

# Junior High School Mathematics Teachers' Tutoring in Extra-curricular Time: An Empirical Research

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**Abstract** This research focused on the current status of junior high school mathematics teachers' tutoring in extra-curricular time and adopted face-to-face interview method to collect information. A total of 133 mathematics teachers from 9 cities in Shandong Province participated in this survey. The results indicated: (1) 88.76% of teachers usually tutored backward students; (2) 93.75% of teachers always employed the face-to-face way to tutor; (3) 97.63% of teachers tutored students between classes; (4) 88.61% of teachers tutored students not more than 15 minutes; (5) 89.83% of teachers generally tutored students problem solving, etc. So the current method of junior high school mathematics teachers' tutoring was obviously too simple and superficial. This should be the direct reason resulted in the low efficiency of mathematics tutoring in extra-curricular time in current junior high school.

**Keywords:** *mathematics teachers, mathematics tutoring, extra-curricular time, junior high school, tutoring efficiency*

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## 1. Introduction

The mathematics tutoring in extra-curricular time is a kind of further teaching or guiding which is based on the students' classroom learning for correcting, supplementing, perfecting, strengthening or improving students' learning. As a communication bridge between teachers and students, the extra-curricular tutoring is an indispensable and essential link in junior high school daily teaching activities [4,5]. Therefore, it was widely attached importance to, and several researchers had researched it and obtained some quite valuable results, such as Bai hong Liang, Liu jian Qing, He Feng and Gui Tao. Bai hong Liang, Liu jian Qing and He Feng thought the teachers should understand the students' learning situations at first when they began mathematics tutoring, so as to do targeted tutoring according to the student's specific situation [1,3]. Gui Tao argued the teachers should value the students' psychological counseling and learning methods and so on when they started mathematics tutoring [2]. However through reviewing previous researches, It could be seen the researches on the efficiency of mathematics tutoring still did not appeared yet. In fact, the problem of efficiency of mathematics tutoring was very important in junior high school, since it was very low at present. Many teachers did mathematics tutoring in extra-curricular time quite seriously, but it was difficult to achieve the desired effect. What was the reason? In order to find out the reason and improve current status of junior middle school mathematics tutoring, we chose 133 junior high school teachers in Shandong Province and conducted a survey.

## 2. Methodology

### 2.1. Participants

We recruited randomly 133 junior high school mathematics teachers as respondents from Jinan city, Qingdao city, Yantai city, weifang city, Linyi City, Liaocheng, Dezhou city, Jining City and Dongying city. These 133 teachers consisted of 71 female teachers and 62 male teachers, in which 51 young teachers less than 35 years old, 63 middle-aged teachers between 35 and 50 years old, and 19 older teachers aged over 50 years old.

### 2.2. Instruments

To find out the status of junior high school mathematics teachers' tutoring in extra-curricular time completely and in depth, we adopted interview method to collect information. The interview outline was developed according to relevant literature and the earlier understanding to teachers. It was mainly involved questions about students' amounts and levels, tutoring methods, tutoring time, tutoring content, tutoring process and tutoring requirements.

### 2.3. Data Collection

We interviewed all junior high school mathematics teachers who we recruited by face-to-face, recorded their responses at first, and then organized their recording into text materials.

### 2.4. Data Analysis

We encoded the text materials with qualitative analysis software nivo10 at first, and then analyzed the codes in table and calculated the percentages of each code.

### 3. Results

#### 3.1. The Pattern of the Tutoring

According to the answers of junior high school mathematics teachers, it could be seen some teachers got used to tutoring more than one student at the same time, while others usually tutored only one student. The details about the pattern of tutoring were as shown in Table 1. From Table 1, we knew more than 60% of teachers usually tutored many student at same time, about 40% of teachers always employed the pattern of one to one.

Table 1. The pattern of the tutoring

The pattern of tutoring	teachers (percentage of teachers)
Only one	39.63
More than one	60.37

#### 3.2. The type of Students

Chinese teachers got used to dividing students into outstanding students, middle level students and backward students as students' learning status. According to teachers' answers in this survey, there were 88.76% of teachers generally tutored backward students, 44.39% of teachers usually tutored middle level students, and the percentage of teachers who usually tutored outstanding students was less than 10%. The details about type of students who were usually tutored were as shown in Table 2.

Table 2. The type of students

Levels	teachers (percentage of teachers)
Outstanding students	9.37
Middle level students	44.39
Backward students	88.76

#### 3.3. The Methods of Teachers' Tutoring

The teachers' methods of tutoring were various. But according to the answers of teachers, it could be seen almost all teachers got used to employing the face-to-face way, only 12.50% of teachers usually tutored through the telephone or network. The details about the methods of tutoring were as shown in Table 3.

Table 3. The methods of teachers' tutoring

The methods of tutoring	teachers (percentage of teachers)
Face-to-face	93.75
By telephone	46.88
By network	21.88
Others	12.50

#### 3.4. The Time of Teachers' Tutoring

As for the time of teachers' tutoring, according to the answers of teachers in this survey, it could be seen most teachers tutored students between classes, some did it in free class time, and some did it after class or after school. The details were as shown in Table 4. From Table 4, it was obvious that the percentage of teachers tutoring between classes was the largest, which reached 97.63%.

