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# Discussion on Chinese Teaching for Mathematics Major in Science and Technology

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**Abstract:** In recent years, with the improvement of China's independent innovation ability and the export of science and technology, more and more overseas students come to China to study science and technology. Most of them are to study science and engineering professional courses, and engaged in related industries for the purpose. Science and technology Chinese as the paving stone of science and engineering overseas students to learn professional knowledge is increasingly valued. This paper puts forward some humble opinions on the Chinese teaching for mathematics major in science and technology Chinese, in order to provide some reference for the teaching of science and technology Chinese.

**Keywords:** Science and Technology Chinese; Chinese Teaching for Mathematics Major; Teaching Methods.

## 1. Introduction

With the continuous enhancement of China's comprehensive national strength, the education of overseas students in China is constantly promoted, more and more international students hope to learn advanced scientific knowledge in China, rather than limited to the language of "Chinese". Especially in recent years, the number of foreign students studying science and technology majors in China is increasing year by year, and the ordinary Chinese teaching has gradually failed to meet the learning requirements of overseas students, while science and technology Chinese is favored by overseas students.

Science and technology Chinese is set up in the preparatory stage, with science and engineering overseas students as the teaching object, with science and technology Chinese and scientific knowledge as the teaching content, with the teaching purpose of cultivating the concept, expression and using ability of professional Chinese. The teaching focus is to help international students understand the content of professional subjects from the perspective of Chinese, rather than impart professional knowledge. Scientific and technological Chinese is very professional, with unique stylistic features, including discourse structure, sentence structure and vocabulary, which are not available in basic Chinese. However, scientific and technological Chinese is carried out on the basis of ordinary Chinese teaching. Without a solid Chinese foundation, it is difficult to learn scientific and technological Chinese. Therefore, it is necessary to study how to adopt scientific teaching strategies to the teaching of scientific and technological Chinese, and adopt targeted teaching methods to improve the teaching effect.

## 2. Overview of Scientific and Technological Chinese Courses

Scientific and technological Chinese is a special Chinese course for international students in the preparatory stage as a transition from ordinary Chinese to mathematics, physics and chemistry courses. It belongs to a language class, rather than a mathematics, physics and chemistry knowledge class. The purpose of the course is to use Chinese as a tool for professional learning, to help international students with only general Chinese learning experience improve their professional Chinese level and adapt to the professional course learning in Chinese teaching mode. The teaching goal of this course is to provide the most basic Chinese knowledge and ability support for mathematics, physics and chemistry courses, highlighting practicality. The teaching focus is to teach the commonly used words, basic sentence patterns and commonly used expression categories of scientific and technological Chinese, cultivate students' most basic ability of scientific and technological Chinese and related independent learning ability, and lay a preliminary Chinese foundation for overseas students to study mathematics, physics, chemistry and other professional courses. The teaching content is mainly divided into three parts: new words (including scientific and technical words and general words); common format, no longer the traditional grammar, but the associated words, calling methods and unit notation related to the concept of mathematics and physics; text, generally three to four shorter narrative articles. How to teach the scientific and technological Chinese to the preparatory students in China, how to make the overseas students quickly accept the vocabulary and grammar knowledge of professional Chinese on the basis of only 1200 words, and basically equip the students with the ability to enter the pure Chinese classroom to learn professional courses in just 96 hours, this is a new topic and new challenge proposed in the field of foreign language teaching in the past decade.

## 3. The Teaching of Chinese for Mathematics Major in Science and Technology

Chinese itself has the characteristics of large density of new words, strong professionalism and separation from daily life experience, and the grammar knowledge has strong scientific, targeted and complexity. In order to improve the teaching efficiency and students' learning interest, we need a set of effective teaching methods. In addition to the need to use the traditional "direct method", "listening method", but also often use situational teaching method, schema teaching method, so that students immerse themselves in the combination of professional knowledge and Chinese knowledge, acquire new grammar points of science and technology Chinese; In

addition, the game teaching method will also be interspersed in the classroom teaching, adjust the classroom atmosphere, so that students in the face of some complex, semantic obscure, from the daily life experience of vocabulary and grammar, will not have fear of difficult emotions, and can through the teacher's elaborate design of the game, quickly master these vocabulary and grammar.

