

# Mathematics Teaching Design for "Rotation Classroom" Mode

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**Abstract.** Turn the classroom as a kind of new teaching mode, brought new development opportunities for education reform. Traditional methods of teaching students lack of thinking and practice opportunities can't make full play to initiative. In this paper, based on the relative theory and method of turning classroom study and combine the characteristics of the mathematics teaching, to improve the quality of mathematics education and cultivate students' abstract thinking ability to provide solutions. The research content mainly includes three aspects: first, analyzed the "turn the classroom" is applied to the advantage of mathematics teaching; two, turn the classroom guided learning plan, is to guide students in active learning scheme of knowledge construction and establishment; and three, "turn the classroom teaching process design, design the teaching process in the form of graphics, and the analysis before, class and after class.

## Introduction

Mathematics in the development of human civilization plays a very important role and it promotes the great progress of science and technology. But in history, limited to technical conditions, according to the mathematical reasoning and calculate the predicted, often it will take years. Mathematics for the human production and life bring benefit is easy to be ignored. In the 20th century, the time gap between mathematical theory research and practical application gradually reduced. Especially entering the new century, with the application and popularization of computer technology, information digitization and networking of information channel, based on the creation of the mathematics as a vision has been achieved can real-time test and real-time implementation, mathematical techniques will be a kind of the most widely used, the most direct, the most timely and most creative practical technology.

Mathematics is an important method of human rational thinking, mathematical model, mathematics and mathematical inference often can make the foreseen before concrete experience. This forecast is not out of fantasy, but for the nature and necessity of expressed in mathematical way. With the development of science and technology, the accuracy of the mathematical prediction and examine increasingly shows its importance. In the era of rapid development of science and technology, mathematics information digitization and information processing has become a high-tech project many common core technology. From design and make plan in advance to test to explore and continue to improve, to command and control and the specific operation, is relied on mathematical techniques. No matter in daily production and life or in relation to the survival and development of critical moment, mathematics plays a very important role. The rapid development of science and technology and production puts forward more requirements on mathematics, must seize the moment increase input, strengthen mathematics and mathematics education, enhance the whole nation of mathematics quality, to meet the challenges of the future better.

Mathematics teaching content coverage is big, has the certain theory, content and boring, do not interest the students. At the same time, the teacher to carry out the teaching theory and teaching methods of research is not enough in-depth students lack of thinking and traditional teaching methods and practice, student's positive initiative not give full play to the independent learning ability is poor. Turn the classroom as a kind of new teaching mode, brought new development opportunities for education reform. To adjust the inside and outside the classroom, will study the decision from teachers to students, students to plan their own learning, learning, learning style and the pace of knowledge, teachers' teaching method and the collaboration method is used to meet the

needs of students and promote personalized learning. In this paper, based on the relative theory and method of turning classroom study and combine the characteristics of the mathematics teaching, to improve the quality of mathematics education and cultivate students' abstract thinking ability to provide solutions.

### **Advantages on "Rotation Classroom" in Mathematics Teaching**

Mathematics is abstraction, and other three characteristics of rigor and application universality. The height of the mathematical sciences abstractness, decided to mathematics education should develop the students' abstract thinking ability as the target. Abstract from the specific things out quantitative relation and spatial form, the practical problems into mathematical problems in the process of scientific abstract, can develop the students' ability of abstract; Rigor is required for any mathematical conclusion, must be in strict accordance with the correct inference rules, according to the mathematics of it has been proved and confirmed the correct conclusion, through logical reasoning, which requires the conclusion there can be no subjective and one-sided; With the development of computer technology, mathematics into all walks of life, and materialized to various kinds of advanced equipment. From the satellite to the nuclear power plant, from the weather forecast, to household appliances, new technology of high precision, high speed, high automatic, high safety, high quality and high efficiency etc., are all through the mathematical model and mathematical methods and computer control to achieve. The three characteristics decide the importance of mathematics education. On the one hand, mathematics teaching must face all student, learning to improve thinking ability; On the other hand, it should be according to the actual students and interests, according to students' academic and intellectual development expertise, let different students have different in different ways.

