

# Reasons for the Low Effectiveness of the Third Learning Mathematics Knowledge of Senior High School Students

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## Abstract

400 students from two high schools in the Shandong province of China are surveyed by a questionnaire to study reasons for the low effectiveness of the third learning mathematics knowledge of senior high school students. The result shows: (1) Many students' learning methods are unreasonable. Students don't compare, summarize, or classify the knowledge after class. And they don't think about whether the knowledge of the section would be helpful for them to learn the knowledge later. They do less comprehensive exercises of simple answers and proofs, and they don't reflect adequately after finishing questions. (2) The proactivity of the learning of students is not high. Students can't actively listen to the explanation of homework of teachers, compare the homework, make up the knowledge that they have not learned well, or reflect on their mistakes. (3) There is a deficiency in teachers' teaching methods. Teachers fail to use appropriate methods to ensure that students can finish their homework on time. (4) There is a deficiency in teachers' teaching supervision. They don't provide students with poor grades with individual tutoring. Therefore, following suggestions are put forward: (1) Teachers should cultivate reasonable learning methods and habits of students; (2) Teachers should change the traditional teaching method, and make use of wrong notes to improve the proactivity of students; (3) Teachers should encourage students to finish their homework; (4) Teachers should provide students with poor grades with individual tutoring.

## Keywords

The Third Learning, Mathematics Learning, Review, Reflection, Summary

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## 1. Introduction

At present, students in school usually learn mathematics knowledge three times every day: The first is the learning in the classroom; The second is the learning after class by doing their homework; The third is the learning after class by summarizing, reviewing, reflecting, or generalizing the knowledge that has been learned. By the first two learning, students have learned basic knowledge and can apply it basically. However, it is not enough. Since only with the first two learning, the knowledge that is mastered by students is usually unsystematic, and the comprehension of theories of students is superficial. The third learning is the key to truly

forming ability. Through after-class summary and review--- the third learning, students master the knowledge deeply, the thinking logic of students is improved, and the whole knowledge of students can be arranged well, so as to improve their academic performance and ability of learning [1]. The difficulty and complexity of knowledge of senior high school are higher than these of junior high school. It's difficult for students to understand and master the knowledge based on the first learning experience. Therefore, it is necessary to conduct an after-class review---the third learning [2]. Therefore, the research of reasons for the low effectiveness of the third learning mathematics knowledge of high school students is not only of high theoretical value but also of high practical value.

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## 2. Literature Review

The after-class learning of mathematics knowledge is the basis of the third learning. At present, the research on after-class learning and teaching of mathematics mainly focuses on four aspects: after-class tutoring, after-class review, after-class summary, and after-class reflection.

Chen puts forward several teaching strategies of personalized tutoring after class in the intelligent classroom environment: The first is to accurate data analysis to evaluate personalized learning and cognitive ability of students; The second is to conduct micro class personalized tutoring to grasp learning personality characteristics of students; The third is to expand the space intelligently to achieve closed-loop of personalized learning of students [3]. Wang points out that teachers should pay attention to the following aspects in after-class tutoring of mathematics: Firstly, teachers should focus on solving issues of deepening and systematization of the knowledge of students, and help students to find out deficiencies in the mastery of knowledge. Secondly, teachers should find out deficiencies of knowledge, skills, learning, and thinking methods of students and help students to correct deficiencies. Thirdly, teachers should test students that whether they really master the knowledge after finishing questions. Fourthly, teachers should pay attention to the efficiency of tutoring and answering questions. Fifthly, teachers should pay attention to reflecting and tracking after class. Sixthly, teachers can take the initiative to provide students with after-class tutoring [4]. Wang points out several teaching strategies to improve the efficiency of after-class tutoring: The first is to clarify specific tutoring tasks; Secondly, making up the difference of students and the improvement of students are focuses of after-class tutoring; Thirdly, teachers should make different ways and plans according to different characteristics of students [5].

