

# Empirical Research on the Curriculum Satisfaction of Postgraduates in Mathematics

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**Abstract** This research focused on the experience and cognition of postgraduates in mathematics in mainland China to their curriculum, aimed at the figuring out their Curriculum Satisfaction. We adopted a close-ended structure questionnaire and mainly investigated the satisfaction of following five aspects: curriculum goal, curriculum content, curriculum implementation, curriculum evaluation and curriculum resources. A total of 166 postgraduates in mathematics from 19 universities in China participated in this investigation. The results indicated that most postgraduates were generally satisfied with current curriculum, but their satisfaction degree was not high. What the postgraduates were most dissatisfied with were curriculum content and curriculum evaluation. Therefore, the curriculum content and curriculum evaluation should be paid special attention to when we reform the postgraduates' curriculum.

**Keywords:** *postgraduates, curriculum, satisfaction, mathematics*

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## 1. Introduction

Satisfaction is a status when a person's willingness was satisfied with. It could directly affect a person whether he could accept something easily or not, or was willing to devoting time and energy to an activity or not. So, understanding the students' satisfaction of their current curriculum and to master their learning situations were of great significance for the reform of the curriculum and teaching, and it has become a hot topic in education research area. By now there have had many studies about students' satisfaction. Such as Wei Huiru et al. had studied the university students' satisfaction to their curriculum provision in normal universities [13]. Li Hong and Huang Qiumei had studied the postgraduates' satisfaction of their curriculum provision in science and technology universities [2]. Zhou Haiyin had studied graduates' satisfaction of their curriculum in Shandong Province in China [16,17]. Qian Kai had studied the university students' satisfaction in east universities of China [6]. Sun Jian and Mao Mingming had studied university students' satisfaction of econometrics curriculum in Chongqing Technology and Business University [7]. Ji Yuehua had studied the university students' satisfaction of English curriculum in higher vocational Colleges [1]. Mi Yuqian et al. had studied the curriculum satisfaction of undergraduates majoring in Health Career Management [4]. Liang Qi had studied the curriculum satisfaction of undergraduates majoring in musicology [3]. Manuela Paechter, Brigitte Maier and Daniel Macher had studied the students' satisfaction of electronic curriculum in 29 universities of Austria [5]. Ya-Ling Wu and Jia-Jen-Hu had studied the students' satisfaction of technical education

programs in Taiwan Junior high school [15]. Wei Jingzhu and John N. Gathegi had studied the curriculum satisfaction of 228 students majoring in library and information science in two universities in China [14]. However after reviewing these studies, we haven't found one which was about the curriculum satisfaction of the postgraduates in mathematics in China yet. Indeed a quite part of contents of curriculum of postgraduates in mathematics in China universities now were formed many years ago, some of them even were formed 30 year ago. The situation of curriculum arrangement and the content generally were also the same. Do the current postgraduates in mathematics like these curricula? Are they satisfied with current curriculum provisions? These questions are not known yet. However, these problems were quite urgent to be understood in the era of comprehensive development and complete reform of higher mathematics education. In 2014, the China ministry of education ever issued an official document: Opinions on Improving and Strengthening the Construction of Postgraduate Courses, which specifically mentioned the current postgraduate curriculum and teaching problems and emphasized the postgraduate curriculum and teaching should closely follow the development of times [8]. Therefore, we conducted a survey of curriculum satisfaction of postgraduates in mathematics from some universities in China.

