

# Discussion on the Application of Educational Psychology to Mathematics Teaching under the Network Background

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**Keywords:** educational psychology, network, mathematics, efficiency

**Abstract.** Researches on teaching psychology show that: influencing factors of learning can be divided into internal and external ones, and teaching media is the most critical for external factors. With today's growing popularity, network is increasingly applied to teaching activities, gradually replaces traditional blackboard, enriches classroom teaching content and shows incomparable advantages. This paper, with the example of mathematics teaching, analyzes about how to apply research achievements of educational psychology appropriately to mathematics teaching under the network environment to improve teaching efficiency.

## Introduction

According to constructivism education theory: learning is an initiative construction process, and individuals' learning is not simply about accumulation of more external information, but to learn more procedures related to their cognition of things, i.e. reconstruction of cognitive structure. Students do not receive knowledge passively, but process knowledge actively, learn new knowledge initiatively, realize transformation of knowledge and evaluate knowledge objectively. Constructivism education theory makes us think deeply about teaching methods and learning methods, how to carry out efficient teaching activities, and make students construct knowledge network and think about knowledge actively. In mathematics teaching, apply educational psychology, change teaching concepts and methods, show student-oriented values, create lively, relaxing and open classroom teaching, make students construct mathematics knowledge network actively and improve mathematics teaching effects.

## Introduction to educational psychology

In college education, mathematics is a basic discipline of many majors, and is also a strongly abstract and logical discipline, and is very difficult for students to learn. However, teachers mostly adopt traditional cramming teaching method, carry out teaching activities around problem solving, mainly train students' problem-solving skills, and fail to show student-oriented concept of constructivism. As a result, students have low interest in learning, and do not want to participate in classroom teaching activities subjectively, resulting in low teaching efficiency. Thus, teachers shall learn to start from educational psychology, grasp students' learning psychology, and introduce educational psychology to mathematics classes, in order to improve teaching efficiency.

### Learning motivation and efficiency

Researches on educational psychology indicate that: motivation intensity has a nonlinear relationship with learning efficiency, but an inverted U curvilinear relationship. In other words, when motivation intensity reaches the optimal level, the highest learning efficiency would be achieved; while further enhancement of motivation intensity would lead to decline of learning efficiency. This is because too great motivation intensity would lead to huge stress to human psychology, and people can hardly give full play to their normal level under anxiety and tension and have declined learning efficiency. In addition, research of Dodson and Yerkes indicated that: the optimal level of learning intensity was not changeless, and will be different with the nature of learning tasks. When learning task was less difficult, an optimal level could be reached with high learning motivation intensity; and when learning task was difficult, an optimal level could be reached with low learning motivation intensity.

### Learning transfer theory

Learning transfer is the influence of one type of learning on another, and can be said to be the influence of existing knowledge, skills and learning methods etc on learning of new knowledge; or application of learned experience to another situation. Students' application of learned knowledge to actual life and work is one of ultimate goals of learning transfer and teaching. According to common element theory: the cause of transfer of two types of learning activities lies in some common components or elements between both, and finding common elements is conducive to better promotion of learning transfer. According to cognitive structure theory: students' cognitive structure is an important influencing factor of learning transfer, and cognitive structure exists in students' brains, and the strengthening of cognitive structure is conducive to promoting the formation of a new cognitive structure.

### Application effects of educational psychology in mathematics teaching

According to mathematics educational psychology, students' cognitive process start from the overall, and teachers shall introduce the overall overview of each topic before it begins, so that students could have an overall grasp of content to be learned and form overall mathematics concepts to facilitate smooth implementation of teaching activities.

Educational psychology emphasizes on changing teaching methods and concepts in mathematics classroom teaching, and teachers shall stand on the position of students considerably to know about their cognitive structure and background, understand their cognitive psychology and rules, identify characterization of mathematical knowledge with appropriate cognitive pattern, carry out individualized teaching according to students' experience and ideas, and guide students to constructing mathematical knowledge independently. During construction, teachers shall play a guiding, corrective and evaluation role, which is of important and active significance for improving mathematics teaching efficiency.