Liu believes that teachers should cultivate habits of summary of students after class. Firstly, teachers should classify and specifically analyze the contents of lessons after class, and generalize mathematical symbols that have been learned by students. Secondly, students and teachers should conduct an interactive summary after class. The third is to connect with reality [6]. Wu puts forward several methods for cultivating summary ability and habits of students after class: The first is to penetrate the cultivation of habits into the classroom; The second is to scientifically use mind maps to efficiently summarize; The third is to summarize by comparison [7].

Wu points out that after-class review is an indispensable part of mathematics class. Teachers can conduct an after-class review on four aspects: Firstly, they can compile exercises of daily life, and summarize the knowledge that has been learned in class; Secondly, they can conduct micro class guidance, and highlight the key and the difficulty of

textbooks; Thirdly, they can use network assistance to promote exchanges and communication of knowledge of students; Fourthly, they can conduct teacher-student interaction to improve the efficiency of after-class review of mathematics [8]. Pan thinks that the best way to consolidate knowledge is to review in the process of learning. In order to cultivate habits of after-class review of students, teachers should comply with following aspects: The first is to infiltrate review in the teaching to make students aware of the importance of review; The second is to carry out comparative experiments to let students experience the importance of review; The third is to pay attention to repeatedly strengthening [9]. Zhao points out three suggestions for after-class review: The first is to create an atmosphere of after-class review; The second is to highlight the focus of after-class review; The third is to encourage students to conduct classified discussion [2].

In addition, Li and Li put forward three learning strategies for summary and review of knowledge after class: The first is timeliness. Students should summarize and review the contents of lectures in time; The second is integrity. Students should pay attention to the integrity of summary when they summarize knowledge; The third is sharing. Students should communicate with others and they should discuss the knowledge that they have summarized [1].

Wang believes that reflection in mathematics learning is to review and rethink the original learning experience, and after-class reflection is an important part of all reflective behaviors of a student. Some students in high school don't have habits of reflection after class. Therefore, teachers should guide students to conduct emotion reflection, knowledge reflection, and skills reflection after class to cultivate habits of after-class reflection of students [10]. Zhang believes that after-class reflection is conducive to grasping knowledge. The reflection after solving problems is conducive to improving students' problem-solving skills and enhancing the flexibility and mastery of knowledge [11]. Zhang proposes three measures to strengthen reflection of questions: The first is to optimize reflection homework after class to develop the awareness of reflection of solving problems; The second is to strengthen reflection after finishing questions to expand the ability to solve problems; The third is to deepen thinking after solving problems to develop the quality of thinking of solving the problem [12].

The above research on mathematics after-class learning and teaching mainly uses methods of theoretical speculation and experience summary to put forward some strategies and suggestions for implementing after-class tutoring, after-class review, after-class summary, and after-class reflection, so as to promote review, reflection and summary of students after class. There is no research on reasons why the effectiveness

of mathematics knowledge of the third learning of students is low. It is necessary to conduct a deep study of reasons for the low effectiveness of the third learning so as to put forward better suggestions to promote after-class learning.

### 3. Theoretical Basis

#### 3.1. Ebbinghaus' Forgetting Rule

The forgetting curve that has been proposed by Ebbinghaus shows a rule of forgetting development: in the short period after recognizing and memorizing, the development of forgetting is fast. After a longer time, the amount of memory retention is less, and the development of forgetting is slow [13].

#### 3.2. Reflective Learning and Reflective Mathematics Learning

Reflective learning is to learn by reflecting on the process of learning activities. It is the reverse thinking of learners on the process of their learning activities and the learning characteristics of related materials, information, thinking, and results involved in the process of activities. It is not only a review or repetition of learning generality but also a deep study of the knowledge, methods, ideas, and strategies, etc. It has a strong nature of scientific research [14].

Reflective mathematics learning is the reverse thinking of learners about their process of mathematics learning activities and learning characteristics of related things, materials, information, thinking, results, etc involved in activities [15].

