



Research on the Cultivation Path of Higher Mathematics on Digital Literacy of College Students in the Digital Context

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Abstract. In the context of the digital era, higher mathematics, as a core course in higher education, is particularly important for the cultivation of students' digital literacy, and the digital literacy of college and university students has become an important cornerstone of their future career development. This paper firstly explains the intrinsic connection between digital literacy and higher mathematics, then analyzes the current situation and problems of digital literacy in colleges and universities, and based on this, puts forward the specific paths and strategies of higher mathematics in cultivating students' digital literacy. It is expected to provide a useful reference for the reform of mathematics teaching in colleges and universities.

Keywords: digital background; higher mathematics; digital literacy; cultivation pathway.

1 Introduction

With the rapid development of information technology, digitalization has become one of the main features of today's society. Against this background, digital literacy, as the basic ability of individuals to adapt to the digital era, has been increasingly emphasized by all sectors of society. As a basic discipline of higher education, higher mathematics has an irreplaceable role in the cultivation of students' logical thinking and data analysis ability. Therefore, it is of great practical significance and theoretical value to explore the cultivation path of higher mathematics on digital literacy for college students in the digital background.

2 Connotation and Relationship between Higher Mathematics and Digital Literacy

Connotation of Higher Mathematics and Digital Literacy Digital literacy, on the other hand, refers to an individual's ability to acquire, process, utilize, and create information in a digital environment, including the use of digital tools, the understanding

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of digital content, and the safeguarding of digital security. As an important course in higher education, higher mathematics covers a wide range of fields such as calculus, linear algebra, probability statistics, etc., aiming to cultivate students' mathematical thinking ability, logical reasoning ability and innovation ability[1][2].

The relationship between higher mathematics and digital literacy There is a close connection between higher mathematics and digital literacy. Firstly, the study of higher mathematics can improve students' mathematical thinking ability and provide a solid foundation for the cultivation of digital literacy. Secondly, the data processing and analysis methods in higher mathematics play an important role in improving students' data processing ability and information analysis ability. In addition, the study of higher mathematics can also cultivate students' innovative ability and problem-solving ability, and then improve digital literacy.

3 The Analysis of the Current Situation of Digital Literacy of College Students

Currently, there are some problems in digital literacy of college students. On the one hand, some students are not skilled enough to master digital technology and lack the awareness and ability to solve problems by using digital technology; on the other hand, some students lack effective analysis methods and processing ability when facing a large amount of data. The existence of these problems restricts the improvement of digital literacy of college students and also affects their future career development.

III A Study of the Pathways of Higher Mathematics in the Development of Digital Literacy in Higher Education Students

3.1 Optimize the Higher Mathematics Curriculum System and Integrate Digital Literacy Education

In order to better cultivate the digital literacy of college students, the higher mathematics curriculum needs to be optimized and reformed. First, the teaching content of higher mathematics should be adjusted according to the requirements of digital literacy, and the use of digital tools, data processing and analysis should be incorporated into the curriculum. Secondly, it should pay attention to the cross-fertilization between higher mathematics and other disciplines, cultivate students' comprehensive application ability through interdisciplinary teaching, and introduce some emerging mathematical fields and cutting-edge technologies in order to broaden students' horizons and knowledge. In addition, elective courses or practical programs related to digital literacy can be offered to provide students with more learning opportunities and practical platforms[3].

3.2 Innovative Teaching Methods of Higher Mathematics to Enhance the Effect of Digital Literacy Cultivation

The innovation of teaching methods is of great significance in enhancing the effect of digital literacy cultivation. Firstly, teaching methods such as heuristic and inquiry can be used to guide students to actively participate in the learning process and improve their independent learning ability and innovation ability. Secondly, information technology means, such as multimedia teaching and online teaching, can be utilized to enrich the form and means of teaching and improve students' interest and participation in learning. In addition, teaching activities such as case analysis and group discussion can be carried out to cultivate students' teamwork spirit and communication ability.

Exercise Cooperative Learning and Teamwork Skills. The development of cooperative learning in small groups: students are organized to engage in cooperative learning in small groups so that they can discuss and solve problems together. Cultivate students' teamwork ability and communication ability through group discussion and experience sharing. At the same time, let students learn from each other, inspire each other and make progress together in cooperation.

The practice of project-based learning: design some comprehensive projects involving multiple knowledge points and let students work in teams to research and implement them. Through the implementation process of the project, students can cultivate their comprehensive application ability and teamwork ability. At the same time, let students feel the charm and application value of mathematics in practice.

Application of Digital Resources and Enhancement of Independent Learning Ability. Use of digital resources: Make full use of digital teaching resources, such as online courses, teaching videos and e-books, to provide students with diversified ways of learning. At the same time, students are guided to use these resources correctly to improve their independent learning ability.

Cultivating a sense of innovation: Encourage students to try new ideas and methods of problem solving and cultivate their sense of innovation and spirit of exploration. This helps students to be able to dare to challenge themselves and find new solutions when facing new problems.

Cultivation of independent learning ability: Students are encouraged to engage in independent learning and to expand their mathematical horizons and knowledge reserves by consulting the literature and attending academic lectures. At the same time, students are guided to make reasonable study plans and methods to develop their self-management and self-improvement abilities[4].

Stimulation of Creative Awareness and Exploratory Spirit. Training in creative thinking: Cultivate students' sense of creativity and spirit of exploration by guiding them to try out new ideas and methods of problem solving and to participate in mathematical competitions. Students are encouraged to dare to challenge traditional concepts and methods and to put forward new ideas and insights[6].

