# Research on Optimizing Teaching Mode of Number Theory Course Based on Teaching Reform

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**Keywords:** Teaching Reform; Number Theory Course; Teaching Mode; Optimization

**Abstract:** This paper scientifically describes the teaching and teaching of number theory and the relationship between them. The teaching and learning of mathematical theory mainly refers to the courses offered by normal universities for students' training. It can cultivate students' solid basic knowledge of mathematics and unique thinking methods of mathematical theory. On the one hand, it is helpful for students to further explore the unknown field of number theory, and on the other hand, it is helpful for teachers who will be engaged in mathematics teaching in primary schools to better grasp the teaching of number theory. Teachers should organically combine the learning and teaching of number theory to further develop a scientific outlook on life and values. In combination with number theory course teaching practice, on the analysis of present situation on the basis of the theory course teaching in our country, this paper expounds the necessity of number theory course teaching reform, and then from the change of teaching ideas, the reform of the teaching content, teaching method improvement theory course teaching reform in our country is discussed the possibility of way, hope to acquire the course of teaching and learning "win-win".

## 1. Introduction

Number theory is a very old branch of mathematics which studies the properties of integers. Its part is centered on the divisibility of integers. It includes divisibility, indefinite equation, congruence, continued fraction, distribution of prime numbers (i.e. integers) and number theory functions. It is called elementary number theory [1]. In addition, the theory and method of number theory have been widely used in many fields such as modern cryptography, operator theory, algebraic coding, optimal design, computational methods, combinatorial algebra and information science[2]. Therefore, learning this course is very important for students. As a major course for the education major of normal universities, the course of number theory, on the one hand, trains students to master the basic theoretical knowledge of number theory and to preliminarily apply the tools of number theory to solve practical problems; on the other hand, it also trains more qualified teachers for the new era [3]. However, at present, the teaching content of the number theory course in universities is relatively old, and the teaching method is basically a single teaching mode of "teacher teaching, student learning", which emphasizes the pure theory teaching but ignores the practical application, seriously restricting the improvement of teaching quality [4]. At present, the research on the teaching of number theory in normal universities mainly focuses on theoretical discussion, while there are few practical researches. This paper combines the teaching practice and teaching status of number theory in our university, and combines theoretical research with practice to discuss the teaching reform of number theory in normal universities [5].

In normal colleges and universities, as one of the most closely related courses with mathematics in primary and secondary schools, how to highlight the characteristics of Teacher Education in classroom teaching, strengthen the moral education of students, strengthen the cultivation of students' teaching practice ability and creative thinking ability, and lay a good foundation for students to engage in mathematics teaching in primary and secondary schools in the future is particularly important [6]. At present, on the one hand, many local normal colleges and universities are in the period of transformation and development, and the number of colleges and universities developing towards comprehensive and application-oriented is increasing. The important position of teacher education specialty is impacted by various non-teacher education specialties, which

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gradually reduces the human, financial and material resources invested in teacher education specialty. With the rapid development of society and schools, teacher education specialty has not received due attention [7]. Of our students who are on the other hand there is a certain distance to the demands of the service society, main show is: in today's situation of graduate employment is becoming increasingly serious, in the society to teach exam, graduates of higher normal colleges in competition with the ordinary university graduates did not show obvious, should have the advantage of [8]. At present, the teaching content of the number theory courses in colleges and universities is relatively old, and the teaching methods are relatively simple. And the application in daily life is not obvious [9]. These problems are very unfavorable for improving the quality of teaching of number theory. At the same time, it is even more unfavorable to train mathematics teachers with flexible thinking ability and creativity in the future [10].

## 2. Materials and Methods

The author has compiled a questionnaire about the teaching and practice of number theory course. The questionnaire mainly includes students' understanding of number theory, main contents, teaching methods and evaluation methods. Release 100 questionnaires about the implementation of number theory courses, 100 valid questionnaires, the recovery rate is 100%. Use SPESS software to collate and analyze the results of the questionnaires. Through the study of number theory courses. The proportion of students who have a better understanding of the theory course is 43%, which has been greatly improved compared with the beginning of the semester. However, it is noteworthy that 57% of the students still have a general understanding of the theory course. It can be seen that there are still many students who do not have a deep understanding of the theory course, which shows that their learning is not solid enough. When asked: Do you think that the opening of the course of number theory is necessary, 23% of the students think it is very necessary, 42% of the students think it is more necessary, 25% of the students think that the students who think it is not necessary account for 10% (Table 1). It can be seen that through one semester of study, most students believe that it is necessary to open a number theory course.