#### 3.3. Ausubel's Meaningful Learning Theory

Ausubel believes that there are two prerequisites for meaningful learning: Firstly, a student shows a tendency to establish a connection between the content of the new learning and his existing knowledge; Secondly, the content of learning has potential significance for the student, that is, the content of learning can connect with the existing knowledge

structure of the student [16].

#### 3.4. Stages of Learning

Learning can be divided into three stages: The first stage is to listen to the teacher in class; The second stage is to do homework after class; The third stage is the third learning in this paper, which is mainly to review, reflect and summarize the knowledge that has been learned.

#### 3.5. Definition of the Third Learning Mathematical Knowledge

The third learning of mathematics knowledge is the deepening process of learning textbooks based on the first and second learning. The first is to deepen the understanding of basic concepts and theorems in mathematics textbooks on the basis of clarifying them. It is the comprehensible memory and it needs to be internalized. The second is to systematize scattered knowledge to form a complete knowledge system.

### 4. Research Method

#### 4.1. Purpose of Investigation

On four aspects of learning methods of students, the proactivity of learning of students, teaching methods of teachers, and teaching supervision of teachers, the research investigates and analyzes reasons for the low effectiveness of the third learning of mathematics knowledge of students.

#### 4.2. Respondents

Before the questionnaire survey, students in the first and second grades of two high schools in Shandong of China are selected to conduct a comprehensive test. Then a total of 400 students with unsatisfactory grades and low effectiveness of the third learning is selected for the questionnaire survey. Basic information of respondents with low effectiveness of the third learning shows in Table 1.

**Table 1.** Basic information of respondents with low effectiveness of the third learning.

Basic Information	First Grade	Second Grade	Male	Female
The population of the first school	94	89	97	86
The population of the second school	91	98	94	95
The total	185	187	191	181
Percentage	49.73	50.27	51.34	48.66

#### 4.3. Survey Tool

A questionnaire is designed based on the four aspects of students' learning methods, students' learning proactivity, teachers' teaching methods, and teaching supervision. Each aspect sets 4-8 questions, a total of 27 questions is compiled,

and 5 options are set for each question.

Questions related to learning methods of students are as follows:

1: What do you usually do when you encounter difficult problems after class?

- 2: Do you compare the knowledge in the section with the previous knowledge after class?
- 3: Do you conduct a systematic summary of knowledge of the section based on the previous knowledge after class?
- 4: Do you do comprehensive exercises for the knowledge that is learned in this section after class?
- 5: What are the types of comprehensive exercises do you do after class?
- 6: After finishing comprehensive questions, do you reflect on questions?
- 7: After learning knowledge of a section, have you ever thought about how the knowledge of this section will help you in the future?
- 8: Do you try to classify the knowledge after learning the knowledge of a section?

Questions related to learning proactivity of students are as follows:

- 9: Do you actively complete the homework assigned by the teacher after class?
- 10: After class, do you actively or passively conduct a systematic review of knowledge?
- 11: Do you listen to the teacher's explanation of homework every time?
- 12: Do you take the initiative to compare questions with the previous knowledge when you do questions?
- 13: Do you take the initiative to ask for the help of teachers or classmates when you have a difficult problem?
- 14: After class, do you take the initiative to ask for supplementary study for the knowledge you haven't learned well?
- 15: Do you take the initiative to reflect on which piece of

knowledge is wrong when you don't do well in an exam?

Questions related to teaching methods of teachers are as follows:

- 16: Does mathematics teacher take the initiative to summarize knowledge after learning knowledge of a section ?
- 17: After learning knowledge of a section, does mathematics teacher explain it again according to students' questions?
- 18: Does mathematics teacher check the homework on time?
- 19: Does mathematics teachers punish students who don't complete their homework on time?
- 20: How does the mathematics teacher explain the homework?
- 21: Does the mathematics teacher make a systematic summary of typical problems in the homework?
- 22: Does the mathematics teacher ask students to reflect on problems in the homework?
- 23: Does the mathematics teacher systematically guide students' knowledge aspects?

