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The Design of Exercise Structure and Operation System of Higher Mathematics Under the Background of Educational Informationization

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Abstract: The teaching reform of higher mathematics has been paid much attention and achieved a lot of achievements. But people have not paid enough attention to the exercises and homework of higher mathematics. The exercises and homework of higher mathematics should not be ignored. It is an important aspect of teaching and learning of higher mathematics. The traditional higher mathematics homework is the students' personal operation to do the exercises in the textbook after class. Practice has proved that these exercises are very necessary, but it is far from enough for homework to be limited to such exercises. In order to stimulate students' interest in learning, encourage their confidence in learning and strengthen the spirit of cooperation among students, the structural design under the background of information is mainly adopted in enriching the forms of higher mathematics homework.
Keywords: Informatization; Advanced mathematics; Problem sets; Design thinking

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Preface

In the process of higher mathematics teaching, students should strengthen their understanding of concepts, skillful use of calculating formulas and flexible grasp of problem-solving methods. Homework is inseparable from this important link, homework has a very important role. [1] Higher mathematics homework online system is the use of network teaching platform, the traditional mode of classroom teaching, including teaching contents, teaching means and so on carries on the connotation and denotation of development, realize the students answer, error analysis, operation management, homework reviews and answering questions discussed fully computerized and networked, practice shows that it can greatly improve the teaching effect of higher mathematics course.

1. Thoughts on the Question Bank of Advanced Mathematics

In the 1990s, there have been many exercises about higher mathematics in China, which have been used by many colleges and universities for many years. But (1) the lack of a general exercise system facing the network teaching platform; (2) Each question is only a single knowledge point, not a series of knowledge points and test points of the overall embodiment, can not well adapt to the needs of network platform teaching. In the structural design of exercises, college teachers have accumulated some experience, but there is no systematic arrangement; Zhu Fu put forward the basic idea in "On the Development of CAI Correcting Software System for Higher Mathematics operation". There are few research achievements in this field abroad. In short, there is no subdivision of knowledge points, progressive learning of the question bank.[2]

2. Thinking about the operation system of Higher Mathematics

Some universities in China, especially radio and television universities, have implemented many network operating systems. The traditional exercise structure is used in the exercise bank, only the corresponding knowledge points and chapters of each exercise, there is no comprehensive decomposition of the corresponding knowledge points subdivision; Not suitable for big data analysis of network platform; Simple statistics, rather than data mining in the context of big data; Maplesoft's products are only general teaching systems, not specialized operating systems, not operating systems for a specific course; There is no corresponding sample bank, no data analysis suitable for Chinese learning situation; Its Web presentation is self-contained and not suitable for the teaching accumulation of front-line teachers.

3. The main value orientation of information system

Problems existing in the current model of students: just to complete the task to do homework, do not think much about the relevant knowledge; Back the topic, back the answer, did not really understand the knowledge; The answer, not to pay attention to knowledge; Plagiarism cannot master knowledge. Exercise redesign structure: exercise decomposition itself is the analysis process of exercise, will play a good role in learning guidance; Re-decompose the existing exercises according to the leading knowledge, current knowledge, problem-solving steps, conclusions, question structure, etc. Each question is a series of small knowledge points

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combination; Can guide students to summarize and master knowledge; When a mistake occurs, both the student and the teacher can recognize where the problem is. Operation system: random distribution of homework, tests, so that plagiarism is not easy to achieve, but also make the assessment more scientific; Can let the student, especially the knowledge foundation weak student, more delicate, more systematic master the knowledge.[3]

4. Design thinking

4.1 The structural design of the problem

Collect, research and design the basic textbook of Advanced Mathematics, the seventh edition of Tongji University, and carry out the following work:Research outline, carry on the knowledge point and the knowledge system comb; Structural design of exercises; The parameter key value of exercises is designed to adapt to the database of network platform; Exercises type structure design, in order to achieve the purpose of randomly set questions.

4.2 Design of operating system

Design a variety of answer templates, design the corresponding Web page. Design the following data analysis: operation results analysis; Similarity analysis; Evaluation and analysis. The system adopts the client service architecture based on Web. The client program is mainly responsible for making requests and displaying results, providing the interface for students to visit the operating system, and sending the results of students' operations back to the server when the homework is completed. Server-side program is the core of the online operating system, all functions of the parsing and database calls are completed by it, the server to the data processing. Perform performance statistics, analysis, feedback, etc.

4.3 Knowledge point combing and outline revision

Knowledge structure, integrity (covering the whole course knowledge), intersections (crossing different knowledge points and chapters), and repetition (quoting and strengthening previous knowledge). For example, according to knowledge points or chapters, can meet the needs of the examination; Weight analysis, the organic combination of the importance of a single question and the rationality of the score, for example, the problem is not necessarily high; Difficulty parameter, on the basis of the weight coefficient of single question, the adjustment of the overall difficulty of the test paper; The design of the process assessment, the arrangement of knowledge structure, including the relationship analysis of the number of exercises of basic questions, each question or each knowledge point to add exercise parameters.

4.3 Problem structure design

Each of the traditional exercises is subdivided into a series of knowledge points and examination points; It includes: preliminary knowledge, understanding of basic concepts, classification of question types, solving or proving ideas and skills, process embodiment, conclusion and so on.

4.5 Operating system design

First of all, the teacher side is responsible for the input management of homework questions, teachers can input, delete, modify various types of homework questions, including fill-in-the-blank questions, multiple choice questions, judgment questions, calculation questions and mathematical model questions. Secondly, according to the teaching needs, the teacher should use the online assignment function, select the corresponding topics of advanced mathematics knowledge points in the question bank, randomly select exercises of different difficulty, as students' homework, submit to the server, students can see the teacher's homework after logging in. In addition, the teacher side also has the function of managing homework. On the one hand, teachers can query students' homework status through various query conditions, such as names not submitted or names submitted, to obtain the names and scores of each score segment, teachers can also add homework to the display area for students to evaluate each other. On the other hand, teachers can realize real-time remote communication through the discussion area, and understand and answer students' puzzles in the process of solving problems.[4]

5. Conclusion

Under the background of information, the design of exercise structure and operation system of "Advanced Mathematics" will reduce teachers' labor. Can be done to each student separately assign a set of homework, to prevent students copy the phenomenon of homework: by the computer supervision of students to hand in homework, to solve the problem of difficult to receive homework and do not receive homework; Can give students to write down the usual homework points: help students to sum up their experience in solving problems. It is helpful to teach students according to their aptitude, and will have a positive role in promoting teachers' teaching ability.[5]

References:

[1] Lu Jing Design of advanced Mathematics Online Operation System based on process evaluation[J]. Vocational and technical education in China, Vol.1No.1,Aug,2018

[2] ZHONG Mei Thinking and Pracite on the Higher Mathematics Homework[J]. COLLEGE MATHEMATICS, Vol.23No.4,Aug,2017

[3]ZhuFu.ATalkonDeveloPingaCAISystemtoCoreretStudents'ExereiseofHigherMathematies[J].ReesarehxnTeca,Vol.24No.1,Mar,2018

[4] Abraham Silberschatz, HenryF.Korth, S.Sudar-shan. Database System Co-noepts[M]. Beijing: China Machine Press.2006.

[5] Chen Hua, Nie Gang. American Online Operating System W BASSign and its Enlightenment [J]. Distance Education in China, 2005,(10).