Table 1 the necessity of opening a number theory course

| Category | Very necessary | More necessary | General | Not necessary |
|---|---|---|---|---|
| Number of people | 23 | 42 | 25 | 10 |
| Proportion | 23% | 42% | 25% | 10% |

For the difficulty of the theory course teaching content, 43% of the students felt somewhat difficult, 57% of the students think is right. When you think the teacher in each class of practice the difficulty is how to ask questions or, just 47% of the students think, but there are 44% of the students feel somewhat difficult. Thus it can be seen after class arrangement to consider life is difficult for some students, teaching should be appropriate reduce degree of difficulty thinking exercises from now on.

For the arrangement of the main content structure of the number theory course, 45% of the students thought it was normal, 40% of the students thought it was better, and 5% and 10% thought it was bad and good, respectively. Therefore, more than the general students think that the teaching content structure of number theory course is reasonable. As for the teaching methods adopted by teachers in class, 21% of the students are not clear, 64% and 7% agree with them and 8% disagree with them (Figure 1). It shows that most students still like heuristic teaching methods very much. At the end of the semester, 65%, 20%, 9% and 6% of the students thought they were good, good, general and disliked, respectively (Figure 2). It can be seen that the way of open-book examination is the way most students like to evaluate.

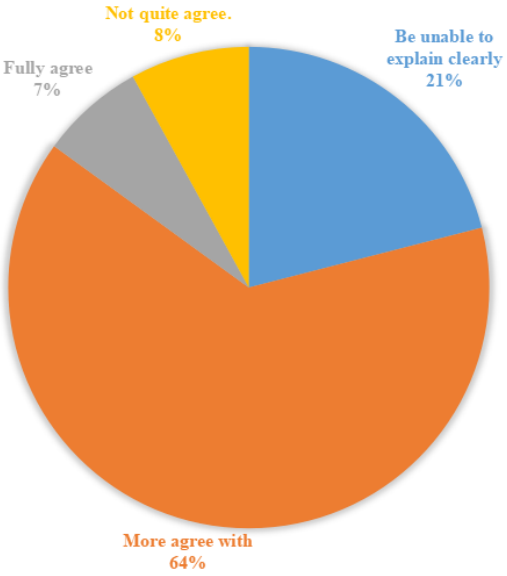


Fig.1. Satisfaction with teaching methods

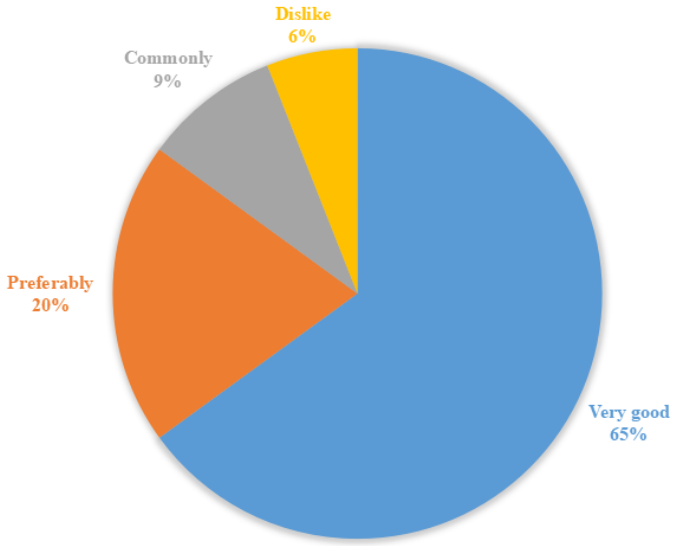


Fig.2. Satisfaction with evaluation methods

## 3. Results

Number theory studies integer division theory and its basic properties. It is a very important basic mathematics course for Elementary Education Majors in Colleges and universities. Its main contents include integer division property, congruence theory, indefinite equation, simple continuous fraction, algebraic number, transcendental number, number theory function and prime number. In the past 60 years, the development of number theory has been very rapid, and new ideas and methods and new knowledge structure system have emerged constantly. However, the content of the current mathematics textbooks in our country is relatively old, which is still the research results and conclusions before the mid-20th century. Its characteristics are pure theory, Abstract content, rarely involving the formation and development of theoretical ideas, and rarely involving the introduction of background knowledge of related issues. In fact, teachers should involve in the history of mathematical development, the cultivation of mathematical ideology and mathematical thinking methods in the teaching process of number theory courses, but these are basically blind areas in teaching practice. Especially in normal colleges, the teaching of number theory courses

generally focuses on theoretical teaching but neglects or seldom involves the practical application of number theory knowledge. The traditional teaching of number theory cannot get rid of the teaching mode of "teachers' single indoctrination-style explanation and students' flowing records". The teaching methods are quite rigid, the class lacks vitality, and the interaction between teachers and students is poor. This is not only not conducive to students to establish a sense of innovation, innovation is not conducive to the cultivation of talent, and the traditional teaching method and the current progress of science and technology, social development does not adapt. The one-sided emphasis on the leading role of the teacher while ignoring the main role of the students leads to the students to develop the habit of lazy thinking, which greatly restricts the cultivation of the students' innovative consciousness and innovative ability. Therefore, it is urgent to reform the model of number theory course in colleges and universities, which is of great significance not only for the teaching of number theory course and the construction of students' systematic knowledge, but also for the cultivation of qualified talents engaged in education in the future.