Research on educational psychology is originated from practice, and finally serves for practice and guides people's teaching work. On the one hand, teachers absorb theories of educational psychology, and grasp the relationship between psychological essence and characteristics; on the other hand, collect research achievements of educational psychology, explore the feasibility, guide teaching practice, improve mathematics teaching concepts and promote healthy growth of students' body and mind.

### Practical application of educational psychology to mathematics teaching under the network environment

Under the network environment, network has become an important teaching tool of mathematics, and plays an important role in improving teaching efficiency. Meanwhile, characteristics of network, such as remoteness, information and real time etc, lead to more convenient application of educational psychology to mathematics teaching. Teachers could introduce psychology knowledge to teaching, make students pursue the beauty of mathematics, cultivate students' logic mathematics thinking, and train students' healthy personality, independent character, keen insight and flexible thinking ability. In practical teaching activities, many new teaching methods develop from traditional ones, and educational psychologists often conduct systematic analysis of these teaching methods and reach different theories. For example, according to traditional teaching methods, classroom questioning shall be random, so that each learner could think actively; if questions are raised in certain sequence, learners know what questions they will have and would only think about answer for that part without caring about others. Research achievements of educational psychology indicate that: questioning in sequence has advantages besides disadvantages, as teachers could take certain intervening measures according to students' psychology to promote all students to think actively. Therefore, teachers shall learn to analyze students' psychology with educational psychology, improve teaching methods, cultivate mathematical thinking and improve teaching efficiency. Here, the application of educational psychology to mathematics teaching and aspects that

need attention will be briefly introduced.

#### Change teachers' role

Gagne, a well-known American educational psychologist, says that: "teaching refers to a set of matters except learners for enhancing internal process of learning." Learning of mathematics is an internal construction process, and teachers shall not only teach knowledge, but also try every means to make students absorb knowledge actively, feel the fun and meaning of life brought by knowledge, learn knowledge actively, and apply knowledge they have learned to practical activities. For instance: as an important branch of mathematics discipline, applied mathematics is closely related to our real life, so that colleges shall not simply carry out conceptual teaching of applied mathematics, but place it in real life and combine theories with practice to help students construct mathematics knowledge system actively, know the specific application of applied mathematics in real life, stimulate students' interest in learning and improve teaching efficiency.

Under student-oriented value orientation, teachers are not subjects of teaching activities, but play a dominant role, and shall get along with students equally, respect students, raise questions to inspire students to think in front of difficulties, and play an encouraging and inspiring role; when students make progress, teachers shall fully affirm, help students establish self-confidence, and often have self-examination, self-evaluation and self-adjustment actively. In front of different opinions, strengthen communication between teachers and students and among students, and let students have exchanges of ideas and self-criticism actively. From the perspective of development, students would be fully integrated into teaching activities only when they are independent learners, learn and construct knowledge initiatively, and absorb new knowledge as their own, so as to improve mathematics teaching efficiency.

Apply educational psychology method rationally and change mathematics classroom teaching concepts

Traditional teaching management advocates rigid management, requires students to do or not to do something, and students who meet teachers' requirements shall be praised and those who do not shall be criticized severely. Such teaching concept will hardly create a harmonious relationship between teachers and students, while tense relationship between teachers and students is bound to lead to students' resentment to teachers, and students are unwilling to listen to teachers carefully which is not conducive to improving teaching efficiency. Moreover, under the network environment, college students have increasingly more channels to the society, and know a lot of information about social economy, politics and culture every day through network, have stronger openness, independence and uniqueness, and hate teachers' blind suppression very much. Thus, correct teaching concepts should be taken to eliminate students' resentment, tension and anxiety in classes, and let them experience learning, get satisfied in learning, and adjust themselves with psychological pleasure. Therefore, each educator shall be good at discovering students' shining points, encourage students actively, and create a wider stage for students to show their abilities, feel the joy of success and change such pleasure into motivation to study. Teachers could also give students some psychological hints through body language, eye contact and expression in mathematics teaching activities, and encourage students to solve problems confidently.

