Research on the Learning Interest of Graduate Students Majoring in Mathematics

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ABSTRACT

Mathematics plays an irreplaceable role in all fields of society with its strong foundation. It is of great significance to strengthen mathematics education, especially for graduate students. However, according to the current learning state of mathematics graduate students, their enthusiasm for scientific research is not high. Therefore, this study takes all the master degree students of mathematics major in 2019 from the school of mathematics and statistics of Shandong Normal University as the objects of investigation, and issues questionnaires to the students, and uses the method of quantitative analysis to study the current situation of mathematics learning interest of the graduate students of mathematics major. The results show that the graduate students majoring in mathematics are interested in mathematics learning in the mass, but the degree of interest is not high, although these students are active in taking notes on mathematics. Therefore, in daily teaching, graduate tutors should pay closer attention to lead and develop students' studying interest to improve their learning motivation.

Keywords: *Graduate students, Mathematics, Learning, Interest, Professional, Teaching.*

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Highlights of this paper

- Mathematics plays an irreplaceable role in all fields of society with its strong foundation.
- The results show that the graduate students majoring in mathematics are interested in mathematics learning in the mass.

1. INTRODUCTION

Mathematics is an important subject with strong applicability, all aspects of social production and life are permeated with the application of mathematical knowledge, so the development of mathematics is bound to promote the development of social production. It is no doubt that graduate students majoring in mathematics are an important force to expand the field of mathematical knowledge. The learning motivation of graduate students drives them to explore the field of mathematical knowledge, largely determines the development speed of mathematical knowledge. While interest is the most dynamic factor among all the learning motivations of students, so it is of great significance to research the learning interest of mathematics graduate students.

2. LITERAURE REVIEW

We sorted and summarized the literature related to the learning interest of graduate students adopting the literature research method before the start of the research, and found that there is rare research on this problem so far.

Zeng thought that interest and hobbies are key components of human internal motivation. Keen interest could bring rich emotional experience for graduate students and let them not regard learning and research as specific tasks as well as spontaneously desire to explore further (Zeng, 2000).

Zhao believed that chief reasons why graduate students generally are lack of research interest are the change of motivation for postgraduate entrance examination, the transformation of learning style, impetuous mentality and negative effects of tutors, and some suggestions pointed at these reasons are proposed (Zhao et al., 2014).

After researching learning motivation, learning strategies and the relationships between them, zhang found that graduate students with deeper learning motivation tend to adopt deeper learning strategies (Zhang, Zhao, Yang, & Li, 2015).

Liu and Zhao (2017) using the questionnaire survey and interview method, found that academic motivation of academic postgraduate, included academic expectation, subsidiary motivation, knowledge exploration, work orientation, self-improvement, diploma, and interest (Liu & Zhao, 2017).

Liu and his workmates believed that academic interest was an important foundation for training innovative talents. Based on the current background of higher education, they discussed the main influencing factors of academic interest of academic graduate students, including academic motivation, scientific research investment, the relationships between guidance and learning, guidance of tutors, academic environment and so on. They also explored the mechanism of each influencing factor (Liu, Zhao, Shi, & Liu, 2019).

In view of the disadvantages of the traditional teaching mode and the practice of curriculum reform, Guo believed that the cultivation of interest played a significant role in improving the effectiveness of curriculum teaching of postgraduates (Guo, Chi, Tang, & He, 2018).

Wang believed that the research interest of doctoral students was generally low. He analyzed that if there ware significant relationships among the chief influencing factors by studying the current situation of scientific research interest of academic doctoral students and its influencing factors (Wang, 2018).

From the above, it is easy to see that there have been some researches on the interest of graduate students at the moment. However, these studies mainly focus on the components of graduate students' learning interest,

influencing factors and internal interaction mechanism between the influencing factors. There is no research pointed at the learning interest of mathematics graduate students so far, while it is necessary and important to study the interest of mathematics learning of the graduate students majoring in mathematics.

3. THEORETICAL FOUNDATION

Regarding the "interest", domestic researchers have different understandings. Some researchers believe that interest is the cognitive tendency with strong emotional color, which is closely related to individual exploration tendency and curiosity and is based on the need to know and explore something. It is the most active factor in students' learning activities. In addition, they also divide interest into personal interests and situational emotions (Jiao, 2008; Zhao, 2011; Zhao, 2009). Some researchers believe that interest is a psychological characteristic pointed at individual enthusiasm and tendency to pay attention to and explore a certain thing or engage in an activity (Zeng, 2000; Zhao, 2011). Some researchers believe that learning interest will produce active tendency if students are interested in learning, thus they will get good grades (Zhao, 2011).

