

The Teaching Exploration of Linear Algebra under the Background of Artificial Intelligence

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Abstract: With the development of artificial intelligence, the teaching content and teaching methods of mathematics courses represented by linear algebra need to be changed accordingly in order to adapt to the development of artificial intelligence in the new era. Based on the reform of the teaching content, teaching methods and assessment methods of Linear Algebra under the background of artificial intelligence, this paper expounds the importance and necessity of Linear Algebra under the background of artificial intelligence, and puts forward the ideas of course design and reform guided by "stimulating interest" and "cultivating ability". On this basis, this paper expounds the specific content of the course teaching reform of linear algebra in the background of artificial intelligence, by combining the method of combining practical problems as the main line, which provides a reference for the course teaching of Linear Algebra.

1. Introduction

At present, artificial intelligence has become a new direction of the development of the field of science and technology in the world, and the importance of linear algebra course, as a basic course of mathematics majors, is self-evident. With the continuous development of information technology, people's ways to acquire knowledge have also undergone great changes. With the development of artificial intelligence, the traditional "teaching-based" teaching methods can no longer meet the learning needs of students. "Student-oriented" is the main feature of higher education in the new era; therefore, how to carry out the teaching reform of Linear Algebra under the background of artificial intelligence is particularly important. First of all, teachers should follow the teaching design and reform of "stimulating interest" in the teaching process. At present, there are some problems during Linear Algebra: first, some teachers still adopt the traditional teaching mode; second, some teachers are familiar with the traditional teaching mode and pay not enough attention to the teaching of Linear Algebra under the background of artificial intelligence; third, some teachers, the assessment method of Linear Algebra is too single [1-6].

1.1. Traditional Teaching Mode

The traditional teaching mode of Linear Algebra is mainly "lecturing". The teaching content

mainly includes: linear correlation of matrices, vector groups, determinants, eigenvalues and feature vectors of matrices, etc. This part of the content is highly theoretical, and students' learning is boring and difficult to understand. In addition, because of the "teaching" teaching mode, it is difficult for students to digest and absorb. Because this part of the content is too boring, students are not interested in this part of the content, if this goes on; it will cause students to weariness and even lose interest in learning "Linear Algebra" courses. In addition, because the "teaching type" teaching mode is a "teacher-centered" teaching mode, teachers often ignore the main position of students in the teaching process. This teaching mode based on "teaching type" leads to the poor teaching effect of "Linear Algebra" courses [7-10].

In the "teaching type" teaching mode, teachers usually focus on some important knowledge points in the class, which are often unfamiliar and easily confused by students. Although this "teaching" teaching mode can improve teachers' professional quality and theoretical level, its disadvantages are also obvious: first, students' interest is not high in learning. Since the "teaching" teaching mode cannot make students actively participate in the classroom, students are often passive in the classroom; second, the teaching efficiency is low. Since teachers focus on explaining important knowledge points in a class, it is difficult to fully explain these knowledge points in a limited time; third, less interaction between teachers and students. Because the traditional "teaching" teaching mode ignores students' subjectivity and the interaction between teachers and students, there is no good interactive relationship between teachers and students.

Although the traditional "teaching" teaching mode can improve teachers' professional quality and theoretical level, this "teaching" teaching mode only pays attention to the play of teachers' personal subjective initiative but ignores the cultivation of students' subjective initiative and innovative consciousness. Therefore, in the context of artificial intelligence, the traditional "teaching" teaching mode needs reform and innovation.

1.2. Neglect Teaching

Due to the rapid development of artificial intelligence technology, many universities have taken Linear Algebra as the basic course of computer major, and many students take Linear Algebra as the entry course of computer major. Therefore, the teaching of Linear Algebra in the background of artificial intelligence has become a difficult problem at present, and the teaching of Linear Algebra in the background of artificial intelligence needs to be reformed [10-14].

