

Studies on Employment of the Chinese College Students Majoring in Mathematics

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Abstract

With the expansion of college enrollment, the number of college graduates is increasing year by year, and the employment of graduates has been widely concerned by all walks of life. This paper reviews and combs the research on the employment situation of the students majoring in mathematics, and draws the following conclusions: (1) The previous research mainly focuses on three aspects: the current situation of the employment of the college students majoring in mathematics, the analysis of the reasons of employment difficulty for the college students majoring in mathematics, and the suggestions and countermeasures for the employment of the college students majoring in mathematics. (2) The previous research comprehensively analyzes the influencing factors of the employment problem of mathematics major college students and puts forward suggestions and countermeasures from the three levels of colleges, graduates themselves, and society. However, previous research also has the disadvantage of being relatively subjective. (3) At present, the research on the employment of college students in mathematics majors has not yet covered aspects such as teaching evaluation and internship management and supervision systems. Therefore, in the future, it is necessary to improve the research methods and conduct research from a broader perspective to find out more reasonable suggestions and countermeasures.

Keywords

Mathematics, College Students, Employment, Graduates

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1. Introduction

With the expansion of college enrollment in recent years, the number of college graduates increases every year, and the employment of graduates has attracted widespread attention from all walks of life [1]. Mathematics, as a basic discipline of colleges, is under more severe employment pressure than other science and engineering majors. At the same time, with the development of modern science and technology, the value and role of mathematics have received more and more attention from the public [2]. Therefore, a series of studies on the employment situation of mathematics majors have appeared. In order to more fully grasp the employment situation of college students majoring in mathematics and

provide directions for further research in the future, this article intends to review and sort out relevant articles in the past 10 years.

2. Methods

2.1. Source of Data

This article adopts the literature method and uses the documents in the China National Knowledge Infrastructure (CNKI) as the data source. CNKI is the most authoritative document retrieval tool for national academic journals, which basically includes all the contents of journals in China. This paper chooses this database to ensure the persuasiveness and reliability of the research.

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2.2. Data Collection

With “mathematics employment” as the search term and “subject” as the search item, 181 articles are retrieved according to the ascending order of publication time. This article studies the employment situation of college students majoring in mathematics. Considering the research problems and the citations of the literature, 33 references are finally selected.

2.3. Data Collation

In the process of Intensive reading of literature, we can summarize and sort out the research problems and results of the past researches by the method of taking notes.

Through reviewing and sorting out, it is found that the predecessors mainly study from three aspects: the current employment situation of the college students majoring in mathematics, the analysis of the reasons of employment difficulty for the college students majoring in mathematics, and the suggestions and countermeasures for the employment of the college students majoring in mathematics.

3. The Current Situation of the Employment of the College Students Majoring in Mathematics

The researchers have the same understanding of the employment status of college students majoring in mathematics, which shows the situation of difficult employment and fierce competition. The main problems are that the supply of the students majoring in mathematics is greater than the demand, the quality of the talents is required to be improved, the employment direction is single, the structural contradiction is prominent, and the vocational satisfaction of the students majoring in mathematics is low.

Wu Xuan, Zhao Shuyue and others point out that the employment pressure of mathematics graduates is great under the situation of continuous enrollment expansion; the quality requirements of talents are constantly improving; the advantages of mathematics specialty are difficult to play due to its basic rather than professional nature; vocational satisfaction of graduates is low [3-4]. Through data analysis, Li Shiyu points out that the employment rate of mathematics normal graduates is declining, and the gap between the high-quality employment rate and the employment rate is narrowing, indicating that graduates pay more and more attention to the quality of jobs [5]. Liu Jia and Xiang Shanshan point out that at present, the expectation value of employment of mathematics normal university graduates is generally

higher than the demand of the society itself, the post adaptability and professional skills are poor, and the grass-roots employment is less [6].

Liu Guangfu, Li Chaofeng and others learn from the investigation of the employment situation of mathematics graduates in local normal universities that the employment directions of mathematics and applied mathematics major mainly include postgraduate research, education fields, and industries related to mathematics applications. However, teachers are the main employment channel and the employment direction is single. Secondly, more than 70% of graduates choose to work locally, and 30% choose other regions.

4. Analysis of the Reasons of Employment Difficulty for the College Students Majoring in Mathematics

Summarizing the reasons put forward by researchers for the difficulty of employment for the college students majoring in mathematics, it can be roughly summarized into three aspects including colleges, graduates themselves and society.