Oversea scholars roughly define interest according to philosophy, pedagogy, and psychology. For example, Kant believed that only individuals combine emotion with reason can interest generate with the characteristic of pure reason. Herbart explained what interest is on the basis of pedagogy. He believed that interest is not only the active and extensive movement of students' psychology and human inner initiative but also ideas and a state of curiosity and alertness of intellectual activities with high attraction and attention to what they have learned. Krapp et al. defined interest according to psychology and believed that interest is human character disposition and psychological state (Du & Wang, 2017).

Herbart was the first one to study the classification of interest; he divided interest in emotion and cognition. According to his interest classification theory, the cognitive part includes experiential, speculative and aesthetic interest. Meanwhile, the emotional part includes sympathetic, social and religious interest. In addition, in John Dewey divided interest into active interest, social interest, discoverable interest, and rational interest. He also classified interest by the relationships between purpose and means; they are direct interest and indirect interest. Indirect interest is a desire and aspiration to achieve set goals and expectations by striving, direct interest is desire and intention to accomplish something or activity you want (Du & Wang, 2017). Moreover, interest can be classified by different standards. For example, interest includes direct interest and indirect interest according to the way of learning interest generation; it is also divided into transient interest and stability interest on the basis of interest time duration (Zhao, 2011).

Researchers have a lot of ways to define the concept of interest, but after summing up, we can find that most researchers define "interest" as a cognitive tendency, mental orientation or psychological characteristics with positive emotional color, which is a definition from a psychological perspective. Therefore, our study intends to adopt the definition of "interest" in the field of psychology, which is defined it as "interest is individual's psychological tendency to actively explore certain things and activities", thus, we intend to define "interest in mathematical learning" as individual's psychological tendency to actively explore mathematics knowledge or love joining in mathematical activities. We divided interest into direct interest and indirect interest referring to Zhao's classification and this study mainly investigated the students' direct interest in mathematics learning.

4. RESEARCH METHOD

4.1. Participants

In this study, the sample of this research is the postgraduate students of all 2019 mathematics majoring in the school of mathematics and statistics of Shandong Normal University, including 13 students majoring in basic mathematics, 11 students majoring in computational mathematics, 11 students majoring in applied statistics, 10

students majoring in applied mathematics, 5 students majoring in operation research and cybernetics and 5 students majoring in statistics, with a total of 55 students.

4.2. Instrument

Questionnaire was used as a survey tool to collect data in this study. The questionnaire includes 21 questions and mainly contains professional knowledge learning in class, professional knowledge learning after class and amateur knowledge after class. They are all scale questions except for the basic information questions. Each question has five options: "very inconsistent", "inconsistent", "general", "consistent" and "very consistent". In order to facilitate the computer statistical processing, the above options are given scores of "1, 2, 3, 4, 5" .

4.3. Data Collection

This study used "questionnaire star" as information collecting media. Researchers input the questionnaire content into "questionnaire star" and sent it to 2019 mathematics graduate students' QQ group in the form of link. Meanwhile, these students filled them in anonymously.

4.4. Data Processing

We used the data processing function of "questionnaire star" to make statistics on the percentage and average scores of collected data after information collection.

5. RESULTS

55 questionnaires were sent out and all of them were recovered in this study, so the recovery rate was 100%; 55 questionnaires could be used for data statistics after sorting out and analyzing, the effective rate was 100%.

5.1. Professional Knowledge Learning in Class

Through statistical analysis, it is found that more than 70% of the students are able to actively answer questions, put forward questions, discuss and communicate in class, but their initiative is not high; 69% of the students are very active in taking mathematical notes as well as the average is 3.93. Details are shown in Table 1.

Table-1. Students' initiative in learning professional knowledge in class.

Options	Answering questions actively	Putting forward questions	Taking notes carefully	Discussing and exchanging views
Very Inconsistent	3.64%	9.09%	1.82%	1.82%
Inconsistent	10.91%	20.00%	5.45%	7.27%
General	52.73%	43.64%	23.64%	36.36%
Consistent	27.27%	23.64%	36.36%	36.36%
Very consistent	5.45%	3.64%	32.73%	18.18%
Average Score	3.2	2.93	3.93	3.62

Source: Field survey, 2019.

5.2. Professional Knowledge Learning after Class

Through statistical analysis, it is found that more than 70% of the students are able to introspect classes and make their own learning schedule actively, but their initiative is not high; In addition, 69.09% and 67.27% of the students are active in previewing and communicating mathematical content, but the degree of initiative is not high; 60% of the students are positive to solve difficult mathematical problems, so their initiative is also not high. Details are shown in Table 2.