Below focuses on the teaching of the three major parts of the Chinese course for mathematics major, namely vocabulary, language points (common format of science and technology Chinese), and text, as an example, elaborates the teaching methods of science and technology Chinese in detail.

## 3.1. Teaching Methods of Vocabulary

The textbook used in the teaching is CCN "IFP Mathematics Professional Textbook". The new words are divided into two categories, one is mathematics professional words, and the other is general words. When teaching these two categories of words, the most used methods are "direct method" and "situational method".

The direct method advocates intuitive means to teach the target language, without native language translation, paying attention to oral learning approaches, such as pictures, actions, objects, charts and so on. It contains three aspects: direct learning, direct understanding and direct application. Its representatives are: German linguist Bei Li Zi. The direct method follows the principles of direct connection, oral language-based principles, imitation-based principles, inductive approach to teaching grammar principles and contemporary common language as teaching materials. The direct method is the most frequently used teaching method in the teaching of scientific Chinese, because there are a large number of professional terms, semi-technical words and written words with classical Chinese color in the vocabulary of scientific Chinese, which are far away from the students' daily life experience. It is difficult to explain the usage and meaning directly to the students. We often explain the corresponding with the help of pictures and mathematical symbols, which are simple and convenient, and can let the students better understand the meaning of the terms.

Example 1: At the beginning of each class, there is the study of mathematical symbols, such as "add (plus sign), subtract (minus sign), multiply (times sign), divide (divide sign), less than (less than sign), greater than (greater than sign), equal to (equal sign), approximately equal to (approximately equal sign) and other words.

In teaching, teachers can first use the Chinese-English translation method to tell students the meaning of "mathematical symbols", and then ask several students to write down their most commonly used mathematical symbols on the blackboard. After writing, they will ask students whether they know the Chinese pronunciation of these symbols. The students will be curious. At this time, teachers can point to the symbols and tell students the Chinese pronunciation of these symbols. After students memorize them for several times, teachers can also increase the difficulty, and ask another student to write down several simple mathematical formulas on the platform and let other students read them out. This also reflects the teaching principle of "i+1", which can be well understood and absorbed by students.

In this teaching process, the symbols and their Chinese pronunciation are compared, which is concise and intuitive. It is helpful for students to transfer from basic Chinese learning to scientific and technological Chinese learning as soon as possible. At the same time, students can truly understand the purpose of this course, so as to strengthen their learning motivation and improve their learning enthusiasm. In addition, in the use of "direct method", in addition to using pictures, actions, objects and other ways, the most commonly used is "graphic method", that is, the "graphic explanation" commonly used by teachers in mathematics class.

Example 2: When explaining the commonly used mathematical figures and the relationship between them, it is necessary to teach the words "ray, endpoint, curve, circle, common point, tangency, intersection, separation, isosceles, isosceles" and so on. These words are more abstract and not easy to explain; later, we will learn the words "starting point, midpoint, end point", among which "end point" and "midpoint" are homophones. At this time, the method of "drawing explanation" will be used. Because all the overseas students are science and engineering students, their relevant theoretical knowledge is very solid, so almost all the students can understand clearly by drawing.

In addition, formula method and example method are also commonly used teaching methods.

Example 3: When learning the three words "integer, fraction, rational number", the teacher can first give examples such as "1, 2, 3..." and tell the students that this is "positive integer"; then give examples such as "-1, -2, -3..." to lead to the concept of "negative integer"; finally, use the formula "integer = positive integer + negative integer + zero" to tell the students the meaning of "integer". Similarly, we can inform the students what is "fraction". Finally, give the formula "rational number = integer + fraction", which can clearly explain these three professional words.