## 2. Methodology

### 2.1. Participants

To get the comprehensive and accurate results, we recruited 166 postgraduates in mathematics randomly

from Peking University, Beijing Normal University, Nanjing University, Fudan University, Shanghai Jiaotong University, Wuhan University, University of Science and Technology of China, Sichuan University, Anhui University, Gansu University, Northeast Normal University, Tianjin University, Shandong University, Shandong Normal University, Qingdao University, Ludong University, Linyi University, Qufu Normal University and Liaocheng University. These 166 postgraduates all aged between 24 years old and 30 years old, and in which there were 51 male students and 115 female students, 40 postgraduates in basic mathematics, 33 postgraduates in computational mathematics, 32 postgraduates in applied mathematics, 34 postgraduates in Operational Research and Cybernetics, and 27 postgraduates in probability theory and mathematical statistics. The most important was they all had already finished their curriculum learning, and after comparing their curriculum plans and curriculum schedules, we found their curriculum content of same major approximate in 60% was same or similar, even though the names of some curriculum were different[9-12]. The distinct difference of their curriculum was in aspect of optional curriculum. However these curricula were not too much, the percentage of that was only about 40%.

## 2.2. Instrument

The instrument we used was close-ended structure and Likert-Scale five points measure questionnaire, which was developed in Chinese based on a large number of present curriculum satisfaction questionnaires in Mainland China and relevant literatures. Its items mainly involved the following five aspects: curriculum goals, curriculum contents, curriculum implementation, curriculum resources and curriculum evaluations. Each item was given a 5-point scale with 1 = strongly dissatisfied, 2 = dissatisfied, 3 = average, 4 = satisfied, and 5 = strongly satisfied.

## 2.3. Data Collection

The questionnaires were distributed by email to respondents. About 3 weeks later they all were sent back. After abandoning 13 questionnaires due to having missing items or multiple answers, finally we got 153 available questionnaires.

## 2.4. Data Analysis

At first, we classified above 153 questionnaires according to previous five aspects and majors of mathematics, and then calculated the percentages of each answers of all issues and the mean scores of each issue. The results of this paper were derived from the analysis of these percentages and mean scores.

## 3. Results

### 3.1. Curriculum Goals

The detailed situations of curriculum goals were as shown in Table 1. From Table 1 we knew that more than 50% of the postgraduates in mathematics were satisfied with the current curriculum goals. Especially the postgraduates in Computational Mathematics, more than 60% of them were satisfied with their curriculum goals. However, it also could be seen from the Table 1 that the mean satisfaction degree of curriculum goals of all postgraduates in five majors was not high. It was just slightly higher than the general level. (And after calculating, there was no significant difference between the 19 universities postgraduates' satisfaction.) Among these means, the highest satisfaction degree of curriculum goals was given by the postgraduates in Computational Mathematics, whose mean satisfaction degree of curriculum goals reached 3.47. Otherwise, the lowest satisfaction degree of curriculum goals was given by the postgraduates in Fundamental Mathematics, whose mean satisfaction degree of curriculum goals was just 3.32.

Table 1. The situations of satisfaction degree to curriculum goals

Majors	Items		strongly dissatisfied	dissatisfied	Average	satisfied	strongly satisfied	Means	Variances
Fundamental Mathematics	1	Frequencies	2	8	8	14	5	3.32	1.13
		Percentages	0.05	0.22	0.22	0.38	0.14		
Computational Mathematics	1	Frequencies	3	3	7	14	5	3.47	1.16
		Percentages	0.09	0.09	0.22	0.44	0.16		
Applied Mathematics	1	Frequencies	1	6	5	13	3	3.39	1.07
		Percentages	0.04	0.21	0.18	0.46	0.11		
Operational Research and Cybernetics	1	Frequencies	2	6	5	13	4	3.37	1.16
		Percentages	0.07	0.20	0.17	0.43	0.13		
Probability and Mathematical Statistics	1	Frequencies	1	6	5	9	5	3.42	1.17
		Percentages	0.04	0.23	0.19	0.35	0.19		

### 3.2. Curriculum Contents

The situations of curriculum contents were as shown in Table 2. From Table 2 we knew that more than 50% of the postgraduates in mathematics were satisfied with their current curriculum contents. Similarly, we could see from the Table 2 that the mean satisfaction degree of curriculum contents of all postgraduates in five mathematics majors was not very high, it was also just slightly higher than the general level. (After calculating,

there was no significant difference between the 19 universities postgraduates' satisfaction either.) The highest satisfaction degree to curriculum contents was alike given by the postgraduates in Computational Mathematics, whose mean satisfaction degree to curriculum contents reached 3.56. The lowest satisfaction degree to curriculum contents was given by the postgraduates in cybernetics and operations research, whose mean satisfaction degree of curriculum contents was just 2.97, so the postgraduates in cybernetics and operations research should be slightly dissatisfied with their curriculum contents.