4.1. Colleges Factors

Jin Guitang, Yang Yunfan and Zhao Wenlu point out that college has problems in professional settings, curriculum settings, teaching, and employment guidance. First, the professional settings are too narrow, which leads to narrower graduate employment; Second, the curriculum settings are not reasonable and there are fewer applied courses and computer courses; Third, the teaching plan, teaching mode and teaching method are lagging behind, and the applicability of teaching materials is poor. There is a big gap between the knowledge ability and thinking mode of the graduates and the social needs, forming a structural employment contradiction; The fourth is that the content of employment guidance is not systematic and scientific, the form of employment guidance is simple, and the process of employment guidance is too short, which affects the employment of college students to some extent [7-9].

Cao Wanrong and others point out that firstly, the comprehensive strength of the school dominates the choice of some enterprises; secondly, from the perspective of professional development, the school's professional positioning is not clear, and the curriculum system is chaotic; finally, the practice teaching link is weak and the internship effect is poor, which is not conducive to improving the quality of employment [10]. Liu Jia and Xiang Shanshan put forward that the school training mode is single, that is to say, under the condition of the diversity of student categories and the gap of

quality level, the training mode is unified and one-way [11].

4.2. Graduates Factors

Liu Min and Mao Qunying point out that the employment concept of graduates of mathematics majors is outdated, which is mainly manifested in three aspects. First, they are determined to enter public institutions through “public recruitment”. They have “three unwillingness” in the employment process: unwilling to work in non-educational systems, unwilling to work in rural or other remote grass-roots areas, unwilling to work in units that are not formally established; Second, graduates’ career positioning is inaccurate, lack of understanding of their interests and hobbies, and no career planning; Third, graduates’ employment consciousness is too passive, passively waiting or mechanically responding to various recruitment and trial lectures [12-13].

Yang Yunfan, Wei Jianyun, Guo Xiaochuan, and Wei Wei propose that employability includes professional knowledge and skills, general professional ability, and personal character. College students’ employment competitiveness is low due to poor practical application of knowledge and poor team awareness, inadequate cooperation and communication skills, and poor willpower and self-regulation capabilities [14].

Chen Zhangyang puts forward the reasons for the unsatisfactory employment of graduates of mathematics and applied mathematics combined with the actual survey of graduates. Firstly, graduates lack the corresponding practical experience. Secondly, graduates themselves are not hard enough, including inadequate professional knowledge, less relevant knowledge of the major, and lack of necessary certificates [15].

4.3. Society Factors

Guo Jianxia, Zhao Guoxi, Li Shangfang and others analyze the employment difficulties of graduates of mathematics and applied mathematics from the objective environment, the government and other social parties and reached the following conclusions: First, the cultivation scale is too large, and the number of students in primary and secondary schools is decreasing year by year; The second is that a large number of non-teacher professional students have joined the basic education market. Third, due to the restriction of local finance and employment system, it is common that some poor areas prefer to substitute teachers; The fourth is that the employment specifications of employers are increasing, and some secondary schools are more likes to hire experienced teachers or graduate students, key primary and secondary schools tend to hire graduates from key universities, etc; Fifth, the structural contradictions are prominent, that is, the imbalance between supply and demand between different

regions. Economically developed regions and large and medium-sized cities have little demand for teachers and high requirements, and many graduates who want to go; less-developed areas and rural towns have a high demand for teachers, but fewer graduates are willing to go [16-17].

5. Suggestions and Countermeasures for the Employment of the College Students Majoring in Mathematics

5.1. Colleges Level

5.1.1. Adjust Training Mode

Zhang Fengmin and Ma Zhongli propose that the reasonable positioning of mathematics talent training goals should be considered from the following aspects: the objective position of self-schools in Chinese universities, the social and economic environment of the region, and the needs of economic development in the next few years. Jiang Shuzhen, Zhang Shuang and others point out that the major exports of mathematics graduates are admitted to further education, mathematics teachers, and engaged in big data related industries. Therefore, colleges should improve their talent training programs, and implement divergent training based on the three modules of basic mathematics, mathematics education, and applied mathematics [18]. Zhong Liyan, Zhang Fengmin and others propose that colleges should establish a wide range of curriculum system and curriculum structure including professional basic courses, professional courses and professional elective courses. First of all, the basic mathematics course is the basis for learning other courses. Secondly, colleges should set up professional direction modules, and set up elective courses for mathematics education, mathematics application, and mathematics professional knowledge promotion [19].