First of all, teachers should pay attention to the explanation of basic knowledge in the teaching process. At present, some teachers still use the traditional teaching mode to teach the basic knowledge of the Linear Algebra course and explain the more abstract and complex theorems and formulas in class. However, with the rapid development of artificial intelligence technology, many abstract and difficult knowledge points can be solved by computer programming, which requires teachers not to stick to the traditional teaching mode when explaining knowledge points, but to carry out teaching design and reform with the guidance of "stimulating interest". At the same time, teachers should pay attention to the explanation of basic knowledge in the teaching process, especially in the explanation of some theorems and formulas can not only be limited to "understand" or "remember". In the teaching process, teachers should pay attention to the inspection of students' basic knowledge mastery, the cultivation of students' applied knowledge ability, the stimulation of students' interest in learning, and the establishment of students' learning confidence.

At present, although some teachers attach importance to the cultivation of theoretical knowledge and practical ability, they do not pay attention to practical application. After the teacher explains the knowledge points in the class, he will no longer explain or teach, it is too simple. Although some students can learn knowledge from books and apply it, but due to the lack of practical ability and

practical application ability, a lot of knowledge cannot be used in practical life.

On the one hand, students can design the experiment and complete the corresponding experiment report after class; on the other hand, students can design the experiment and realize the design results by computer programming. In such a way, students can effectively apply the knowledge learned to their real life.

Finally, teachers should pay attention to the stimulation of students' interest in learning in the teaching process. At present, some teachers only pay attention to the explanation of students' basic knowledge in class and ignore the stimulation of students' interest in learning. Therefore, teachers should fully mobilize students' learning enthusiasm and initiative in class, guide students to find problems, solve problems, and stimulate their interest in learning. In the teaching process, teachers should regard themselves as a "guide" and "collaborators" rather than "educators" and "educated" in their teaching design and reform.

1.3. Single Assessment Method

The traditional course assessment method of linear algebra is relatively simple, mainly focusing on the final examination results. This single assessment method has many problems. First of all, the assessment form is too single to reflect the real learning level of students. Secondly, some teachers will no longer evaluate students' usual grades after the final exam, which leads to students doing not understand their own learning situation, and students may have the feeling that "I learned, but my grades are not ideal". Finally, after the final examination, the students were not evaluated and summarized after the final examination. This single assessment method cannot fully reflect the real learning level of students in the course learning process of Linear Algebra, and cannot fully reflect the students' mastery of the course knowledge of Linear Algebra [15-19].

With the continuous development of science and technology and the increasing progress of social life, information technology is playing an increasingly important role in people's lives and work. At present, artificial intelligence has become a new direction in the development of world science and technology. Unlike the traditional subjects, there are many practical problems involved during "Linear Algebra". At present, most colleges and universities in China adopt the traditional teaching mode to teach the course of linear algebra, which to some extent cannot meet the needs of linear algebra under the background of artificial intelligence.

Finally, teachers should pay attention to cultivating students' independent learning ability. Under the background of artificial intelligence, the teaching of Linear Algebra should not only cultivate students to master theoretical knowledge solidly, but also cultivate students' ability to think and solve problems independently. Under the traditional teaching mode, teachers mainly focus on "teaching" in the teaching process. This mode not only cannot well mobilize the enthusiasm of students, but also make students have a kind of "I learn can use" idea [20].

2. Curriculum Design and Reform

In view of the problems existing in the teaching of linear algebra courses, we put forward the ideas of curriculum design and reform under the guidance of "stimulating interest" and "cultivating ability", and carry out curriculum reform from three aspects of teaching material content, teaching methods and assessment methods.

In terms of the content of the textbook, we have selected the relevant knowledge during linear algebra, and added the latest research results of artificial intelligence. For example, we selected the application of artificial intelligence technology in image recognition as a teaching case. By introducing theoretical knowledge such as computer vision and artificial intelligence, we combined linear algebra with practical problems to stimulate students' interest in learning and improve their

enthusiasm for learning.

In terms of teaching methods, we put forward the heuristic teaching-oriented and problem-centered teaching methods. Introduce the problem situation in the teaching, create the learning situation, let the students master the knowledge, and improve the ability in the process of asking problems, analyzing problems, and solving problems. For example, we introduce the mathematical concept of "least squares" as the teaching content. By creating real life examples, students think about how to use the "least squares" to solve practical problems. Integrating cutting-edge knowledge and research results of computer vision, artificial intelligence, and other technologies into the teaching, students can understand that these technologies are closely connected with linear algebra.