Questions related to teaching supervision of teachers are as follows:

- 24: Does the mathematics teacher often urge you to review systematically?
- 25: Does the mathematics teacher conduct a systematic test after learning the knowledge of a chapter?
- 26: How does the mathematics teacher deal with students with poor grades?
- 27: Does the mathematics teacher provide individual tutoring with students with poor grades?

The options for each question are shown in the table 2.

Table 2. Options for each topic.

Options	A	B	C	D	E
1 (multiple choice)	Give up	Ask the teacher	Look up the information Solve it by yourself	Internet Baidu answer	Discuss with classmates
2-4, 7-8, 16-17, 25	Every chapter	Most chapters	Basic chapters	Occasional chapters	Not at all
5	Choice questions mainly	Fill in the blanks mainly	Short answer questions mainly	Calculation questions mainly	Proof questions mainly
6	Every question	Most questions	Basic questions	Wrong questions	Not at all
10, 12-15	Take the initiative every time	Take the initiative most times	Take the initiative basic times	Take the initiative occasionally	Take the initiative not every time
20	Detailed explanation	Explain most of the homework	Explain the basic part of homework	Explanation only for wrong questions	No explanation only the answer
26	Patiently analyze reasons	Harsh criticism	Simple criticism	Don't care	Else
9, 11, 18-19, 21-24, 27	Always	Often	Basic	Occasional	Basically not

#### 4.4. Investigation Process

A total of 400 questionnaires is distributed and 400

questionnaires are recovered, including 372 questionnaires that are valid and 28 questionnaires are invalid. The recovery rate is 100% and the efficiency is 93%.

### 4.5. Process of Survey Data

The number of choices for each option of each question is counted and it is represented as the percentage. It includes the percentage of the first grade and the second grade, and the percentage of the total number of students in two grades.

## 5. Research Results and Analysis

### 5.1. Learning Methods of Students

It can be seen from the data that when encountering problems, more than 90% of students can try to solve problems. The total number of students who can do comprehensive exercises based on the knowledge of the section in each chapter, most chapters and basic chapters reach 55%. The total number of students who can do comprehensive exercises including choice

questions, filling blank questions, and calculation questions after class is 61%. More than 80% of students can reflect on questions, and most of them can reflect on the wrong questions. The total number of students who occasionally and not at all compare the knowledge of the section with previous knowledge, systematically summarize knowledge of the section based on the previous knowledge, and systematically classify the learned knowledge after learning knowledge of the section reaches 70%. After learning knowledge of a section, the total number of students who occasionally think and don't think about whether the knowledge of the section would be helpful for later learning reaches 57%. Therefore, most students don't compare the knowledge of the section with the previous knowledge, don't systematically summarize the knowledge of the section, don't try to classify the knowledge that they have learned, and don't think about whether the knowledge of the section is helpful for later learning. Specific results are shown in Table 3.

Table 3. Survey results of topics related to learning methods of students.

Percentage		1	2	3	4	5	6	7	8
A	First grade	7.19	4.86	5.41	16.22	45.95	2.70	4.86	4.33
	Second grade	6.18	6.42	9.09	19.25	37.97	6.96	9.63	8.56
	Total	6.67	5.64	7.26	17.74	41.94	4.84	7.26	6.45
B	First grade	17.24	9.73	8.11	10.81	5.94	10.81	6.49	7.57
	Second grade	14.52	11.23	6.42	18.18	3.74	13.37	8.02	11.76
	Total	15.83	10.48	7.26	14.52	4.83	12.10	7.26	9.68
C	First grade	29.02	12.97	14.59	25.41	18.38	16.22	19.46	12.43
	Second grade	28.49	11.23	16.04	21.39	26.74	24.06	25.67	13.37
	Total	28.75	12.10	15.32	23.39	22.58	20.16	22.58	12.90
D	First grade	11.78	45.95	42.70	32.43	14.05	51.35	42.16	43.24
	Second grade	12.37	45.99	44.39	27.27	14.97	43.85	35.29	39.04
	Total	12.08	45.97	43.55	29.84	14.52	47.58	38.71	41.13
E	First grade	34.77	26.49	29.19	15.13	15.68	18.92	27.03	32.43
	Second grade	38.44	25.13	24.06	13.91	16.58	11.76	21.39	27.27
	Total	36.67	25.81	26.61	14.51	16.13	15.32	24.19	29.84