Situational method is also often used in the teaching of Chinese vocabulary for mathematics majors. Situational method, also known as "audio-visual method". Emphasize in a certain situation, the combination of auditory and visual perception, a teaching method for the perception of the overall structure. Situational method uses multimedia teaching means, through slides, recordings, films, etc., so that the combination of auditory perception and visual perception of students; through the display of images and dialogue, so that students directly perceive the dialogue in the overall structure, as well as the voice, intonation, tone, speed, vocabulary, grammar and many other elements.

The proper application of audio-visual method will make the Chinese class of mathematics professional full of vitality, become more mysterious and interesting. When learning the concept of "limit", teachers can carefully select a concise language, easy to understand, interesting cartoon for students to watch and learn, not only can cause students' interest in learning, active classroom atmosphere, but also mobilize more professional knowledge in the mind of overseas students, greatly improve the learning efficiency.

In addition, it is necessary to emphasize that in the Chinese class of preparatory students in China, the use of English and various media languages is strictly controlled, so higher requirements are put forward for teachers. It is necessary to use as vivid, simple and direct ways as possible to explain clearly these professional vocabulary of mathematics, science and chemistry, which really needs to use their brains.

## 3.2. Common Format of Teaching Methods

Different from basic Chinese teaching, in the teaching of Chinese for mathematics majors, routine grammar is no

longer taught, but some commonly used narrative formats related to mathematics are learned. For example: "along the... (direction); V + into/in/to" and so on. The methods we often use are "deduction" and "induction".

Deduction is to show grammar rules first, and then illustrate grammar rules with examples, so that students can replace, generate and expand by themselves. Usually, the grammar rules are summarized into several sentence patterns, and the sentence patterns are concretized into some example sentences. First let students contact with demonstration sentences, and then through imitation, analogy, replacement, and exercise, let students thoroughly master them. In a sense, it is the flexible use of listening and speaking.

Listening and speaking are often used in the teaching of commonly used formats of Chinese for mathematics majors. Listening and speaking is a teaching method that advocates "listening and speaking in the first place, listening with the ear first, and then saying with the mouth. After repeated oral exercise, the learned language materials can be used automatically". Its theoretical basis is structural linguistics and behaviorism psychology. It follows the basic principles: listening and speaking first; repeated practice, forming habits; taking sentence patterns as the center, excluding or limiting the mother tongue; comparing language structures, determining teaching difficulties; Correct mistakes in time and cultivate correct language habits.

In the specific teaching practice, we often use this method to repeat sentence drills, deepen students' impressions and complete the leap from quantitative change to qualitative change. When teaching, teachers should give abundant examples for students to understand, repeatedly stimulate students' auditory organs, and ask students to make a large number of examples according to the teacher's format.

Example 5: When learning position and direction, students are required to master the movement analysis of simple and complex objects, which needs to use the format of "along the... (direction)." At this time, teachers should first give the usage of this format: "along the horizontal direction to the left/right"; "along the vertical direction up/down"; "along the inclined plane down". Then give the corresponding dynamic pictures, for example: a car pulled to the right on a horizontal table; an apple moving downward under the action of gravity; a block sliding down the inclined plane, etc., and let students make correct sentences according to the rules given by teachers.

Example 6: When learning instructions and requirements, we will learn a format -- "V+ into/in/to", then we will use induction method to teach. Induction is to first show a certain number of examples (as many as possible), and then a lot of exercises, and finally guide the students to generalize the grammar rules, if necessary, can also derive a representative grammar structure formula. In class, the teacher should first give a lot of examples, such as:

1) put sugar into water, sugar will slowly become less, water will slowly become sweet.

2) will xl, x2 respectively into the equation, obtain yl, y2.

3) will write the sender's address in the upper left corner of the envelope.

