American Journal of Business and Society
Vol. 5, No. 4, 2020, pp. 217-220
http://www.aiscience.org/journal/ajbs

The Research on How to Teach Mathematical Analysis in College in China

Luyao Wang, Zezhong Yang*

The School of Mathematics and Statistics, Shandong Normal University, Jinan, China

Abstract

Mathematical Analysis is one of the most important professional basic courses for mathematics study in colleges and universities, and it is a key course to guide students from elementary mathematics to higher mathematics learning. Mathematical analysis is the basis of many subsequent courses. Therefore, how to teach mathematical analysis has become a problem that researchers are eager to study. What are the aspects of these studies? What are the shortcomings? It is also worth exploring. Therefore, we have made a simple review of the literature in CNKI in the past two years by using the literature method, and the conclusions are as follows: (1) In the past two years, the research on how to teach mathematical analysis in universities has mainly focused on students, teachers, assessment, teaching content, and other six aspects. For these six aspects, predecessors have studied more, so it has certain reference significance for mathematical analysis teaching. (2) Problems in existing research: There is a lack of empirical research in the existing literature, and the scientificity is not enough; although some aspects are mentioned, the results obtained are not detailed enough. (3) There are still some gaps in existing research: how to implement mathematical analysis teaching in a special period, such as the impact of novel coronavirus pneumonia on mathematical analysis teaching. Therefore, it is necessary for future research to adopt more empirical research methods on the basis of existing research, implement solutions to actual classroom teaching to verify actual effectiveness, and consider the design of mathematics classrooms from the current actual situation.

Keywords

Mathematical Analysis, Teaching, College

Received: October 21, 2020 / Accepted: November 15, 2020 / Published online: December 11, 2020

1. Introduction

Mathematical analysis, founded in the 17th century, is a subject with a wide range of applications. It is the core professional basic course for university mathematics majors and related disciplines, and it is the cornerstone of the follow-up courses. As one of the compulsory subjects in the entrance examination for mathematics majors, its importance is self-evident [1]. With the development of natural sciences and social sciences, a deep background in advanced mathematics is required in many disciplines [2]. In the training of talents in colleges and universities, mathematical analysis is not only a kind of tool, knowledge, and language but also is a kind of quality and culture [3]. Mathematical analysis provides the necessary theoretical foundation for various professional courses in mathematics. The most important thing is that the mathematical ideas it condenses, the method of handling problems, and the logical reasoning ability formed during the entire learning process will extend to the follow-up study and scientific research, which will benefit a lifetime [4]. The concepts in mathematical analysis are relatively abstract, the theorems are difficult to understand, and the theoretical methods are difficult to apply. Therefore, in the teaching practice of this course, we should continue to explore new teaching models and methods to further improve the quality of the classroom [5]. In recent years, researchers have done a lot of research on the teaching of mathematical analysis in China.

* Corresponding author
E-mail address: zhongzee@163.com (Zezhong Yang)

However, there is no general research on the overall research situation. In order to find out the current research situation of mathematics analysis teaching, the shortcomings of the research, and the blank points of the research, this paper intends to make a holistic summary of the conclusions of the existing research. This study can not only provide available information for teachers to understand mathematics analysis classrooms and improve teaching quality but also it can provide the basis of current research for the research of related problems, help future researchers to grasp the present situation and characteristics. And it can push the research on mathematics analysis teaching to depth.

The issues studied in this article mainly include the following: 1. What are the results of the research on "how to teach mathematical analysis in universities"? 2. What aspects of the current research on mathematical analysis teaching are good? What is not good? Where are the gaps?

2. Method

2.1. Data Sources

The documents involved in the article are all derived from the CNKI database. At present, CNKI has developed into a collection of journals, doctoral dissertations, master's thesis, conference papers, newspapers, reference books, yearbooks, patents, standards, and overseas literature. It includes 168 professional subject digital libraries, covering documents in various disciplines, and is a highly authoritative document retrieval platform. Therefore, this article selects this database to retrieve target documents to ensure the scientific nature of the research.

2.2. Data Collection

When collecting data, this article uses "title" as the search term and "mathematical analysis, teaching" as the keyword. Considering the timeliness of the article, the author chooses the articles published from 2019 to 2020 as the target documents for the research. After screening the content of the article and considering the amount of citation, the author finally selected 11 references.

2.3. Data Processing

Firstly, read the literature intensively and take notes on each article. Then record the aspects and results of the literature research. Finally, sort out all the information.

3. Results

3.1. Statistics of Research Aspects

Through reading 11 articles, the author found that previous research on how to teach mathematical analysis in universities mainly focused on students, teachers, assessment, teaching content, teaching methods, and teaching ideas. According to the statistical results, there are more researches on students, teaching content, and teaching methods, less research on teachers, and assessment. The least research on teaching ideas. The details are shown in Table 1.

