure. (BZR01-08, XLD03)

These survey results further explain why P.E. teacher serves as a head teacher and why it does not cause students' academic disadvantages. At the same time, it also shows to a certain extent that P.E. teacher has unique advantages when engaged in class management. However, since we failed to measure the teacher-student relationship and class atmosphere during the experiment, we can only obtain empirical observation results at present. More detailed studies in this area are needed in the future.

Conclusions and Suggestions

The most critical finding and conclusion of this research are that a P.E. teacher serving as a head teacher will not affect students' academic performance. Not only that, in terms of promoting the overall development of students, may P.E. teacher has more advantages as a head teacher. Our study provides scientific evidence for the discussion of general topics and improves the head teacher's configuration and management.

First of all, at the conceptual level, prejudice and discrimination against "non-core subject" teachers, including P.E. teachers as head teachers, should be eliminated. Fundamentally speaking, the reason for this understanding is mainly due to the one-sided pursuit of academic performance. In management, the school should adhere to the correct teaching concept, strengthen the communication and exchange with parents, guide the parents with correct educational concepts, do an excellent job of clearing and explaining, and dispel unnecessary parents' anxiety.

Second, optimize the head teacher management to provide a good atmosphere and environment for P.E. teachers to serve as a head teacher. This research has proved that who is the head teacher may not be an essential issue. The critical question should be how to make anyone in the head teacher position indeed do an excellent job as a head teacher and grow. In this study, the experimental school has ensured the head teacher's management work's quality and effectiveness through training, incentives, and system construction. This may be a useful experience worth learning from.

Third, give full play to the role of "non-core subject" teachers in educating people and realizing their work's value. This requires appointing "non-core subject" teachers like P.E. teachers as head teachers and giving full play to these subject teachers' expertise. This enables them to use more colorful class management methods to create a united and progressive class atmosphere, achieve the educational goals of establishing morals and nurturing people, and promote students' all-round development.

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