The item 2 was related to the volumes of curriculum content, and the item 4 was related to the organization of curriculum content. So from the Table 2 we could also know that the most dissatisfied aspects to postgraduates

was the volumes of curriculum content, and the most satisfied aspects of postgraduates was the organization of curriculum content.

**Table 2. The situations of satisfaction degree of curriculum contents**

Majors	Items		strongly dissatisfied	dissatisfied	Average	satisfied	strongly satisfied	Means	Variances
Fundamental Mathematics	2	Frequencies	4	4	8	19	2	3.30	1.10
		Percentages	0.11	0.11	0.22	0.51	0.05		
	3	Frequencies	3	4	9	18	3	3.38	1.06
		Percentages	0.08	0.11	0.24	0.49	0.08		
	4	Frequencies	2	1	12	20	2	3.51	0.87
		Percentages	0.05	0.03	0.32	0.54	0.05		
Computational Mathematics	2	Frequencies	3	2	7	19	1	3.41	1.01
		Percentages	0.09	0.06	0.22	0.59	0.03		
	3	Frequencies	2	2	14	13	1	3.12	1.12
		Percentages	0.06	0.06	0.44	0.41	0.03		
	4	Frequencies	2	1	10	15	4	3.56	0.98
		Percentages	0.06	0.03	0.31	0.47	0.13		
Applied Mathematics	2	Frequencies	2	6	6	14	0	3.14	1.01
		Percentages	0.07	0.21	0.21	0.50	0.00		
	3	Frequencies	2	2	13	10	1	3.21	0.92
		Percentages	0.07	0.07	0.46	0.36	0.04		
	4	Frequencies	2	1	7	17	1	3.50	0.92
		Percentages	0.07	0.04	0.25	0.61	0.04		
Operational Research and Cybernetics	2	Frequencies	3	8	8	9	2	2.97	1.13
		Percentages	0.10	0.27	0.27	0.30	0.07		
	3	Frequencies	1	6	8	13	2	3.30	0.99
		Percentages	0.03	0.20	0.27	0.43	0.07		
	4	Frequencies	2	1	10	11	6	3.60	1.07
		Percentages	0.07	0.03	0.33	0.37	0.20		
Probability and Mathematical Statistics	2	Frequencies	4	5	3	13	1	3.08	1.23
		Percentages	0.15	0.19	0.12	0.50	0.04		
	3	Frequencies	3	4	8	10	1	3.08	1.09
		Percentages	0.12	0.15	0.31	0.38	0.04		
	4	Frequencies	2	1	9	11	3	3.46	1.03
		Percentages	0.08	0.04	0.35	0.42	0.12		

### 3.3. Curriculum Implementation

The situations of curriculum implementation were as shown in Table 3. From Table 3 we knew that nearly 70% of the postgraduates in mathematics showed satisfaction with the current curriculum implementation. Particularly, the postgraduates in Fundamental Mathematics, Operational Research and Cybernetics, and Probability and Mathematical Statistics, whose percentages of satisfaction of their current curriculum implementation were respectively more than 70%. At the same time, we could see from Table 3 that the mean satisfaction degree of curriculum implementation of all postgraduates in five mathematics majors was higher than that in the two previous aspects. (But after calculating, there was no significant difference between the 19 universities postgraduates' satisfaction.) The highest satisfaction degree of curriculum implementation was given by the postgraduates in Operational Research and Cybernetics, whose mean satisfaction degree of curriculum implementation was up to 4.1. While, the lowest satisfaction degree of curriculum implementation was given by the postgraduates in Computational Mathematics, whose mean satisfaction degree of curriculum implementation was just 3.47.