Table-2. Students' initiative in learning professional knowledge after class.

Options	Reflection on learning	Learning Schedule Making	Preview Class Content	Communicating mathematical contents	Solving difficult math problems
Very Inconsistent	0.00%	0.00%	5.45%	3.64%	1.82%
Consistent	3.64%	9.09%	16.36%	9.09%	27.27%
General	50.91%	52.73%	40.00%	40.00%	49.09%
Consistent	32.73%	29.09%	29.09%	27.27%	10.91%
Very Consistent	12.73%	9.09%	9.09%	20.00%	10.91%
Average Score	3.55%	3.38%	3.2%	3.51%	3.02%

Source: Field survey, 2019.

5.3. Amateur Knowledge Learning after Class

Through statistical analysis, it is found that more than 70% of the students are active in exploring the principle of formulae and its contexts, constantly trying new methods and strategies for solving problems, mathematical history and watching mathematical relative videos, but the degree of initiative is not high; 69.09% of the students are active in applying and connecting mathematical knowledge to real life, but the degree of initiative is not high; Less than 70% of the students are active in participating in mathematical competitions, talking about mathematics knowledge freely, taking mathematicians as an example, paying attention to the frontier problems of mathematics and reading mathematical magazines, and their initiative is also not high. Details are shown in Table 3.

Table-3. The first table about students' initiative in learning amateur knowledge after class.

Options	Exploring the principle of formulae	Applying mathematics knowledge to life	Trying new methods and strategies	Participating in mathematical competitions	Talking about mathematics freely
Very Inconsistent	5.45%	3.64%	3.64%	5.45%	7.27%
Inconsistent	14.55%	18.18%	9.09%	14.55%	27.27%
General	43.64%	47.27%	52.73%	36.36%	49.09%
Consistent	29.09%	21.82%	25.45%	21.82%	7.27%
Very Consistent	7.27%	9.09%	9.09%	21.82%	9.09%
Average Score	3.18	3.15	3.27	3.4	2.84

Source: Field survey, 2019.

Table-4. The second table about students' initiative in learning amateur knowledge after class.

Options	Taking mathematicians as an example	Interest in mathematical history	Paying attention to frontier math problems	Reading mathematical magazines	Watching videos related to mathematics
Very Inconsistent	3.64%	7.27%	3.64%	5.45%	5.45%
Inconsistent	18.18%	10.91%	10.91%	21.82%	12.73%
General	41.82%	38.18%	45.45%	43.64%	58.18%
Consistent	23.64%	32.73%	21.82%	14.55%	16.36%
Very Consistent	12.73%	10.91%	18.18%	14.55%	7.27%
Average Score	3.24	3.29	3.4	3.11	3.07

Source: Field survey, 2019.

6. DISCUSSION

(1) According to the above results, the students are active in learning professional knowledge in class, learning professional knowledge after class and learning amateur knowledge after class, but the degree of initiative is not high. Thus we can see that the students are interested in learning professional knowledge in class, learning professional knowledge and amateur knowledge after class, but the degree of interest is not high.

(2) Most students are active in answering and putting forward questions, discussing and communicating in class as well as introspecting, making learning schedules, previewing learning contents, exploring the principle of formulae, trying new methods and strategies, watching videos related to mathematics and mathematical history after class, but the degree of initiative is not high. So we can see that the students are interested in the 10 aspects, but the degree of interest is not high.

(3) Merely more than half of the students are active in participating in mathematical competitions, reading mathematical magazines, talking about mathematics freely, paying attention to frontier math problems, taking mathematicians as an example, communicating mathematical contents and solving difficult math problems, and the degree of initiative is not high. Thus we can see that the students are lack of interest in the above 7 aspects.

7. CONCLUSIONS

From the above results analysis, it is concluded that although the students are very active in taking mathematical notes, the students' are interested in mathematics learning and the degree of interest is not high.

8. SUGGESTIONS

According to the conclusion of this study, researchers suggest that graduate tutors should take corresponding measures and pay more attention to, guide and develop students' learning interest in daily teaching work to improve their learning motivations and research ability.

Objectively speaking, this study also had some shortcomings. The subjects we chose just were a grade from the school of mathematics and statistics, Shandong Normal University only. This would inevitably affect the accuracy of the results to some extent. Therefore, it is necessary to increase the number of study samples from different regions and universities in order to make the above conclusion more comprehensive and meaningful.

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