In terms of assessment methods, we changed the final examination from the traditional closed-book written examination to the open-book examination, and introduced the latest research results of line generation in the context of artificial intelligence. For example, we chose the chapter "Matrix Eigenvalue solving" from the linear algebra course as the content of the final examination, and the assessment method adopts the form of open book. The knowledge of relevant information technology is added to the assessment method, so that students can understand that linear algebra is closely related to computer vision, artificial intelligence, and other fields.

Through the above reform measures, we have cultivated the students' independent learning, independent thinking, independent practice, and innovation ability in course teaching. Through the reform and innovation of teaching content, teaching methods, and assessment methods, students' interest and motivation in learning linear algebra are stimulated, and students' ability to analyze and solve problems is improved.

Under the background of artificial intelligence, it is a long-term, complex, and systematic process of introducing "stimulating interest" and "cultivating ability" into the course teaching of linear algebra. In the context of artificial intelligence, linear algebra, as a mathematics course, will inevitably play an important role in the field of artificial intelligence. We need to further discuss the development and reform of linear algebra in the context of artificial intelligence.

2.1. Strengthen the Connection with Artificial Intelligence

Artificial intelligence is one of the important directions for the development of information science, mathematics, computer science, automation, and other disciplines. It is to realize human intelligence by studying the law of human intelligent activity. Artificial intelligence is a multidisciplinary integration field, whose technical research involves mathematics, physics, computer science, psychology, and philosophy. As a basic mathematical course, linear algebra studies matrices, vectors and spatial transformations, which is the basis for the study of various spatial transformations involved in the field of artificial intelligence, such as two-dimensional spatial vector coordinate transformations, three-dimensional spatial vector coordinate transformation, and linear transformations (such as coordinate transformations). Through the study of matrix theory and algorithm, students can understand the important role of linear algebra in the field of artificial intelligence. Linear algebraic theory research can provide mathematical theoretical support for artificial intelligence technology and help artificial intelligence technology to solve practical problems effectively. At present, many universities have offered the course "Linear Algebra", which is one of the essential basic courses in the field of artificial intelligence. In the context of artificial intelligence, we need to further strengthen the connection between linear algebra and artificial intelligence. For example, linear space and vector groups are important research fields in artificial intelligence, and they are closely related between them. In the course teaching, the concept and properties of spatial vector space can be explained, and the connection

between linear space and vector groups can be explained in combination with computer vision and machine learning. For example: when introducing the linear correlation theory of vector groups, matrix theory can be used to study the correlation problem between vectors. By explaining the knowledge of linear transformation theory and matrix theory, students can understand that these subjects are interrelated and promote each other. In addition, the connection between vector space and vector groups can be introduced together with matrix theory knowledge.

2.2. Improve the Teaching Method of Linear Algebra

Linear Algebra is a basic mathematics course that students of artificial intelligence must learn. In the context of artificial intelligence, linear algebra needs to make some changes in its teaching methods. First of all, we should change the teaching method of "teaching method", let the students to explore, analyze, and solve problems in this process to master the knowledge and improve the ability. In order to cultivate students' interest in learning, we can design some cases related to real life to stimulate students' interest in learning. For example, when explaining the concept of determinant, we can design the problem of "how to implement determinant computing on a computer" to attract students. When students understand the concept of determinant, we can further put forward the question of "why computers can calculate the value of the determinant with only two numbers" to guide students to think and solve it. When students think about and solve this problem by themselves, they will have a strong interest in learning linear algebra.

Linear Algebra is a very theoretical mathematics course, but also a very active thinking course. In the context of artificial intelligence, we should change the traditional teaching method of "teachers speak students listen to", and let students take the initiative to participate in the classroom. Teachers should give the initiative to the students, let the students become the master of the classroom, rather than passively accept the knowledge. In the teaching of "linear algebra", teachers should try to avoid talking about "teaching materials", "standard answers" and "problem-solving skills". We should explain the background, mathematical ideas, and a method of knowledge formation as much as possible, so that students can understand that linear algebra is a subject to solve practical problems with mathematical theory. In the teaching process, teachers can guide students to think about problems and ask questions. Through continuous questioning, inspiration and guidance stimulate students' interest in learning and the desire to think. In the teaching process, students can be given some practical problems and given some time to solve these problems.