Mathematics curriculum takes the outcome goal despise process goals, lack of attention to students' emotional attitude in the learning process and individual differences. "Turn the classroom not only emphasizes the mastery of basic knowledge, also emphasizes the innovation ability and practice ability training. Under the premise that the students master the basic knowledge, according to the different needs of students, choose their learning progress and challenges. Turn the classroom teaching video produced by the teacher himself or collect the latest high quality resources, make the mathematical learning content close to the practice of life show the latest science and mathematics. "Turn the classroom teaching activities of the" set up "mathematical inquiry" and "mathematical modeling" and "mathematics reading" and other learning activities, enrich the students' mathematics development space, for the students to form active learning style created the conditions, at the same time stimulate students' interest in mathematics and innovation spirit, make students gradually form a scientific learning method, help students form the habit of active exploration in the process of learning mathematics. Mathematics "turn the classroom teaching design has certain openness, for students' questions, collaboration, exploration, display results and practice application" of space. Information technology is widely used in the education of mathematics teaching mathematics learning had a profound impact. In "turn the classroom" pay more attention to the application of information technology, hard to present knowledge present in a traditional class, or to extend the knowledge learning in school to each place, through the handheld mobile devices anytime, anywhere learning, development and study of time and space.

### **Design on Guided Learning Plan of "Rotation Classroom"**

Learning case refers to the teachers according to the characteristics of teaching knowledge and teaching purpose, based on the students' cognitive level and knowledge, to guide the student to carry on the active knowledge construction and establishment of learning solutions. Is a concentration of lesson plans, learning case, notes, standard assessment and review the information in the integration of teachers and students to share the teaching text, is the carrier of the unity of teaching, is the basis of evaluating cooperate with teachers in science, is a student learning to learn, learn to innovate, learn to cooperate and independent development road map.

Design is the purpose of guiding case: convenient students self-study, cultivate students' autonomous learning ability; Establishment of cooperation to explore the learning situation and classroom dynamically generated situation; Achieve the dominant position of students' learning and teachers' dominant position effectively; Enhance the effectiveness of classroom teaching, improve teaching effectiveness; Respect students individual difference, the realization of hierarchical and individualized learning. Design of guide case should follow four basic principles: first, principle of subjectivity. Based on the student learning, exert students' subjective initiative respect students' individual differences reflect the students' main body status. Second is guiding principles. "Guide" is to guide or lead; "Learning" is not speak, also is not to teach; "Case" is a kind of solution, a design that is not the simple accumulation of knowledge and subject. Three is explorative principle. Is advantageous to the student to carry on the inquiry learning, cultivate students' exploring spirit and innovative spirit, do the knowledge problems, to explore, to explore the hierarchical, tutorship simplification ". Four is the principle of hierarchy. Conform to the cognitive characteristics of students learning scheme at every level, guide students by shallow into. The different levels of the students are learning something, excavate students learning to drive, let every student can learn to enjoy the joy of success. "Turn the classroom learning case design content is shown in Fig. 1.

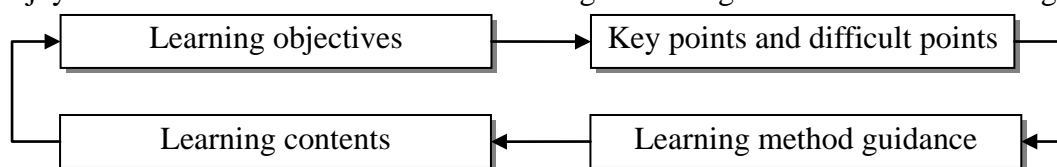


Fig. 1. Design content on guided learning plan of "Rotation classroom"

Learning design content is a loop structure, each contents is based on the content before, and provide support to the next item design.

(1) Learning objectives. Learning objective is to establish a knowledge framework structure, be specific and operable. The targets including knowledge, ability, emotion manner values, etc.;

(2) Key points and difficult points. The Key and difficult point is the core content of learning, told students focus and difficulty, and presented the corresponding breakthrough method;

(3) Learning method guidance. undertake to the student of the influence of the scientific method and training, make the students master the most basic and the most important scientific method, to promote knowledge Learning, ability cultivation and improve scientific quality purposes;

(4) Learning contents. Must master and can be applied in the actual content. Learning content through the form of a single task given to students.