Table 1. Aspects and Number of Literature.

Aspects	Student	Teacher	Assessment	Teaching content	Teaching methods	Teaching ideas
Number	9	5	5	8	10	2

3.2. Statistics of Research Results

Through the analysis of the corresponding results, the author finds that most results are focused on the students, teaching contents, and teaching methods. The results of teachers and assessment are relatively few, and the results of teaching ideas are the least. The details are shown in Table 2.

Table 2. Aspects and Number of Results.

Aspects	Student	Teacher	Assessment	Teaching materials and content	Teaching methods	Teaching ideas
Number	8	6	4	8	10	2

3.3. Current Main Points

3.3.1. Student Aspect

Among the results obtained, the literature mentioned more about cultivating students' interest in learning, mobilizing students' learning enthusiasm, and improving students' self-study awareness. Zhao pointed out that interest is the best teacher. With interest, you will have a lot of motivation to learn, and you can discover more wonderful things in mathematical analysis, so as to get a lot of fun and joy and form a virtuous circle [6]. Cao et al. believed that professional goals and personal interests should be oriented so that students understand the importance and necessity of learning mathematical analysis [7]. Wu believed that learning interest is an important factor affecting students' learning efficiency [8]. Huang et al. believed that students should learn to arrange their spare time reasonably [9]. Yuan et al. believed that good study habits are an important factor in learning mathematical analysis [10].

3.3.2. Teacher Aspect

Among the results obtained, the most mentioned in the literature is the ability and level of teachers. Wu mentioned that teachers are the guide of classroom teaching and their teaching ability is directly related to the quality of teaching. Teachers' teaching philosophy and methods are inseparable from students' learning conditions [8]. Dai believed that the key to curriculum construction is the construction of a teacher team. Teachers should first have good moral and intellectual ability and dedication [11].

3.3.3. Assessment Aspect

Among the results obtained, the most mentioned point is the reform of the evaluation method. Cao et al. believed that reasonable assessment methods and evaluation mechanisms are effective means to objectively, accurately, and comprehensively evaluate teaching effects, and are an important guarantee for the smooth realization of course teaching objectives [7]. Huang et al. believed that the study of mathematics analysis should pay attention to the process assessment rather than the result assessment [9]. Dai believed that when establishing a mathematics analysis and assessment system, we should dilute the students' point-only theory [11].

3.3.4. Teaching Content Aspect

In terms of teaching content, strengthening the construction of teaching materials and optimizing teaching content are commonly mentioned views. Li believed that mathematical analysis teaching should select textbooks carefully and teach seriously [1]. Cao et al. believed that the teaching content should be arranged reasonably for students with different goals [7]. Yuan et al. believed that mathematical analysis teaching materials must be optimized [10]. Dai mentioned that teachers can reorganize the content of teaching materials, and most of them are combined with the background of the times and the future professional needs of students [11].

3.3.5. Teaching Methods Aspect

In terms of teaching methods, the most cited point of view is to adopt diversified teaching methods. Cao et al. believed that it should choose the corresponding teaching method according to the different learning goals of students [7]. Yuan et al. believed that new diversified teaching modes can improve teaching quality [10]. Dai believed that the presence of teachers should be diversified [11]. Li [1] and Zhang [12] believed that it is necessary to pay attention to the construction of the contextual framework, emphasize the theoretical foundation, and be good at using knowledge network structure diagrams and mind maps. Zhao [6], Wu [8], and Zhang [13] believed that it is very important to make rational use of after-school learning links, pay attention to after-school tutoring, and pay attention to homework and chapter quizzes.

3.3.6. Teaching Ideas Aspect

From the perspective of teaching ideas, we must pay attention to the penetration of ideas and methods. Yuan et al. believed that the current classroom teaching of mathematical analysis emphasizes the instillation and memory of theoretical knowledge too much, and lacks the guidance of mathematical thinking and methods [10]. Zhang thought that more attention should be paid to the penetration of analogy in the teaching of mathematical analysis so that students can better grasp the connection between knowledge [13].

4. Discussion

According to the above induction and analysis, it can be seen that the current literature on how to teach mathematics analysis well in universities is generally researched from students, teachers, assessment, teaching content, teaching methods, and teaching ideas. There are many articles mentioning students, teaching materials, teaching content, and teaching methods. It can be seen that students, teaching content, and teaching methods are the areas that current researchers pay more attention to. There are a few articles mentioning teachers and assessment, we can conduct more comprehensive research in the future. Articles mentioning teaching ideas are the least, and more in-depth understanding and exploration are required in future research.