As a compulsory course for higher normal colleges, number theory should adhere to the organic unity of teacher professionalism and academics, and highlight the characteristics of teacher profession. At the same time, the knowledge of number theory should be infiltrated in teaching, and the qualified modern education major should be cultivated according to higher normal colleges. The teacher's goal is to position the course. In the teaching process, it is necessary to highlight key points, highlight the teaching content closely related to real life, highlight the chapters in the textbook that are closely related to primary and secondary schools, can inspire students' thinking, and apply more in competition mathematics. This course mainly adopts heuristic teaching methods, combined with analogy and creative teaching methods. Heuristic teaching can not only improve students' ability to understand and accept new knowledge, but also improve students' ability to analyze and solve practical problems. Strengthen the cultivation of students' sense of innovation and innovation. The greatest advantage of this teaching mode is to strengthen the interaction between teachers and students. Multimedia technology should be used in teaching. Multimedia teaching is vivid and full of pictures and texts. It can cultivate students' innovative consciousness and increase students' interest in learning. Of course, the application of multimedia technology can not ignore the traditional teaching methods. Practice has proved that mathematics teaching must combine traditional teaching and multimedia technology in order to better play the role of multimedia and achieve good teaching results. Therefore, in the teaching process of number theory, we should adhere to the principle of "student-centered, teacher-led and multimedia-assisted", fully combine the traditional teaching mode with multimedia teaching effectively, so that we can accomplish teaching tasks with high quality in limited classroom teaching time, and students can get the greatest harvest.

## 4. Conclusion

The course of number theory in our country still basically inherits the traditional teaching mode. The teaching reform path proposed in this paper based on the requirements of the new era and the change of talent training objectives has certain scientificity and practicality, but it cannot solve many disadvantages of the course of number theory in our country. Teachers should fully grasp the relationship between learning and teaching of number theory, grasp the main content, basic ideas, distinguish between key points and difficult points for teaching, so that students can experience the joy of learning. Number theory is a basic course. The quality of teaching is directly related to the quality of mathematics education in colleges and universities. It is hoped that more scholars will invest in the research of number theory teaching and promote the development of mathematics talents and the development of mathematics in China. We must, according to the talent training objectives of mathematics and applied mathematics in higher normal colleges, train our primary and secondary school teachers who use modern educational methods and methods to carry out mathematics education and teaching, or apply talents who can continue to pursue postgraduate degrees. The teaching content and teaching methods of the number theory course comprehensively improve the quality of education and teaching.

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