5.1.2. Promote Teaching Reform

Li Jinna, Wang Yan and others put forward the following suggestions. First of all, colleges should strengthen the construction of the teaching staff, strictly control the “entrance” and “quality” of talent introduction, optimize the structure of the teaching staff, focus on the introduction of academic leaders and teaching backbones in professional positioning, actively organize young and middle-aged backbone teachers to participate in academic exchanges. Secondly, we should strengthen the construction of teaching materials, and take authority, classics, universality and practicability as the principles of selecting teaching materials [20]. Wang Haiyan proposes that colleges should design

teaching content in accordance with the direction of employment to strengthen the professionalism of teaching content [21]. Zhang Yongsheng, Wu Chunxia, Wang Haiqi and others propose that the teaching model should be changed, students' initiative should be brought into full play in teaching, and new teaching methods such as dual-subject teaching method, case teaching method, and discussion teaching method should be used in teaching. Secondly, popular mathematical applications should be introduced in teaching activities [22-24].

Zhou Qingye, Zhang Fengmin and others propose to strengthen practical teaching. First, the establishment of simulation laboratories in schools; second, strengthening school-enterprise cooperation, establishing off-campus internship training bases, and adding enterprise induction training to the student training system. Graduation thesis can be used as a practical topic for enterprises; The third is to encourage students to participate in various simulation contests and mathematical contests; The fourth is to encourage students to participate in scientific and technological projects and extracurricular research activities for college students; The fifth is to actively develop various channels for students to provide students with social practice opportunities, and students with different professional training orientations participate in different social practices; The sixth is to extend student trainee time, actively conduct lectures by famous teachers, and develop detailed assessment standards to assess student teacher skills; The seventh is to improve the management and supervision system of student practice. The practice mode should focus on centralized practice. After the internships, students should summarize and reflect on them, and further improve their practical ability [25-28].

5.1.3. Improve Employment Guidance System

Wu Xuan and Xu Hongwei point out that colleges should provide good employment guidance. First, colleges should provide employment guidance courses and current politics courses, infiltrate employment guidance education in the teaching of professional courses, introduce the employment situation at that time, analyze employment trends and employment policies in-depth, and help students understand clearly professional strengths, weaknesses, opportunities and challenges; Secondly, an independent tutoring department is set up to provide personalized services for students; Finally, colleges should ensure that the "mentor system" is effectively implemented. Starting from freshman enrollment, teachers should strengthen guidance for study, life and employment, strengthen links with internship bases [29]. Zhang Fengmin and Ma Zhongli point out that the practice instructors are basically school teachers and lack of rich social practice experience, so they make the following suggestions: one is the

celebrity forum; the second is the report of corporate managers or outstanding graduates; the third is professional training; the fourth is to carry out professional forums, campus simulation job fairs, career design competitions, and other activities to create a professional campus culture. Jin Guitang, Cao Wanrong, and others propose that colleges should establish employment archives and employment information websites for college students, implement the "first question system for graduates", realize the informatization and full-scale employment management services for college students, and establish an efficient network platform to release employment information to students regularly.

5.2. Graduates Level

Fan Zhixin, Liu Jia and others propose that graduates of mathematics majors should establish a popular employment concept; establish grass-roots consciousness, career consciousness, and struggle consciousness, and set up a career selection strategy of "employment first, then choose a career, and then start a business"; improve their quality, and master the ability of interdisciplinary learning and interdisciplinary work through minor and self-study [30-31].

Cao Wanrong, Xu Hongwei and others put forward the following suggestions: graduates of mathematics majors should clarify their strengths and characteristics, early self-positioning and academic planning; improve their ability to apply mathematics and learn to solve problems in life with a mathematical perspective; as soon as possible cultivate interest, strengthen professional skills, and set long-term goals; maintain a serious attitude towards school practice and use winter and summer vacations for targeted practice; maintain a good attitude, enhance initiative, and make full use of information channels such as the Internet [32-33].