In terms of research results, students, teachers, teaching materials, teaching content and teaching methods have obtained more results, which have certain reference significance for mathematical analysis teaching. There are fewer results obtained in assessment and teaching thinking. The aspects with fewer results can be used as the focus of future research.

As far as the problems in the research are concerned, the above-mentioned results are obtained by researchers from reference to other people's literature or their own experience. They lack scientific empirical research. Therefore, in the future research on mathematical analysis teaching, we must carry out multi-faceted investigations and more in-depth research on these areas with fewer results. In addition, we must also implement the teaching of mathematical analysis in accordance with the actual situation.

5. Conclusion

This research analyzes the literature on how to teach mathematical analysis in universities in the past two years and finds that: (1) In the past two years, the research on how to teach mathematics well in universities has mainly focused on students, teachers, assessment, teaching materials and

contents, teaching methods and teaching ideas. Through the study of these six aspects, predecessors have obtained more results, so it has certain reference significance for mathematics analysis teaching. (2) There are still some problems in the existing research. For example, the results obtained in the existing literature are obtained by researchers from reference to other people's literature or their own experience, which are not scientific enough. In addition, although some aspects have been mentioned, the results obtained are not detailed enough, for example, the mathematical thinking mentioned less, the results obtained are less. (3) There are still some gaps in existing research. College mathematical analysis teaching should consider the actual situation and how to implement mathematical analysis teaching in special periods, such as the implementation of mathematical analysis teaching under the influence of the current epidemic. Therefore, it is necessary for future research to adopt more empirical research methods on the basis of existing research, implement solutions to actual classroom teaching to verify the actual effectiveness, and consider the implementation of university mathematical analysis teaching from the current actual situation.

References

[1] Li Z. X. (2020). A Preliminary Study on the Teaching Reform of Mathematical Analysis Course in Experimental Class. *Education Teaching Forum*, 12(24): 177-179.

[2] Zhao W. Q. (2019). Some Thoughts on Teaching Reform of Economic Mathematics Analysis Course. *Education Teaching Forum*, 9(21): 142-143.

[3] Wu J. X., & Liu C. (2018). Reform of Teaching Method and Examination Method of Mathematical Analysis. *Journal of BOHAI University*, 40(02): 138-142.

[4] Tan C., Qu Z. L., &Ma S. F. (2018). Some Experiences on Teaching of Mathematical Analysis. *Teaching of Forestry Region*, 34(05): 70-73.

[5] Yang X., & Liu Q. (2018). On How to Improve the Teaching Effect of Mathematical Analysis Course. *Education Modernization*, 5(29): 193-194.

[6] Zhao C. R. (2020). Experiences and Suggestions in Teaching "Mathematical Analysis". *Education Teaching Forum*, 12(28): 308-309.

[7] Cao Z. H., Yu S. M., & Min J. (2020). Teaching Reform and Practice of Mathematical Analysis Course One Taking the Credit Accounting and Statistics Major of Anhui Agricultural University as an example, *Xinyang Journal of Agriculture and Forestry College*, 30(02): 130-133.

[8] Wu C. H. (2019) Inquiry into the teaching reform of mathematical analysis course in general undergraduate colleges. *Ability and Wisdom*, 19(03): 85-86

[9] Huang T., Zheng C. Y., & Cao P. (2020). Perplexity and thinking in mathematical analysis teaching under the background of reduction in-class hours. *Education Teaching Forum*, 12(07): 319-320.

[10] Yuan Q. Q., Lu Z. G., Zhang C., & Wang Y. L. (2019). Improve A Probe into the Teaching Effect of Mathematical Analysis in the Classroom. *Journal of Langfang Teachers College (Natural Science Edition)*, 19(04): 106-108.

[11] Dai X. J. (2020). Discussion on the teaching reform of mathematical analysis courses in local applied undergraduate colleges. *Science & Technology Economic Guide*, 28(20): 163.

[12] Zhang H. (2019). Thoughts on the Teaching of Mathematical Analysis. *Journal of Hubei Open Vocational College*, 32(22): 146-147.

[13] Zhang Q. (2019). "Mathematical Analysis" Course Teaching Experience. *Firecracker Technology and Market*, 56(03): 195-196.

[14] Yang L. (2019). Discussion on the Teaching of Mathematical Analysis Course. *Fujian Tea*, 41(11): 156.

[15] Wan A. Y., Bian X. J., & Yang J. Y. (2019). The precise teaching exploration of "Mathematical Analysis" under the application-oriented talent training mode-Taking Hulunbuir College as an example. *Journal of Hulunbuir College*, 27(03): 128-130+113.