### Teaching Process Design on "Rotation Classroom"

Teaching design is according to the requirement of the curriculum standard and teaching object, the characteristics of integrating all teaching factors in an orderly arrangement, determine the right idea of teaching plan and program. Generally include teaching goals, teaching difficulties teaching methods, teaching procedures and time distribution and so on. Teaching design guided by the systematic approach to the teaching theory into teaching materials and teaching plan, realize the teaching goal of planning and decision-making activities, is to improve the efficiency of the learners to acquire knowledge, skills, and interests of technical process. Turn the classroom teaching process design should follow the students' autonomous learning, teacher's individual guidance, resource variety selection, activities to explore actively, classroom interaction efficiency and focus on ability training and learning evaluation principles such as diversity. Turn the classroom teaching process design is shown in Fig. 2.

(1) Before class: knowledge transfer. Turn the classroom, the basic knowledge on learning before class, the teacher in the classroom on the default students already have the knowledge of knowledge, will not repeat in the class. Let the students have the right to speak and think in class, so must ensure that the students in class can thoroughly to study. As a result, the design of the task before class is the key to the relationship to turn the classroom effect, mainly is for students in the

memory, understanding, and application level. Basic concept and basic knowledge of memory, task before class is commonly emphasized basic concepts and basic meaning, require students to memory; Understanding and application of hierarchical task before class, pay attention to inspire the student to solve the problem, and guide students to actively explore, discover, and generalizations. Design is the core of learning task before class. Learning tasks including overall understanding and grasp the requirements. "Overall understanding" in the structure of the comb effectively grasps the learning content, from the whole to make the students to gradually learn to grasp in the autonomous learning. "Concrete grasp" refers to the specific knowledge ability request, usually in the form of a question. Must carry on the design problem, the problem of teaching difficult point or other knowledge into, make the student in the at the same time grasp the teaching difficult point to solve the problem or other knowledge, to cultivate students' ability of problem solving and extrapolate. Supporting learning resources to help students to achieve learning goals and create the situation. By providing situation, help the students when necessary through the situation of the inquiry or processing, to achieve the purpose of teaching difficult point.