2.3. Diversified Assessment Methods

The traditional examination form is mainly the closed-book written test, and the content of the assessment is mainly the grasp of the students' basic concepts, basic theories, and basic methods. In the context of artificial intelligence, the assessment content of linear algebra should be combined with students' majors, and pay attention to the cultivation of students' comprehensive ability. Therefore, we have reformed the traditional closed-book written test. We adopted the open-book examination form in the final exam, which includes the chapter of "Matrix eigenvalue solving" in the Linear Algebra course. The assessment method is changed from closed-book written examination to open-book form, which includes the assessment of students' daily study previews, classroom questioning, classroom practice, homework completion, and other conditions. In the final examination, the latest research results of artificial intelligence technology in image recognition were added, and the course knowledge were combined with practical application. Through the reform of diversified assessment methods, students' enthusiasm and initiative of learning linear algebra courses are improved.

In the final examination process, we introduced the process evaluation. The whole course is

divided into several learning stages, after the completion of each stage, the examination is conducted, and the attendance and homework correction in the whole course learning process are included in the usual results. Teachers assess students' daily studies, previews, classroom questioning, classroom practice, homework, and other conditions, thus forming a diversified assessment system. This assessment method can not only check students' mastery and application ability of linear algebra course knowledge, but also stimulate students' interest in learning and improve students' independent learning ability and innovation ability.

Under the background of artificial intelligence, we have made some achievements in the teaching reform of linear algebra courses, for example, the examination score of linear algebra course has increased by more than 20 points compared with the past; through the reform and innovation of the course content, teaching methods and assessment method of linear algebra, students' learning interest and initiative have been improved. Through the teaching reform and innovation of "Linear Algebra" course, under the guidance of "stimulating interest" and "cultivating ability", we have explored a new way suitable for the teaching reform and innovation of linear algebra courses under the background of artificial intelligence.

3. Combining with Practical Application

Linear algebra in the context of artificial intelligence, there are many application fields, such as: statistics, finance, medical care, etc., For example, for a given data, we can use the matrix in the linear algebra to solve the maximum minimum problem, the matrix rank problem, and the matrix in the linear algebra to solve the dimension problem of vector space.

By expanding the course knowledge, combining practical problems, and combining theoretical knowledge with practical application, not only can students master the basic theories and methods of linear algebra, but also can improve their ability to solve practical problems. For example, in the teaching process, the "polynomial system", "support vector machine" and other contents in the field of machine learning can be introduced into the linear algebra course. Through learning related problems in machine learning, students can understand the application of linear algebra in machine learning and enable them to understand how linear algebra combines mathematics and computer science in artificial intelligence.

Combining theoretical knowledge with practical application can improve students' interest and enthusiasm in learning mathematics, stimulate students' learning interest and learning potential, and cultivate students' ability to solve practical problems.

3.1. Using the Mathematical Software

The use of mathematical software can let the students to deepen the understanding of the course knowledge in class, but also can solve some practical problems. For example, when learning the elementary transformation of a matrix, students can use the MATLAB software to show the elementary transformation of matrices in the form of animation, so that students can not only understand the concept of the elementary transformation of the matrix, but also deepen the understanding of the elementary transformation of matrices. In addition, MATLAB software can be used in the teaching process. MATLAB is a set of scientific computing and data processing software developed by Math Works company, mainly used in numerical computing, image processing, scientific computing, and data analysis, as well as applications in various engineering technology fields. MATLAB Software has a powerful numerical calculation function and graphical display function, though it can visually show the image or array changes within a specified range of trends. Students can solve some problems in linear algebra very well with MATLAB software. For example, when teaching the inverse matrix of a matrix A , MATLAB software can be used to draw

AA matrix, AA-B and other graphs. Through the comparative analysis of different matrices, we can find that these matrices are similar in some aspects; for example, when teaching the second-order matrix, MATLAB software can draw the second-order matrix, and the distribution of the second-order vector group in the rectangular coordinate system can be intuitively seen through the image. Through these examples, students can further understand that some problems and methods in linear algebra have good applications in the context of artificial intelligence. Using mathematics software for teaching can not only stimulate students' interest in mathematics learning, but also cultivate students' ability to solve practical problems with mathematics knowledge. At the same time, students can also understand how linear algebra is applied to practice in the context of artificial intelligence.

