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How to Improve Math Score in Chinese High Schools

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ABSTRACT. *This research will mainly discuss the improvement in mathematics from the perspective of external and internal factors. Math test may not be appropriate to all students, however, it is an irreplaceable part of China's university entrance exam. Moreover, native students and immigrant students do not receive equal math education. The environment of study, including comments from parents, teachers and classmates significantly affect the academic performances of students. Most of the suggestions in this research is well-accepted, and hypothesis is proved to be correct. In conclusion, measures, such as providing a peaceful learning environment and interactions between teachers and students, and doing more exercises and summaries, should be taken to promote students' understanding of new knowledge.*

KEYWORDS: *Math, High school, Environment, Summaries, Exercises*

1. Introduction

This chapter mainly deal with how to improve students' academic performances in high schools of China, and the background of Chinese math education in high school, including advantages and limitations. Moreover, it also analyzes how these factors, such as school teaching, learning environment and self-effort influence students' learning efficiency.

2. Improve Math Score in Chinese High Schools

At present, Chinese students are competing for limited learning opportunities provided by top universities, and math score becomes increasingly important during the past ten years. Some advocated that mathematics test should be abolished as some students are not talented in this subject. However, the education department claims that math is very important for screening students. It is believed that in math study, boys preform better than girls, and foreign students are not likely to have high math scores than native students (OECD 2017). Actually, logical thinking is the basis for students to learn mathematics, but memory and language is not helpful. Therefore, it is extremely difficult for students to make improvements in math.

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Moreover, it is not impossible to remove math test and it takes a high percentage in China's university entrance examination. Professors explained that the score reflects the level of a students' achievement in mathematics (Carnoy et al., 2016; Stacey, 2011). The reason is that math test examines a student's ability to solve problems, make innovations in special cases, pay high attention to problems for a long time. In order to reach high standard, students need to be confident, ready to innovate, work hard in math study, and choose appropriate methods (Akyüz 2014). This indicates that the learning of mathematics is long-term study, it is not easy to make improvement in math. The next chapter will illustrate the study of mathematics from several perspectives.

The learning environment, such as the support of parents, teaching skills of educators and encouragement of classmates, can influence the quality of learning. The delicate concern of parents, and parental relationship significantly contribute to students' success in mathematics (Jeynes 2007). External factors are as important as internal factors as the improvement in mathematics requires the questions answered by educators and encouragement instead of criticism when students behave not well. Encouragement significantly increases students' learning efficiency as students would make more efforts in their math study (Scheerens,2019). In contrast, these reactions, such as keeping questions in the mind without solution, doing exercises with careful thinking, blame from teachers and parents result in negative effects. Games related to contents in lessons or interactions between teachers and students would help students to solve practical problems and form mathematical thinking (Tian 2019). Interactions can motivate students to solve math problems, and support them to apply the newly learned skills. Lectures given in schools provide basic rules for students to grasp skills, however, tutoring classes are believed to extremely useful as students achieve higher scores. After that, some students ignore school lessons but attend more tutoring classes, which result in their less learning time in basic concepts and skills. In a part of schools, especially those for children of migrated rural workers, students have to study with poor facilities and irresponsible teachers, which result in the low-efficiency education (e.g.;Lai et al,2011; Song,Loyalak, and Wei,2010). Most of the migrant students have to transfer to another school as their parents may have work opportunities in other cities. Under such circumstances, they are less likely to adapt themselves to the teaching practice there, and may not afford the extra expenses for tutoring classes.

Diligence and modesty are needed to math study as students are not born with such as a math. In addition to math exercises, taking tests is also a effective solution. Exercise is definitely essential as it enable students to think basic, complex and strange cases, feel less nervous and get more qualified during the exam. It is commonly seen that students understand some knowledge points in class, but may not grasp the use after a few days due to the lack of special exercise (Yan, 2018). Attempts to solving advanced problems is also helpful but it should be made after the grasp of basic problem solving skills. Students should try to solve problems from simple to difficult, thus it is necessary to do questions on textbooks as they include the basic exercises (Yan, 2018). Students should develop the ability of independent thinking, and try to solve problems alone, if they could work out questions without

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the help of their teachers (Wang, 2019). As a result, making progress in math needs repeated exercises, grasp of learning skills and endurance in learning. In addition, school lectures are also emphasized as it helps students to grasp special math skills. In summary, working hard, doing adequate exercises and independent thinking can help enhance students' math score in high school.

In the questionnaire, there are questions like single choice, judgement, and brief description, in an effort to investigate the decisive factors affecting students' math learning. Statistic methods will be applied to calculate the frequency of each answer. Pilot test will also be used. A total of 300 questionnaires will be issued and at least 200 valid samples are expected to be collected. Quantitative data will be chosen in this research as it is more accurate for analysis. The main respondents are teachers from high school, as they know what kinds of difficulties faced with students in their math study.