Organization of practical activities: Organize some practical activities related to mathematics, such as Mathematical Modeling Competition, Mathematical Culture Festival, etc., so that students can experience the fun and value of mathematics in practice. Through participation in practical activities, students' desire for exploration and innovative spirit will be stimulated.

3.3 Strengthening Practical Teaching Links to Improve Students' Ability to Apply Digital Literacy

Practical teaching is an important way to cultivate students' numerical literacy. Colleges and universities should strengthen the design and implementation of practical teaching links in higher mathematics. Colleges and universities can strengthen cooperation with enterprises, research institutions and other organizations to establish practice teaching bases and provide students with more practice opportunities. By participating in practical projects and solving practical problems, students can apply what they have learned in practice and improve their practical ability and innovation ability. At the same time, practical activities such as mathematical modeling contests and data analysis contests can be carried out so that they can master mathematical knowledge and digital skills in practice. In addition, students can be encouraged to participate in activities such as mathematical modeling competitions and data analysis competitions to improve their digital literacy level and application ability.

Mathematical Modeling Training. Mathematical modeling is the process of transforming practical problems into mathematical problems and solving them. By organizing mathematical modeling competitions or practical activities, students are guided to build mathematical models and solve them from practical problems. It not only improves students' ability to apply mathematics, but also develops their innovative thinking and problem-solving skills[6].

Data Analysis Skill Enhancement. In the information age, the ability to analyze data is particularly important. Therefore, students need to be guided to master basic data analysis methods, such as data preprocessing, data visualization, statistical analysis and so on. Through practical exercises and case studies, students will improve their data processing and interpretation skills[7].

Cultivation of Computational Skills. Computational skills are an indispensable part of mathematics learning. Through a lot of calculation practice, students' calculation speed and accuracy are improved. At the same time, students are guided to master some calculation skills and methods, such as simplification, approximate calculation, etc., to improve the efficiency of calculation.

Learning and Application of Mathematical Software. Modern mathematical software such as MATLAB, Python, etc. have become important tools for mathematical

learning and research. Therefore, students need to be guided to learn and master the basic operation and application of these software. Through the use of software, students can perform numerical calculations, data analysis and graph drawing more efficiently.

4 Case Studies and Empirical Research

Higher mathematics courses not only focus on the teaching of theoretical knowledge, but also actively organize students to participate in mathematical modeling competitions. In the competition, students need to transform practical problems into mathematical models and use mathematical methods and computer tools to solve them. This process not only exercises students' mathematical thinking ability, but also improves their numerical literacy, laying a solid foundation for future career development.

In order to verify the effectiveness of higher mathematics on the cultivation of digital literacy of college students, we conducted an empirical study. Two groups of students were selected as samples for the study, one receiving traditional higher mathematics instruction and the other receiving higher mathematics instruction that incorporates digital literacy development.

Table 1. Survey of students

Do you think math is important?		Your attitude towards math is	
important	37.2%	very interested	22.3%
more important	42.9%	more interested	20.4%
not matter	13.7%	not matter	27.2%
unimportant	6.2%	not interested	30.1%
Do you think the use of multimedia teaching		Do you think classroom instruction should be	
necessary	9.3%	Don't overload the classroom	38%
not matter	25.7%	Focus on practicality and reduce arguments	42%
unnecessary	31.6%	combine lecture and practice	7.2%
other	28.4%	other	12.8%

Table 2. Survey of teachers

What you consider most when preparing a lesson is		What you focus on the most in your classroom is	
Handling of teaching material	31.4%	Completion of teaching tasks	34.2%
Design of teaching methods	29.5%	Breaking through the key points	36.1%
Use of teaching tools	9.1%	Student learning status	20.0%

Students' knowledge and potential	30.0%	The creation of mathematical contexts	9.7%
Do you know anything about research studies?		You apply research-based learning to	
realize	9.2%	Course Instruction	5.0%
Understand a little	10.1%	exercise class	44.0%
not realize	80.7%	Modeling or extracurricular technology activities	51.0%

In the process of empirical research, we used a variety of assessment methods, including questionnaire survey, achievement comparison and practical ability test. Through the questionnaire survey, As shown in Tables 1 and 2, we learned about the students' attitudes and views on mathematics learning and digital literacy development; through the grade comparison, we analyzed the differences between the two groups of students in terms of their mathematics performance; through the practical ability test, we assessed the improvement of the students' ability in practical problem solving and data analysis.

After a period of experimentation and assessment, we came to the following conclusions: students who received higher mathematics teaching incorporating digital literacy development showed obvious advantages in both math performance and practical ability. They not only acquired solid mathematical knowledge, but also possessed high numerical literacy and problem-solving ability. This result verifies the important role of higher mathematics in the cultivation of digital literacy among college students.

5 Conclusion and Prospect

Higher mathematics plays an important role in the cultivation of digital literacy of college students. By optimizing the curriculum system, innovating teaching methods and strengthening practical teaching links and other paths, the digital literacy level of college students can be effectively improved. However, at present, there are still some challenges and problems in higher mathematics in digital literacy cultivation, such as insufficient teaching resources and single teaching method. Therefore, it is necessary to further strengthen the research and practice of higher mathematics and digital literacy cultivation in the future and explore more effective cultivation paths and strategies.

Looking ahead, with the continuous development of digital technology and the continuous expansion of application fields, the demand for digital literacy of college students will become higher and higher. As one of the important ways to cultivate digital literacy, higher mathematics should constantly adapt to the needs of the times and carry out continuous reform and innovation. At the same time, colleges and universities should strengthen cooperation and communication with other institutions to jointly promote the development and improvement of digital literacy education.

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