

PROCEEDINGS ARTICLE

Practical Exploration on the Linear Algebra Group Cooperative Inquiry Learning Mode

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ABSTRACT

"Group cooperative inquiry learning mode" refers to the process of independent inquiry and cooperative learning, which the group members carry out for the same problem at the same time. The application of the mode of group cooperative inquiry learning to linear algebra, can fully inspire students' learning initiative, enthusiasm and creativity, and enhance the intention of cooperation with others and the ability of communication and expression.

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1. INTRODUCTION

As an important basic course in colleges and universities, the linear algebra course has the characteristics of foundation, quality and application, and has a very important position. At present, linear algebra teaching faces many difficulties: class hours are compressed, but the teaching content cannot be deleted, leading to the intensification of "cramming teaching"; the traditional single teaching mode cannot meet the requirements of large information and efficient teaching [1]. At present, some reforms of linear algebra teaching mostly focus on teaching means and teaching content. That is to say, in addition to chalk and blackboard in class, there are only slide show, projection, audio and video recording and other audio-visual media. However, there is still a lack of interaction between teachers and students, and the students cannot actively participate in the classroom teaching, which is difficult to stimulate the students' independent learning and hard to cultivate innovative ability. The group cooperative inquiry learning model will be able to solve this problem very well.

"Group cooperative inquiry learning mode" refers to the process of independent inquiry and cooperative

learning, in which group members address the same problem at the same time. Group cooperative learning integrates teacher-student interaction as a leading factor in teaching into the teaching system, expands the extension of the teaching system, and regards it as an indispensable part of the teaching process, which is an innovation [2]. I have 5 colleagues in the Teaching and Research section, including from September 2021 to July 2022. I have cooperated to explore the practice of teaching mode reform in 9 classes for one year and have achieved very good results.

2. SPECIFIC IMPLEMENTATION PROCESS

2.1. Establishment of Cooperation Group

At the beginning of the semester, teachers first have a comprehensive understanding of the math level of the whole class through questionnaire and examination; comprehensively considering the learning foundation, enthusiasm for speaking, complementarity of personality, organizing ability and other factors [1]. Then dividing the students into groups and formulate

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rules and regulations of cooperative learning. A cooperative group of 4 to 6 students is recommended. When dividing the groups, it usually follows the principle of "heterogeneity and homogeneity between groups", that is, each member of the group forms differences in academic performance, ability, personality and other aspects, but the overall characteristics of each group are not very different. Intra-group heterogeneity lays the foundation for cooperation among group members, and homogeneity between groups creates conditions for fair competition among groups in the class [3]. Each group has a group leader, responsible for organizing the interactive activities of the group members. To ensure each member can get the opportunity to exercise, the group leader implements the rotation system.

2.2. Operating Procedures for Group Cooperative Learning

2.2.1. Defining Group Cooperation Tasks

Teachers arrange learning tasks in advance, and group cooperation exploration can be carried out in three ways. First, regular cooperation tasks. For example, the summary of each chapter must be made by students in the way of group cooperation. In the summary, the key content, key examples and difficult points of the chapter must be included. Inquiry learning not only needs to show knowledge occurrence, but also to reflect the abstract summary process of mathematical thought [4]. Second, teachers assign appropriate content for group exploration [1]. For example, summarize the calculation method of the determinant. Third, groups explore issues of common interest independently. The three ways can be combined and promoted together [1].

2.2.2. Group Cooperation and Exploration

After clarifying the learning task, students use their spare time to organize discussions and to write a PowerPoint (PPT) presentation.

2.2.3. Display Group Cooperation Results

First of all, the team members divide the labor and show the discussion results in the form of PPT. The PPT should meet the requirements of: 1) content is correct, clear, and examples must be used to demonstrate the application of the theorem; 2) PPT display page must be simple, clear and beautiful.

Secondly, the teacher randomly checks a group in class. The group sends the group leader to explain the PPT. The interpreter requires clear words, skilled content, logical mastery, quick thinking.

2.2.4. Evaluation System

The teacher evaluates the group according to the PPT content and the speaker performance, and gives the score. The group summarizes and reflects accordingly.

This score is included in the students' usual performance system and accounts for 50% of the usual score.

3. SUMMARY OF THE EXPERIMENTAL RESULTS

3.1. Advantages of Group Cooperative Inquiry Learning

Firstly, group cooperative learning highlights the main status of college students, cultivates autonomy and independence, and stimulates students' creative ability. Group collaborative learning transforms students from bystanders to participants. Team members can be trained on language expression, thinking and courage in the group. Group collaborative learning can cultivate students' ability to think actively and form independent opinions. For example, in the organizing PPT materials, students should take the initiative to sort out and classify the collected relevant materials according to their own ideas to explain their views in the group discussion.