This section will mainly introduce the result of research. In the valid 212 samples, 111 of the participants teach less than 5 years, 61 of them are 5 years to 10 years and the rest 40 choose more than years. 163 of 212 educators which is more than 3 quarters agree with that cram schools are necessary, only 49 teachers give the opposite result. 122 teachers believe all the students can achieve a good score, while 90 teachers disagree with it. The first suggestion preview before lectures, pay attention to what talked about during the lecture, summarize after this lesson can improve math score get a average of 4.31 as more than half of the educators 124 of them gives 5. Do a number of exercises, cultivate good habits when solving problems can improve math score gets 4.3 with only 4 teachers strongly disagree with it. The next suggestion has mathematical thinking modes, use appropriate learning skills can improve math score gets the highest agreement of 4.4. 4.32 is the result of the advises face problems instead of escaping, have passion in learning have a positive impact on math score. Increase interactions between teachers and students during the lectures can help to improve math score has a high support which is 4.39. The following recommendation remember to apply the methods learned when facing with complex problems have positive impact on math score gets 4.32 in average. The last one creates a suitable environment as possible have a positive impact on math score gets 4.36 with only 3 participants strongly disagree. In the open question "what kind of environment do you think is good to mathematics study", the answer most frequently provided is a peace environment without disruption, while others include focused, interaction between teachers and students, team study, etc. Interaction is the highest repeated answer, such as how a lecture reaches its teaching goal, and how to improve high-efficiency, discussion, math atmosphere, picture with contents, funny, positive participation.

These three graphs show the data about the first three questions. More than half of the data in this research comes from educators teach less than 5 years, similar to the amount of the ones between 5 years to 10 years add the ones more than ten years. About the second question, this pie chart clearly shows only 23% of the participants less than a quarter of the 212 teachers disagree with the cram schools. Most students get higher math score than before, some make great progress, some have tiny improvement, and all are beneficial to math study as well. However, students may be

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dependent on cram schools, which means they are likely to ignore school lectures as cram schools are believed more efficient. These thoughts should be avoided as it is irreplaceable to obtain basic knowledge points and skills in school. Students' neglect of school lectures tends to be a reason why some teachers are opposed to cram schools. Moreover, some teachers are confident of their lectures, and believe students only need to finish the school tasks to achieve a good result.

This may explain why a number of educators do not support the training of cram schools.

In the following questions, estimators and confidence intervals, including estimation and hypothesis testing, will be used for analysis. A function of the random sample {X1, . . . , Xn} is used to estimate the value of an unknown parameter. Random sample {X1, . . . , Xn}, i.i.d. with E [Xi] = μ and Var [Xi] = σ^2. So standard deviation s.d. ($\bar{X}$)= σ/√N , called the standard error. The larger n is, the smaller the standard error, and the better X is as an estimator of μ. As the amount of sample is already known, it is a biased estimator.

According to the confidence interval calculated, it can be concluded that all of the previous 7 suggestions are widely accepted by participants. As a result, these methods: preview before the lecture, paying attention to the lecture and summarizing after the lecture, doing exercises, the use of appropriate solving methods, mathematical thinking mode, the grasp of appropriate learning skills, face appeared problems, having passions in study, establishing teacher-student interactions in class, the use of methods learned in class for solving advanced questions, and setting up an environment that fits math learning, are effective for students in their math study.

When asked what kind of environment is good to mathematics study, the most frequent answer is peaceful environment, relaxing learning atmosphere, no disruption from outside. It illustrates that math learning is an individual task but not a team study. When students have questions which cannot be solved it is a fantastic idea to have a discussion. Students are advised to cultivate independent thinking modes, they will appreciate this habit while challenging a complex question. Moreover, it is essential to keep clam and get relaxed, and it is fateful to feel nervous in the exam, as it will ruin students' confidence, and questions already understood may be difficult to them at that time. In summary, a peaceful environment is beneficial for students in their math study, as students would think more, and help them to be less nervous when having a test.

The most popular lesson is funny, high-efficiency, active, clearly defined, full of interactions and discussions. An educational lecture should be attracting as it helps students to follow what is said by teachers. Therefore, some lectures are based on the traditional method, that is, students take notes when the teacher is speaking. However, when students take notes, they do not pay attention to the content teacher talk about. This kind of study is useless though seemingly students are hard-working. As a result, students should try to understand as much as possible in class, while teachers need to inspire students in lecture.

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3. Conclusion

Students need a time arrangement before the exam, and it is important to learn about how to get high scores. It is recommended that students should make appropriate arrangement, and answer questions from simple ones to hard ones, avoid spending too much time on a single question, try to avoid questions which are complicated first and try to finish the easier ones, and finally spend about 10 minutes for checking. In summary, having a balanced time distribution is advantageous for students. The time may not be strictly separated for each question and the rule is that students should have enough time for answering questions and checking. Based on the analysis above, math improvement is a long-term goal. In order to achieve a high score in math test, students should be diligent and make persistent efforts.

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