3.2. Combining with Practical Problems

In the teaching process of Linear Algebra, the teaching content of the course can be combined with the professional characteristics of students' future jobs. For example, in the teaching process, related problems in the field of machine learning can be introduced, such as the rank problem of matrices using determinants in linear algebra and the dimension problem of linear algebra using determinants in linear algebra to solve the vector space. In the teaching process, there are some typical examples in the field of machine learning, such as the "support vector machine" in machine learning during the teaching process of linear algebra, and the "support vector machine" in the teaching process of linear algebra. By combining theoretical knowledge with practical applications, students can understand the application of linear algebra in the field of artificial intelligence and related problems in the field of machine learning. Therefore, it is necessary to introduce relevant problems in the field of machine learning in the teaching process of Linear Algebra.

3.3. Improving Teachers' Professional Quality

Linear algebra is a very practical course. In the context of artificial intelligence, many problems in linear algebra need to be solved by computers. Therefore, in the teaching process, teachers should not only have a solid mathematical foundation and a strong ability to solve problems, but also have the ability to use computers to solve problems. In order to enable students to use the knowledge learned in linear algebra to solve practical problems in the field of artificial intelligence, teachers should constantly improve their professional quality. Firstly, teachers should constantly learn and master relevant knowledge in modern computer science; secondly, teachers should master the content and application in linear algebra; thirdly, teachers should actively participate in scientific research activities. Scientific research activities can improve teachers' professional quality and enhance their ability to find and solve practical problems. In the context of artificial intelligence, linear algebra courses also need to keep pace with The Time and constantly update the course content and teaching methods. Only in this way can we better adapt to the current needs of linear algebra teaching in colleges and universities. This paper mainly discusses the teaching strategies of linear algebra in the context of artificial intelligence.

4. Reform the Assessment Method

The traditional assessment methods mainly take closed-book examinations, with the score of closed-book examination as the only standard to evaluate students' learning quality. This will lead to students' emphasis on "knowledge" over "ability", which is not conducive to cultivating students' innovative spirit and practical ability. The assessment method of Linear Algebra cannot be carried out solely based on the results of the closed-book examination, but more importantly, to evaluate

the ability shown by students in the learning process. Therefore, it is particularly necessary to reform the teaching assessment method of "Linear Algebra" courses. Specifically speaking, it mainly includes the following aspects:

(1) Increase the proportion of the normal grades to the total grades to 70%. Daily performance is a comprehensive assessment of students' learning ability and learning attitudes, which cannot be measured simply by paper scores. Normal performance is a comprehensive evaluation of students' classroom performance and normal homework completion, which can not only test the students' mastery of basic concepts and basic theoretical knowledge, but also test the students' ability to apply basic knowledge and comprehensive quality in the process of learning.

(2) Add the "job" link. Adding the "homework" link to the course assessment of Linear Algebra can avoid the disadvantages of the previous "closed-book exam + usual score + final exam" mode, which can not only reflect students' understanding and mastery of knowledge points in the learning process, but also test students' practical application ability and innovation ability of the knowledge learned. In addition, the "homework" link can also test the students' use of knowledge points, whether they understand the basic concept of linear algebra, and whether they can use the knowledge to solve practical problems.

(3) Add the course design link. The introduction of "curriculum design" into the course assessment of Linear Algebra can test the results of students' ability to use knowledge to solve problems and innovate in the learning process. This study applies linear algebra to practical problems. For example, when explaining the linear correlation of the matrix, students can be guided to apply the matrix to the measurement to solve practical problems. Through the reform and exploration of "curriculum design", the teaching effect and quality of linear algebra can be effectively improved. Through the reform and exploration of the "curriculum design" link, students can comprehensively test the mastery of the knowledge and comprehensive ability and provide an objective basis for the evaluation of teaching effects.

5. Conclusion

Artificial intelligence is one of the hottest topics at the moment, which has brought new impetus to social and economic development. As an important basic course of mathematics major, the Linear Algebra course also needs to make corresponding changes in the context of artificial intelligence. This paper reforms the course content, teaching methods, and assessment methods of Linear Algebra, and aims to improve students' learning enthusiasm and initiative, enhance students' innovative thinking ability and innovative consciousness, and enhance students' application ability and practical ability. It is hoped that the research in this paper can provide a reference for the course teaching of Linear Algebra.

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