5.3. Society Level

Liu Min, Zhao Shuyue, and Li Chaofeng make the following suggestions. First, government departments should formulate laws and regulations to improve the job market system, guide enterprises to absorb employment of college students through reasonable preferential economic policies, and regulate corporate behavior through laws, regulations and other policies; actively expand employment channels in grassroots and key areas; and strengthen portfolio leadership and supervision. Secondly, the employer should change the concept of employment, change the prejudice corresponding to the college students, treat each college student who applies for the job fairly and professionally, should assume social responsibility, actively recruit college students at all levels, and give the stage for talent display. Finally, all sectors of society should strengthen their support for the employment of graduates in mathematics.

6. Discussion

To sum up, it can be seen that the previous research mainly focuses on the current employment situation of the college students majoring in mathematics, the analysis of the reasons of employment difficulty for the college students majoring in mathematics, and the suggestions and countermeasures for the employment of the college students majoring in mathematics.

As for the current employment situation of college students in mathematics, previous studies have pointed out that college students majoring in mathematics have difficulty in employment, fierce competition. The main problems are that the supply of the students majoring in mathematics is greater than the demand, the quality of the talents is required to be improved, the employment direction is single and so on. Regarding the difficulty of employment, the predecessors analyze from three aspects of universities, graduates and society. First of all, there are problems such as too detailed professional setting and unclear positioning, irrational curriculum setting, single training mode, lagging teaching methods, lack of systematic and scientific employment guidance, and weak practical teaching links. Secondly, graduates have problems such as outdated employment concepts, low employment competitiveness, lack of corresponding practical experience, and insufficient quality. Finally, in terms of society, there are problems such as the large scale of university student training, the large number of non-teacher students joining the basic education market, the constraints of local finance and the employment system, the increase in the employment specifications of employers, and the prominent structural contradictions. Regarding the suggestions and countermeasures for the employment of college students in mathematics, the predecessors mainly put forward suggestions from three aspects of colleges, graduates and society. First of all, colleges should adjust the training mode, promote the teaching reform and improve the employment guidance system. Secondly, graduates themselves should establish a popular employment concept and a career selection strategy of "employment first, then choose a career, and then start a business", improve their quality, carry out career planning, actively participate in practical activities, and maintain a good attitude and enhance initiative. Finally, government departments should formulate laws and regulations, improve the employment market system, employers should change the concept of employment, actively assume social responsibilities, and all sectors of society should strengthen their support for the employment of mathematics graduates.

From the above, it can be seen that the previous research aims at the employment problems of college students majoring in mathematics, analyze the reasons from the three aspects of

colleges, graduates and society, and put forward suggestions for improvement, which has an important guiding role. However, there are still deficiencies in previous research. First of all, previous studies mainly focus on students majoring in Mathematics and Applied Mathematics and Mathematics Education, and there is less research on employment issues in other majors in mathematics. Secondly, the previous studies mainly analyze and make suggestions by thinking and referring to previous studies, which are subjective, and the credibility and feasibility of the recommendations are not convincing. Finally, there are still gaps in the study. The more prominent issues are the research on employment-oriented mathematics teaching evaluation and the establishment of internship management and supervision systems. Student assessment standards have an important impact on students' professional knowledge and mastery of professional knowledge. If an appropriate evaluation system is not established, it is not conducive to the mastery of knowledge and skills. In addition, a good internship management and supervision system can help improve the effectiveness of internships. Therefore, in the future, it is necessary to study the impact of teaching evaluation and internship management and supervision system on the employment of college mathematics students.

7. Conclusion

This article reviews and combs the research on the employment situation of mathematics college students in the past 10 years, and finds that:

- (1) The previous research mainly focuses on the current employment situation of the college students majoring in mathematics, the analysis of the reasons for employment difficulty for the college students majoring in mathematics, and the suggestions and countermeasures for the employment of the college students majoring in mathematics.
- (2) The advantage of previous research is that it comprehensively analyzes the influencing factors of the employment problems of college students of mathematics majors, and proposes and countermeasures from the three levels of colleges, graduates themselves, and society, which has an important guiding role.
- (3) There are still deficiencies in previous research. Except for Mathematics and Applied Mathematics and Mathematics Education, there is less research on employment issues in other majors in mathematics; the research methods are mostly speculative and subjective; the current research still has gaps, and the most prominent is employment-oriented mathematics teaching evaluation research and the establishment of internship management and supervision systems. Therefore, in the future, it is necessary to improve the research methods

and conduct research from a wider perspective to find more reasonable suggestions and countermeasures.

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