While the percentage of teachers who tutored after school was only 28.13%.

Table 4. The time of teachers' tutoring

The time of tutoring	Between classes	Free class	After class	after school
Teachers (percentage of teachers)	97.63	43.75	28.75	28.13

#### 3.5. The Duration of Teachers' Tutoring

The duration of mathematics teachers tutoring was an important issue. Its specific situations were shown as Table 5. From this table, we knew 50.48% of teachers' duration of tutoring was about 5 minutes, 38.13% of teachers' duration of tutoring was about 10 minutes, only 2.87% of teachers could spend more than 30 minutes to tutor students.

Table 5. The duration of teachers' tutoring

The duration of tutoring	About 5 minutes	About 10 minutes	15 minutes to 30 minutes	More than 30 minutes
Teachers (percentage of teachers)	50.48	38.13	8.52	2.87

#### 3.6. The Contents of Teachers' Tutoring

The contents that current mathematics teacher tutored for students was various, however it could be generally organized into four categories, that were basic knowledge for learning, classroom knowledge, extracurricular knowledge and problem solving. The details about the contents of teachers' tutoring were as shown in Table 5. From Table 5, it could be seen about 90% of teachers usually tutored problem solving, 51.23% of teachers used to tutoring the basic knowledge, 13.52% of teachers tutored classroom knowledge.

Table 6. The contents of teachers' tutoring

The contents of tutoring	teachers (percentage of teachers)
Basic knowledge for learning	51.23
Problem solving	89.38
Classroom knowledge	13.52
Extracurricular knowledge	9.23

#### 3.7. The Specific Process of Teachers' Tutoring

The process of teachers' tutoring was as shown in Table 7. From Table 7, it could be seen 69.63% of teachers generally asked students to narrate their difficulties firstly and then give them helps. 46.23 % of teachers usually present the problems to students directly, and let them solve it firstly, and then explain the solving method or correct students' solutions.

Table 7. The process of teachers' tutoring

The specific process of tutoring	Teachers (percentage)
Presenting the problems to students, and letting them solve firstly, and explaining or correcting students' solutions.	46.23
Students narrating the difficulties encountered firstly, and then teachers helping them to solve it.	69.63
Students narrating the knowledge they had learnt, then teachers further teaching, guiding or implementing.	9.38
Other ways	3.87

### 3.8. The Requirements for Students

According to the answers of teachers, it could be seen almost all mathematics teachers had requirements for students in process of tutoring, but it was different. 48.75 % of teachers usually asked the students must understand the process of problem-solving and the solving methods, 43.33% of teachers usually asked the students to master the problem which had been explained. Only about 10 % of the teachers required students to know how to think and how to find the solving methods. The requirements for students in process of tutoring were as shown in Table 8.

**Table 8. Requirements for Students**

Requirements	Teachers (percentage)
mastering the problem which had been explained	43.33
mastering the basic knowledge	9.38
Understanding the process of problem-solving and solving methods	48.75
knowing the application of knowledge flexibly	22.25
Doing more exercises	21.87
Knowing how to think	9.13

### 4. Discussion

From above data, It could be seen most junior high school mathematics teachers got used to the “one-to-many” form when they tutored, a few of them used the “one-to-one” form. The teachers' tutoring time was generally within 15 minutes, only a few teachers tutored for more than half an hour. Most teachers tutored students between classes, etc. So the way of current junior high school mathematics teachers' tutoring in extra-curricular time was obviously too superficial and lack of rationality.

Based on the results above, most students tutored by teachers were backward students, while the outstanding students who were tutored by teachers were few. The content were mostly about the solution of the problem and difficulties in the learning, rarely about other contents such as preview methods, learning methods, the variant of mathematical knowledge and mathematics knowledge application, etc. Therefore the students who participated in tutoring activities and the content tutored by teachers were too centralized.

According to the analysis above, when the teachers tutored students, most teachers usually let students solve problems firstly, and then corrected and guided them according to the specific situation, or let students speak out their difficulties, then helped and guided them. Most teachers' requirements for students in the process of tutoring was to understand the problem solving process and the method, master the problems they've solved, and

do more mathematics exercises. So we could draw a conclusion easily that current teachers' tutoring for students mainly valued problem solving.

### 5. Conclusions and Suggestions

The current junior middle school mathematics teachers' tutoring in extra-curricular time was obviously not efficient, even though the teachers tutored the students seriously. Through surveying 133 teachers and analyzing related data, we considered that reason was various. The inappropriate tutoring form, the less tutoring time, the centralized tutoring contents, the fixed tutoring students, the problem solving oriented tutoring process and the requirements were all the direct reasons resulted in the low efficiency. Therefore, to improve the current status, we suggested that teachers should value mathematics extra-curricular tutoring highly, arrange reasonably tutoring time and form to give the students adequate extra curricular tutoring time and more appropriate learning environment, expand tutoring scope to let all kind of students have chance to participate tutoring activates in extra-curricular time. On the content, we suggested teachers not only tutor students to solve mathematics problem and master the methods of solving problem, but also tutor students to learn some other knowledge, such as learning methods, in order to constantly enhance their learning ability and learning level. On the methods and process of tutoring, we suggested teachers should try different way usually to encourage and enlighten students, in order to promote the comprehensive development of students' thinking ability.

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