4) will paste the picture on the wall.

5) will put the supplies on the table into the schoolbag.

6) will put the vegetables into the refrigerator.

The teacher allows the students to conclude this kind of common format structure, that is, "will... V + into / in / to", and finally the teacher allows the students to give more examples according to life experience to consolidate the review. When it comes to the individual and real life closely related, and at the same time in the exercises repeatedly appear in the fixed grammar format, you can also use the situational method, linked to the actual, repeated drill.

## 3.3. Teaching Methods of the Text

The text in the Chinese textbook for mathematics major is generally three or four shorter narrative articles. The main purpose of the text teaching is to let the students read, understand and retell the text content. The commonly used methods are the teacher's reading, the students' reading aloud, the students' retelling and so on. In the specific teaching process, we can use the "cognitive method" for teaching.

Cognitive method is a foreign language teaching method that according to the laws of cognition, mobilizes the intellectual potential of learners, strives to discover and master language rules, and creatively uses language. The teaching process of this method is divided into three stages: explanation (explaining new language knowledge combined with students' existing knowledge), comprehension training (doing comprehension exercises first, such as discrimination questions, yes/no questions, multiple choice questions, and question-and-answer questions; then doing language structural exercises, such as substitution, retelling, and situational dialogue), and comprehensive application (teachers organize students to use what they have learned to carry out verbal communicative exercises, such as discussion, debate, role-playing of the text, language games, etc.).

The cognitive method runs through the whole classroom teaching. In class, teachers first explain new words and explain new language knowledge combined with students' existing knowledge; then, explain the "common format", and ask students to repeat sentence patterns on the basis of understanding; finally, explain the text.

Before explaining the text, teachers should fully explain the new words and common format of the class, and then generally read or play the recording first, let students listen to it once, and then answer questions; then read the text with the teacher, and then let students read the text together, and then do the exercise of judging the correctness. After reading the text several times in various ways, let the students complete the exercise of "fill in the blanks according to the text content" in the book; at this point, the training of comprehension ability has been completed, that is, to do cognitive exercises first, such as discrimination questions, yes/no questions, multiple choice questions, and question-and-answer questions; then do language structural exercises, such as substitution and situational dialogue. Finally, give the key words, and let the students retell the text according to the key words.

In addition, when explaining the text, teachers can prepare some small videos related to the text for students in advance, and let the students watch them before explaining the text to arouse their interest. The videos are generally 2 to 3 minutes of knowledge-based cartoons, with vivid and interesting pictures, concise and easy-to-understand language, and certain popular science, such as: "Zhang Heng's War of Rational Numbers", "Basic Properties of Equilateral Triangles", "Positional Relationship between Lines and Circles", etc. These videos have a good introduction and auxiliary role in learning "simple mathematical relations", "definition and description" and "common mathematical figures and the relationship between them".

# 4. Brief Summary

"Science and technology is the primary productive force, talent is the primary resource, innovation is the primary driving force", promote the research of scientific Chinese, build the teaching system of scientific Chinese, improve the quality of academic education for international students of science and engineering, is to strengthen the international flow of scientific and technological talents, help the internationalization of vocational education, deepen the development of international Chinese education, serve the national strategic layout of a series of major issues.

Efficient teaching methods can effectively improve the quality of teaching, improve teaching performance and language ability, make boring learning become vivid, make passive learning become active. This article is the author combined with the preparatory mathematics professional Chinese teaching practice experience, as well as some theoretical reference summed up the mathematics professional Chinese teaching methods. In the teaching of science and technology Chinese, teaching methods are not constant, according to the different teaching objects, teaching objectives, teaching tasks, to adjust the teaching methods in time to improve the teaching effect. In addition, in the teaching of science and technology Chinese, choose a set of feasible science and technology Chinese teaching materials, have emphasis on teaching strategies, cultivate and improve the ability of international students to master and use science and technology Chinese, for professional learning escort.

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