The item 5 was related to the classroom teaching time and the item 7 was related to the teaching process. From Table 3, it could be found there were more than 70% of the postgraduates satisfied with the teaching processes. By comparison, only approximate 60% postgraduates were satisfied with classroom teaching time.

### 3.4. Curriculum Resources

The situations of curriculum resources were as shown in Table 4. From Table 4 we knew that more than 50% of the postgraduates in mathematics felt satisfied with the current curriculum resources. In particular, there were about 65% of the postgraduates in Operational Research and Cybernetics felt satisfied with the current curriculum resources. However, it could be seen from the Table 4 that the mean satisfaction degree to curriculum resources of all postgraduates in five majors was not high. It was just slightly higher than the general level. (And after calculating, there was no significant difference between the 19 universities postgraduates' satisfaction.) The highest satisfaction degree to curriculum resources was given by the postgraduates in Operational Research and Cybernetics, whose mean satisfaction degree of curriculum resources reached 3.87. While, the lowest satisfaction degree of curriculum resources was given by the postgraduates in

Applied Mathematics, whose lowest mean satisfaction degree of curriculum resources was just 3.29.

**Table 3. The situations of satisfaction degree of curriculum implementation**

Majors	Items		strongly dissatisfied	dissatisfied	Average	satisfied	strongly satisfied	Means	Variances
Fundamental Mathematics	5	Frequencies	0	2	10	25	0	3.62	0.59
		Percentages	0.00	0.05	0.27	0.68	0.00		
	6	Frequencies	2	2	8	23	2	3.57	0.90
		Percentages	0.05	0.05	0.22	0.62	0.05		
	7	Frequencies	1	2	6	18	10	3.92	0.95
		Percentages	0.03	0.05	0.16	0.49	0.27		
Computational Mathematics	5	Frequencies	3	0	9	19	1	3.47	0.95
		Percentages	0.09	0.00	0.28	0.59	0.03		
	6	Frequencies	3	0	7	17	5	3.66	1.07
		Percentages	0.09	0.00	0.22	0.53	0.16		
	7	Frequencies	4	0	4	19	5	3.66	1.15
		Percentages	0.13	0.00	0.13	0.59	0.16		
Applied Mathematics	5	Frequencies	1	1	9	16	1	3.54	0.79
		Percentages	0.04	0.04	0.32	0.57	0.04		
	6	Frequencies	3	0	6	18	1	3.50	1.00
		Percentages	0.11	0.00	0.21	0.64	0.04		
	7	Frequencies	3	0	7	15	3	3.54	1.07
		Percentages	0.11	0.00	0.25	0.54	0.11		
Operational Research and Cybernetics	5	Frequencies	2	1	11	10	6	3.57	1.07
		Percentages	0.07	0.03	0.37	0.33	0.20		
	6	Frequencies	1	2	2	13	12	4.10	1.03
		Percentages	0.03	0.07	0.07	0.43	0.40		
	7	Frequencies	3	0	3	12	12	4.00	1.20
		Percentages	0.10	0.00	0.10	0.40	0.40		
Probability and Mathematical Statistics	5	Frequencies	2	0	8	15	1	3.50	0.91
		Percentages	0.08	0.00	0.31	0.58	0.04		
	6	Frequencies	1	1	6	14	4	3.73	0.92
		Percentages	0.04	0.04	0.23	0.54	0.15		
	7	Frequencies	2	0	3	14	7	3.92	1.06
		Percentages	0.08	0.00	0.12	0.54	0.27		