### 5.2. Learning Proactivity of Students

The total number of students who can always take the initiative to complete the homework, often take the initiative to complete the homework and basically take the initiative to complete the homework reaches 80%. It shows that most students are still very active in completing the homework. When encountering difficult problems, the total number of students who always take the initiative to seek help, in most cases take the initiative to seek help and basically take the initiative to seek help reaches 65%. It shows that most students can take the initiative to seek help from teachers and classmates when encountering difficult problems. The total number of students who can basically and occasionally take the initiative to review systematically and compare questions that they have done with the

knowledge that they have learned reaches 60%; The total number of students who are able to basically and occasionally listen to the explanation of homework of teachers seriously reaches 56%; The total number of students who can basically and occasionally take the initiative to request for tutoring the knowledge that has not been learned well reaches 58%; When they fail an exam, the total number of students who can basically and occasionally take the initiative to reflect reaches 55%. Therefore, most students are not active in the systematic review, comparison of questions and knowledge, and listening to the explanation of homework of teachers. The proactivity of most students to make up for the knowledge that they don't learn well is not high. And the proactivity of most students to reflect on their mistakes when they fail in the exam is not high. Specific results are shown in Table 4.

**Table 4.** Survey results of topics related to learning proactivity of students.

percentage		9	10	11	12	13	14	15
A	First grade	23.78	9.19	14.05	5.40	14.59	8.65	8.65
	Second grade	22.99	10.17	14.97	9.09	16.04	7.50	18.72
	Total	23.39	9.64	14.52	7.25	15.32	8.07	13.71
B	First grade	21.62	12.43	21.62	8.11	29.19	18.38	20.54
	Second grade	28.34	14.97	25.13	8.02	35.29	20.32	18.18
	Total	25.00	13.71	23.39	8.06	32.26	19.35	19.35
C	First grade	29.73	27.03	32.43	21.62	16.22	16.21	29.73
	Second grade	34.76	29.41	35.29	26.74	19.25	24.06	28.34
	Total	32.26	28.26	33.87	24.20	17.74	20.16	29.03
D	First grade	13.51	34.05	25.41	37.84	27.02	40.54	29.19
	Second grade	7.49	30.48	19.79	36.36	22.99	35.29	24.06
	Total	10.48	32.26	22.58	37.10	25.00	37.90	26.61
E	First grade	11.36	17.30	6.49	27.03	12.98	16.22	11.89
	Second grade	6.42	14.97	4.82	19.79	6.43	12.83	10.70
	Total	8.87	16.13	5.64	23.39	9.68	14.52	11.30

### 5.3. Teaching Methods of Teachers

The total number of students who think that teachers could summarize knowledge in each chapter and most chapters reaches 62%. The total number of students who think that teachers could reexplain each chapter and most chapters according to questions of students reaches 74%. The total number of students who think that teachers can always and often check homework on time reaches 86%. The total number of students who think that teachers occasionally punish students who don't finish the homework on time and basically don't punish students who don't finish the homework on time reaches 58%. The total number of students who think that teachers could explain the homework in detail, mostly and basically reaches 92%. The total number of students who think that teachers can every time and often

summarize typical problems of homework reaches 60%. The total number of students who think that teachers can always and often ask students to reflect on problems in their homework reaches 58%. The total number of students who think that teachers can always, often and basically give systematic guidance to students on knowledge reaches 81%. In other words, after learning the knowledge of a section, most teachers can lead students to summarize knowledge, can conduct explanation again according to questions of students, can check homework of students on time, can explain homework of students, can summarize problems of homework of students, can require students to reflect on homework, and can guide students systematically on the knowledge. In addition, most teachers don't punish students who don't finish the homework on time. Specific results are shown in Table 5.