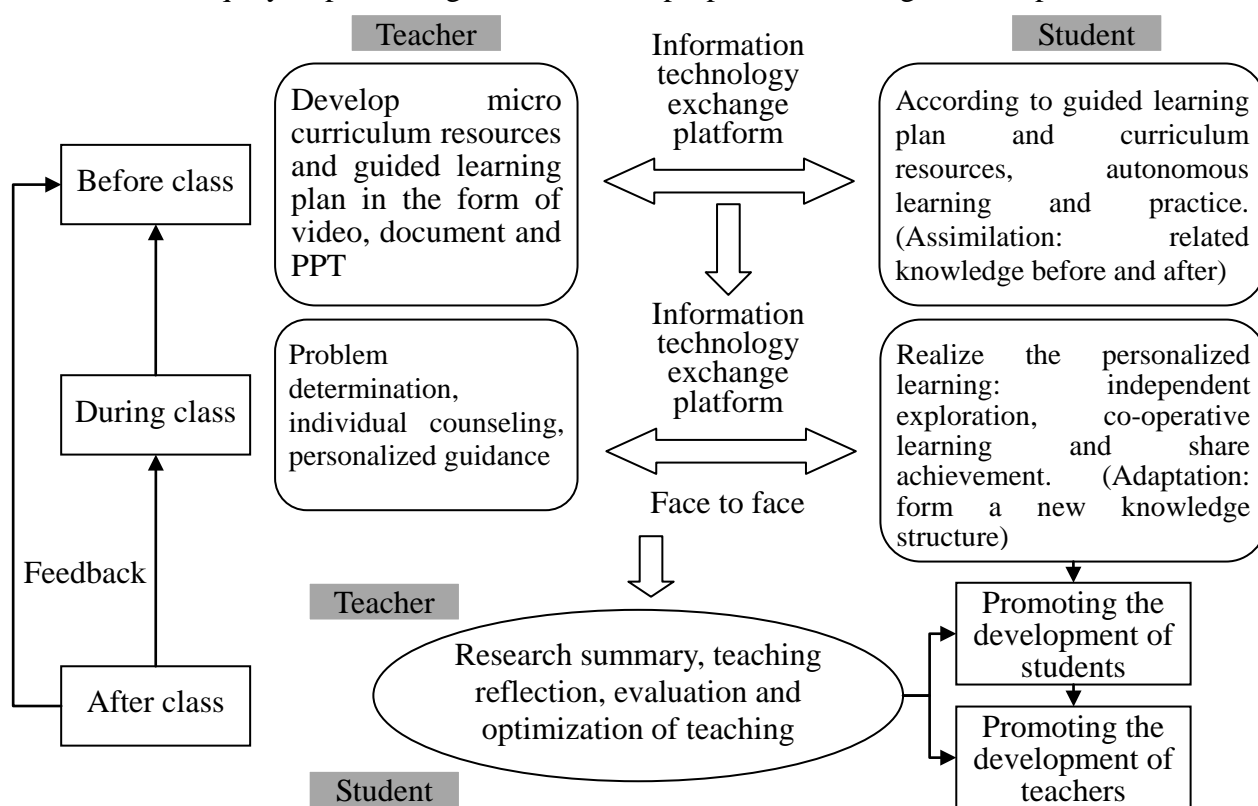


Fig. 2. Teaching process design on "Flipped classroom"

(2) During class: internalization extension. Turn the classroom by transferring knowledge to the class, release the class time for students to the internalization of knowledge. Teachers need to be on the basis of evaluating students' learning situation before class to design of classroom activities, lets the student in the teaching activities of the high quality to complete the internalization of knowledge. Turn the classroom teaching link includes two aspects: one is earnestly, the second is explored. Teachers use less as far as possible the time and follow the "first after school teach, because learning" strategy and "do" with knowledge of teaching concept, focus on students' attention, interpretation of the key, difficult and key points of the disciplines to obtain the overall understanding of knowledge. Use the form of mind mapping, the knowledge related to form "the knowledge tree", enable students to knowledge combined along the mind mapping. At the same time, the relationship between teachers and students in classroom teaching from the "one to many" to the "one to one", emphasis on teaching the asynchrony. Collaborating exploratory teaching, under the guidance of teachers, take students as the main body, lets the student group consciously and actively explore and grasp knowledge and the methods and steps to solve the problem, research

the attribute of objective things, discovered the cause of the development of things and things inside, find rules, form their own concept. In the process, the teacher needs to capture each group to explore the dynamic at any time and in a timely manner to guide. In the process of inquiry teaching, student's main body status and autonomous ability have been strengthened. Only when students think independently, to explore, to solve the problem, can we effectively knowledge internalization, to systematically construct their own knowledge system.

(3) After class: evaluation. Task mainly includes four aspects: one is that achievements communication. After learning before class, teachers earnestly, independent exploration and the team cooperation to explore, in group problem solving, and form a group learning results. Team will report their results, and communicate with other groups and sharing. Second, strengthen after class. Is the classroom teaching mode of extra-curricular activities, mainly problem detection, detection problem to set according to the actual circumstance of students' stratification. Study on spare capacity of students may arrange some fun, challenging and innovative choose to do. Has certain difficulty to the problem solving of students, can be a basic problems or medium difficulty problem. Three, summarizes the reflection. Summary to reflect the purpose is to let the student to the student autonomous learning and collaborative inquiry learning in the classroom before class to carry on the systematic and structured, the content of the teacher to help students to learn knowledge to comb summed up the knowledge framework, method and skill to solve problems. Finally, students can take notes, write a diary or group communication form. Four is, learning evaluation. "Turn the classroom not only pay attention to the evaluation, the result of the study and pay attention to the evaluation of the learning process, truly quantitative evaluation and qualitative evaluation, formative assessment and summative assessment, the evaluation and assessment of group and individual good combination between self-assessment and others assessment. Evaluation content includes the student's performance in team collaboration to explore, achievement show and exercises to practice, etc.

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