**Table 4. The situations of satisfaction degree of curriculum resources**

Majors	Items		strongly dissatisfied	dissatisfied	Average	satisfied	strongly satisfied	Means	Variances
Fundamental Mathematics	8	Frequencies	2	4	14	15	2	3.30	0.94
		Percentages	0.05	0.11	0.38	0.41	0.05		
	9	Frequencies	1	4	13	15	4	3.46	0.93
		Percentages	0.03	0.11	0.35	0.41	0.11		
Computational Mathematics	8	Frequencies	3	2	10	13	4	3.41	1.10
		Percentages	0.09	0.06	0.31	0.41	0.13		
	9	Frequencies	4	2	9	14	3	3.31	1.15
		Percentages	0.13	0.06	0.28	0.44	0.09		
Applied Mathematics	8	Frequencies	2	3	9	13	1	3.29	0.98
		Percentages	0.07	0.11	0.32	0.46	0.04		
	9	Frequencies	2	1	13	9	3	3.36	0.99
		Percentages	0.07	0.04	0.46	0.32	0.11		
Operational Research and Cybernetics	8	Frequencies	2	2	4	12	10	3.87	1.17
		Percentages	0.07	0.07	0.13	0.40	0.33		
	9	Frequencies	2	2	9	3	14	3.83	1.29
		Percentages	0.07	0.07	0.30	0.10	0.47		
Probability and Mathematical Statistics	8	Frequencies	3	2	7	11	3	3.35	1.16
		Percentages	0.12	0.08	0.27	0.42	0.12		
	9	Frequencies	1	3	7	9	6	3.62	1.10
		Percentages	0.04	0.12	0.27	0.35	0.23		

### 3.5. Curriculum Evaluations

The situations of curriculum evaluations were as shown in Table 5. From Table 5 we knew that nearly 50% of the

postgraduates in mathematics felt satisfied with the current curriculum evaluations. In particular, there were respectively more than 50 percent of the postgraduates in both Fundamental Mathematics and Operational Research

and Cybernetics who were satisfied with the current curriculum evaluations. However, it could be seen from the Table 5 that the mean satisfaction degree of curriculum evaluations of all postgraduates in five majors was not very high, and it was just slightly higher than the general level. (The similarly, after calculating, there was no significant difference between the 19 universities postgraduates' satisfaction.) The highest satisfaction degree of curriculum evaluations was given by the postgraduates in Operational Research and Cybernetics, whose mean satisfaction degree of curriculum evaluations

reached 3.53. While, the lowest satisfaction degree of curriculum evaluations was given by the postgraduates in Probability and Mathematical Statistics, whose mean satisfaction degree of curriculum evaluations was just 2.96.

The item 10 was related to the methods of curriculum evaluations and the item 11 was related to the process of curriculum evaluations. From Table 5, it could be found that the satisfaction degrees of the methods of curriculum evaluations of all graduate students in five majors were higher than that of the processes of curriculum evaluations.

**Table 5. The situations of satisfaction degree of curriculum evaluations**

Majors	Items		strongly dissatisfied	dissatisfied	Average	satisfied	strongly satisfied	Means	Variances
Fundamental Mathematics	10	Frequencies	0	3	15	19	0	3.43	0.65
		Percentages	0.00	0.08	0.41	0.51	0.00		
	11	Frequencies	5	4	8	17	3	3.24	1.19
		Percentages	0.14	0.11	0.22	0.46	0.08		
Computational Mathematics	10	Frequencies	0	2	16	12	2	3.44	0.72
		Percentages	0.00	0.06	0.50	0.38	0.06		
	11	Frequencies	5	2	10	13	2	3.16	1.17
		Percentages	0.16	0.06	0.31	0.41	0.06		
Applied Mathematics	10	Frequencies	2	1	12	13	0	3.29	0.85
		Percentages	0.07	0.04	0.43	0.46	0.00		
	11	Frequencies	1	4	15	8	0	3.07	0.77
		Percentages	0.04	0.14	0.54	0.29	0.00		
Operational Research and Cybernetics	10	Frequencies	3	0	8	16	3	3.53	1.04
		Percentages	0.10	0.00	0.27	0.53	0.10		
	11	Frequencies	2	1	15	9	3	3.33	0.96
		Percentages	0.07	0.03	0.50	0.30	0.10		
Probability and Mathematical Statistics	10	Frequencies	1	2	9	14	0	3.38	0.80
		Percentages	0.04	0.08	0.35	0.54	0.00		
	11	Frequencies	4	4	8	9	1	2.96	2.04
		Percentages	0.15	0.15	0.31	0.35	0.04		