#### Change mathematics teaching methods

Traditional mathematics teaching is to give lessons step by step and teach section by section according to chapters of textbooks, and certainly teachers would occasionally arrange some classroom activities, such as case study and situational performance etc. However, generally speaking, there is a serious lack of classroom questioning, and it is basically about teaching of teachers and listening of students. Research of educational psychology indicates that: people's thinking starts from questions and is contained in questions, and thus is related to questions and tasks. After teachers assign mathematics learning tasks or questions, students would inspire thinking actively to solve questions and complete tasks. Thus, the activity of thinking is related to generation and solution of questions. Questions can not only reveal defects of students' mathematics cognitive structure, but also bring certain stimulation to students' psychological intelligence. Thus, we shall change traditional teaching methods, carry actively out question-based teaching, task-oriented

teaching and cooperative teaching, create good thinking environment for students, bring scenes in real life to classes, and make students think about questions in different roles and improve cognitive level in cooperation, competition and confrontation. For mathematics learning, there are many concepts, formulas, theorems and problem solving methods, which can be topics of question-based teaching and cooperative teaching and content of students' active inquiry learning activities, so that students could have deep understanding of mathematical knowledge in exploration. These interactive teaching methods can not only reflect students' dominant role and fully stimulate their individual initiative, but also enable them to know their own strengths and weaknesses in cooperative learning, promote them to learn knowledge actively and learn from other's strong points to offset their own weaknesses. In cooperative teaching, teachers play a guiding role, meet students' desire to learn new knowledge, and let students learn actively under independent inquiry consciousness and construct mathematical knowledge network actively. Finally, teachers would appraise among groups to mobilize students' passion for winning and focus more on future learning, so as to improve teaching effects.

Focus on details of mathematics teaching and enhance students' ability to understand mathematical knowledge

Skimming of language teaching generally exists in mathematics teaching, and language in mathematics mainly includes symbols, terms, graphs and figures etc. Students should master basic characteristics, functions, connotation and rules etc of these mathematical languages. In fact, most of mathematics teachers have not realized the importance of mathematical language, and would not teach specially the connotation, usage habits and rules etc of different forms of language like Chinese class, and would only mention when using. This brings such a problem: master knowledge by understanding language, learn language while mastering knowledge, language is the carrier of mathematical knowledge, and mathematical knowledge is also the carrier of language. If this problem cannot be solved rationally and no attention is paid to mathematical language, it would be difficult for students to improve substantially their ability to understand mathematical knowledge and would be not conducive to teachers' correct analysis of students' problems in learning. Moreover, as concepts and theorems etc in college mathematics are highly abstract, teachers shall carry out specialized language tutoring, in order to train students' mathematical thinking, better grasp mathematical knowledge and have deeper impression of mathematical knowledge.

Create good learning environment

According to constructivism teaching theory, existing knowledge and experience will become learning foundation of new knowledge. Before learning new knowledge, teachers shall make students gain necessary experience and pre-knowledge. For instance, for abstract thinking, teachers shall firstly design teaching process elaborately, and make students gain necessary intuitive experience by various ways. Meanwhile, develop an open, equal and united collective, so that everyone could gain due respect and understanding, take delight in exchanges of experience and insight, carry out self-criticism and accept new thoughts. Teachers participate in teaching activities playing an encouraging, guiding, inspiring and questioning role, create good teaching environment, and stimulate students' interest in and enthusiasm for independent learning, to lay a foundation for students' independent learning in the future.

## Conclusions

With increasingly popular network application, college mathematics teaching would be increasingly open, and classroom teaching methods, teaching activities and teaching thoughts would change constantly. Know about students' psychological characteristics and rules of psychological changes by educational psychology, seek opportunities, and create efficient, free and equal modern mathematics classroom teaching.

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