**Table 5.** Survey results of topics related to teaching methods of teachers.

Percentage		16	17	18	19	20	21	22	23
A	First grade	32.43	43.78	67.03	11.35	20.00	29.19	28.65	23.24
	Second grade	35.29	46.52	63.64	12.83	20.32	30.48	29.41	23.53
	Total	33.87	45.16	65.32	12.10	20.16	29.84	29.03	23.39
B	First grade	27.03	28.11	21.62	7.57	20.54	32.43	25.41	30.81
	Second grade	29.41	29.95	20.32	8.56	19.79	28.88	34.22	27.27
	Total	28.23	29.03	20.97	8.07	20.16	30.65	29.84	29.03
C	First grade	15.14	9.73	7.57	25.95	50.81	28.65	21.62	27.57
	Second grade	10.70	11.23	10.16	17.65	54.01	31.02	15.51	30.48
	Total	12.90	10.48	8.87	21.77	52.42	29.84	18.55	29.03
D	First grade	20.00	9.19	1.08	42.16	7.57	7.03	20.00	12.97
	Second grade	17.11	10.16	3.74	38.50	5.35	5.88	9.09	16.04
	Total	18.55	9.68	2.42	40.32	6.45	6.45	14.52	14.52
E	First grade	5.40	9.19	2.70	12.97	1.08	2.70	4.32	5.41
	Second grade	7.49	2.14	2.14	22.46	0.53	3.74	11.77	2.68
	Total	6.45	5.65	2.42	17.74	0.81	3.22	8.06	4.03

### 5.4. Teaching Supervision of Teachers

The total number of students who believe that teachers can

always and often urge students to systematically review reaches 56%. The total number of students who believe that teachers can carry out systematic tests after learning the

knowledge of each chapter and most chapters reaches 77%. The number of students who think that teachers help students to patiently analyze reasons for poor grades reaches 47.58%. The total number of students who think that the teacher don't tutor students with poor grades reaches 67%. Therefore, most

teachers can urge students to do a systematic review, can systematically test students, and can help students patiently analyze reasons for poor grades. But most teachers don't provide students with poor grades with individual tutoring. The specific results are shown in Table 6.

**Table 6.** Survey results of topics related to teaching supervision of teachers.

Percentage		24	25	26	27
A	First grade	27.03	49.73	48.65	9.19
	Second grade	19.79	50.27	46.52	11.76
	Total	23.39	50.00	47.58	8.88
B	First grade	28.11	25.41	6.49	14.59
	Second grade	37.97	29.41	6.42	11.23
	Total	33.06	27.42	6.45	12.90
C	First grade	25.95	18.38	25.41	9.19
	Second grade	24.06	13.90	19.79	8.56
	Total	25.00	16.13	22.58	10.48
D	First grade	12.97	5.95	14.05	37.84
	Second grade	16.04	5.35	21.39	37.97
	Total	14.52	5.65	17.74	37.90
E	First grade	5.94	0.53	5.40	29.19
	Second grade	2.14	1.07	5.88	30.48
	Total	4.03	0.80	5.65	29.84

## 6. Discussion

From the above survey results, we can see that:

In the investigation of learning methods of students, it is found that most students try their best to solve problems when they encounter difficult problems by discussing with classmates, consulting materials, asking teachers, or searching for answers online. It shows that the learning methods of most students for problems are reasonable. Most students are able to reflect on the wrong questions after finishing questions, but few of them are able to reflect on each question. Most students can do some comprehensive exercises after class, but most comprehensive exercises are choice questions, filling blank questions, and calculation questions. They do few comprehensive exercises of simple answers or proofs. The simple answer and proof questions are more able to examine the systematization of knowledge of students. After learning the knowledge of a section, most students don't compare the knowledge with the previous knowledge, don't summarize systematically the knowledge of the section, don't think about whether the knowledge of the section is helpful for learning the later knowledge, and don't attempt to systematically classify the learned knowledge. It shows that students' learning methods of the third learning are unreasonable. That is to say that students' methods of review, summary, and reflection are unreasonable.

In the investigation of the learning proactivity of students, it

is found that most students can actively complete the homework. Most students can review passively after learning knowledge. Most students can't carefully listen to the explanation of homework of teachers, can't take the initiative to compare the homework with previous questions, can't take the initiative to ask for remediation of knowledge that hasn't been learned well, and can't take the initiative to reflect on their mistakes when they don't get good grades in an exam. Active learning is the key to learning well. Only when students take initiative to learn mathematics knowledge for the third learning, can they get effective results. But most students are passive. It is fully explained that the student is lack of proactivity in learning is one of the reasons for the low effectiveness of mathematics knowledge in the third learning.

In the investigation of teaching methods of teachers, it is found that most teachers can lead students to summarize the knowledge after learning the knowledge of a section, can reinterpret the knowledge according to questions of students, can check homework of students on time, can explain homework of students, can summarize and generalize problems of homework of students, can require students to reflect and summarize the homework, and can systematically guide students learn knowledge. Most teachers don't punish students who fail to finish the homework on time, but teachers should use other methods to ensure that students can finish their homework on time. It can be seen that teaching methods of the third learning are appropriate, but there is also the area that should be improved.

In the investigation of teaching supervision of teachers, it is found that most teachers can urge students to review systematically, test students systematically, and help students patiently analyze reasons for poor grades. However, most teachers don't offer individual tutoring to students with poor grades. It shows that teaching supervision of teachers is not reasonable in the third learning.

## 7. Conclusion

Through the questionnaire survey, reasons for the low effectiveness of the third learning of students are summarized as follows:

- 1) Learning methods of students are unreasonable. Firstly, students don't compare, summarize, or classify the knowledge after class; Secondly, they don't think about whether the knowledge of the section is helpful for learning the knowledge later; Thirdly, they don't try to systematically classify the knowledge that they have learned; Fourthly, students do few comprehensive exercises of short answer or proofs and they don't reflect on questions.
- 2) The proactivity of the learning of students isn't high. Students can't actively listen to explanations of homework of teachers, compare the homework with previous questions, conduct a remedial study for the knowledge that they don't learn well, or reflect on their mistakes when they fail in an exam.
- 3) There is a deficiency in teachers' teaching methods. Teachers don't use proper methods to ensure that students finish their homework on time.
- 4) There is a deficiency in teachers' teaching supervision. Teachers don't offer individual tutoring to students with poor grades.

Therefore, in order to improve the effectiveness of mathematics knowledge in the third learning, the following suggestions are put forward:

- 1) Teachers should cultivate reasonable learning methods and good learning habits of students. The first is to guide students to compare, summarize and classify the knowledge that they have learned with the previous knowledge; The second is to let students do more comprehensive exercises of simple answer and proofs and guide students to reflect after finishing questions.
- 2) Teachers should improve the learning proactivity of students. The first is to choose appropriate teaching methods. They should use cooperative learning, group discussion or others to mobilize the enthusiasm of students; The second is to help students to establish a wrong

question book to reflect on and makeup knowledge that they don't learn well.

- 3) Teachers can reward students who finish their homework on time. They can communicate with students who don't finish the homework on time and analyze the reasons why they don't finish the homework.
- 4) Teachers should give more care and help to students with poor grades, and provide them with individual tutoring.

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