## 4. Discussion

### 4.1. The Majority of the Postgraduates in Mathematics were Satisfied with the Current Mathematical Curriculum

From the above data, we knew that the satisfaction of curriculum goals, curriculum contents, curriculum implementation, curriculum resources and curriculum evaluations of graduate students in different majors of mathematics were different from each other. But almost more than half of the postgraduates expressed their satisfaction. Particularly to curriculum implementation, more than 60% postgraduates expressed their satisfaction with it. What could not let most postgraduates feel satisfied with just were several specific issues of the above five aspects. Therefore, we could come to a conclusion that the majority of the postgraduates in mathematics were satisfied with the current mathematical curriculum. Nevertheless, it should be noted that almost 40% of the students did not express their satisfaction or dissatisfaction. That was to say, although there were almost more than half of the postgraduates in mathematics expressed their satisfaction with the current curriculum, but the number was not too much.

### 4.2. The satisfaction Degrees of Curriculum of Graduate Students in Mathematics were not High

Based on the above results, the majority of the graduate students in mathematics were satisfied with the current mathematical curriculum. However, their satisfaction degrees of the above five aspects of the current curriculum were not very high. The mean scores which the postgraduates in each major rated were almost between 3 and 4. Except the curriculum implementation which let postgraduates in mathematics show great satisfaction, the other four aspects of curriculum only let postgraduates show low level satisfaction. Even the mean scores of some specific issues were less than 3, such as the mean scores of the curriculum contents and the curriculum evaluation processes. Therefore, the overall level of satisfaction degree of the current curriculum of postgraduates was general. It was not very low and not high too.

## 5. Conclusion and Suggestions

It is of great value and significance to have a comprehensive and deep understanding of the satisfaction of curriculum of postgraduates. From this survey we conducted in China, we knew that the majority of the graduate students in mathematics were satisfied with the

current curriculum, although their satisfaction degrees were not high. The aspect which most postgraduates felt satisfied with and which had the highest satisfaction degree was curriculum implementation. From this point, we knew the aspects which were recognized by the current postgraduates in mathematics most were the teaching arrangements, teaching methods, and teaching processes et al. Most postgraduates showed dissatisfaction with curriculum contents and the evaluation processes. In addition, the issues that reached relatively low satisfaction degrees were the volumes of the curriculum contents and the processes of curriculum evaluation. Considering this point, we came to a conclusion that the current volumes of the curriculum contents and the processes of curriculum evaluation could not be recognized by postgraduates in mathematics. The current curriculum contents of postgraduates in mathematics generally followed the traditional ones, which not only had quite fundamental contents, but also often had more volumes. So it was usually difficult to learn. Current curriculum evaluations of postgraduates generally adopted the form of holding examinations and writing academic paper on specialized subjects. Given this point, we thought it was critical and necessary to largely take the contents and evaluations of curriculum into consideration when the overall reform on curriculum of the postgraduates in mathematics starts. Maybe there were other reasons why the graduate students in mathematics felt not satisfied with the contents and evaluations of curriculum. Nevertheless, to reform the traditional teaching contents and evaluation methods and to make them more modern, more easily to accept, and more in line with the cognitive law of students can undoubtedly improve the current situations of curriculum and enhance the postgraduates' recognition for the curriculum contents and the evaluations process.

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