Secondly, it is beneficial to cultivate the team spirit of university students. Group cooperative learning is an effective way to cultivate the cooperative spirit. To achieve the goals of the group, the team members must unite, cooperate and help each other. For example, in the preparation of PPT presentation, the team members need to work together to complete the collection of PPT materials, framework construction, information input, page design and other work. In the whole process, the group members communicate with each other, coordinate with each other, fulfill their own responsibilities, and help each other, which promotes the establishment of university students' sense of cooperation.

Thirdly, group cooperative research can help university students to establish self-confidence and cultivate a good state of mind. The demonstration of the group work requires the group members to show in the way of speech. In this process, the speaker's confidence is exercised. In order to better express, the speaker's psychological quality is improved in the repeated drills. It paves the way for stepping into the society successfully in the future.

Fourthly, group cooperative learning is conducive to improvement of students' language communication

ability. The group cooperation presentation requires that the speaker is clear, articulates and thinks clearly. To achieve this effect, students exercise their language communication ability in the training. It lays a good foundation to participate in social activities.

3.2. Existing Problems

3.2.1. Individualized Tendency of Students Leads to Polarization

In group cooperative learning, the competent and excellent students become the leading role. However, most students, especially those who do not love expression and have poor learning ability, lose the opportunity to express their views, and become "listeners". It will lead them to lose their interest in cooperative learning gradually.

3.2.2. Unification of Group Evaluation Cannot Reflect the Difference of Individual Ability

Because the teacher assigns a unified score to the results of group cooperation, the score of the same group member is the same. This makes it impossible to judge students' contribution to group work. It will result in unfair evaluation.

3.2.3. Student Participation Is Uneven

This causes many students to make up the number and do not participate in any cooperative activities. As a result, the group cooperation becomes the cooperation of one person or a few people. The significance of group cooperation was lost.

3.2.4. Lack of Reflection

After the teacher evaluating the results of the group cooperation, the students do not reflect and modify them and put forward the improvement measures further. The students' research is highly limited, not in-depth refined, and it will not draw inferences.

3.3. Solution Strategy

In view of the above problems, we put forward the following corresponding solution strategies, which are being implemented gradually.

3.3.1. Reasonable Allocation of Team Members and Tasks

Everyone has a task. The excellent student is the group leader, who arranges the tasks and summarizes the tasks. Poor students can take part in tasks such as collecting materials, entering PPT, and making PPT.

During the presentation, teachers can choose easy questions for the poor students, thus students with learning difficulties can present with preparation, in order to stimulate their interest in learning.

3.3.2. Group Evaluation Is Detailed and Evaluation Index Is Diversified

The grade of group cooperative learning evaluation is divided into three parts: the achievement presentation score, the participation score of each group member and the added value. Specific allocations and proportions are shown in Fig. 1.

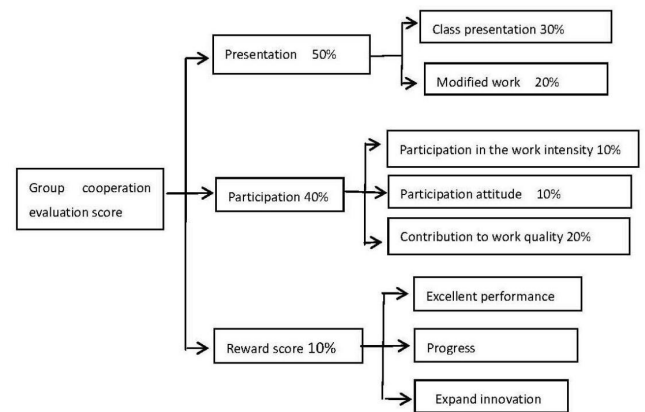


Figure 1. Group cooperation evaluation score table.

3.3.3. Summarizing the Task Results and Extending the Task Objectives

After the group cooperation presentation, the teacher should comment on the group performance in time, and urge the students to correct in time, and give the corrected results with points. At the same time, on the basis of this achievement, the teacher puts forward the ductility problem, and to guide the students, let the students continue to explore. Additional points were awarded for performing groups.

3.3.4. Increasing the Proportion of Group Cooperation and Increasing the Reward

The group cooperation will be increased from 50% of the original usual score to 70%. The increase proportion of group cooperation can improve the attention of students, stimulate students to be more actively into the group activities.

4. CONCLUSION

Through this education mode reform practice activity, university mathematics education teaching methods

are enriched and improved; this activity enables students to build knowledge and find problem solutions [5]. It cultivates students' thinking habits more effectively, increases students' subjective initiative, cooperation and communication ability, and stimulates students' own learning initiative, enthusiasm and creativity fully. Group cooperative inquiry-type teaching can improve students' thinking ability, and cultivate their spirit of cooperation, and finally cultivate highly competitive outstanding talents for the country [6].

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