

# Teaching Reform of Advanced Mathematics Courses Based on Improving Students' Learning Power

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**Abstract:** The article introduces the basic concept of learning power from the fundamental requirements of the country for talent cultivation, digs deeper into the reasons for the weakness of personal learning power of college students in the new era. The organic integration of "High Order, Innovation & Challenge" and curricular ideological and political education is proposed in the teaching content. How to use new media technology to realize three-dimensional teaching, and how to actively build their own knowledge system and exercise their abilities in the way of learning, so as to improve students' overall learning ability and other comprehensive literacy. The application of each element of process evaluation in the evaluation of higher mathematics teaching is emphasized, and finally the important role of improving learning power in the quality of higher mathematics teaching and talent training is summarized.

**Keywords:** Learning Power; Higher Mathematics; Teaching Reform; Curricular Ideological and Political Education

## 1. Introduction

The term "learning power" was first coined by American professor Frost. It is the ability to efficiently extract, integrate, transform, apply and recreate knowledge and information, and it is the core quality for problem solving, mainly including learning motivation, learning ability, learning perseverance and learning innovation, of which learning innovation is the core, learning perseverance is the guarantee, learning motivation is the foundation and learning ability is the method <sup>[1]</sup>.

The National Medium- and Long-term Education Reform and Development Plan (2010-2020) points out that education should "strengthen the cultivation of ability and focus on improving students' learning ability, practical ability and innovation ability", the core of which is to cultivate students' learning ability <sup>[2]</sup>. On the other hand, since 2017, the Ministry of Education has proposed to develop a new engineering discipline, so that only by cultivating talents with strong learning ability can we face future challenges. As a basic subject of engineering, Advanced Mathematics should be adjusted and reformed in time to meet the requirements of the new era.

The literature search reveals that there are more studies on curriculum reform in colleges and universities at home and abroad, and more studies on improving students' learning power, but not many studies correlate the teaching reform of "Advanced Mathematics" course with the improvement of students' learning power. Therefore, there is an urgent endogenous need to take students as the main body, to accurately grasp and improve their learning power level, and to reform the teaching of "Advanced Mathematics" course.

## 2. Analysis of the Reasons for the Weak Learning Power of Our Students at Present

### 2.1 The teachers' education concept is old-fashioned

In the compulsory education stage, schools, teachers and students are influenced by the score orientation, focusing on the acquisition of knowledge and neglecting the cultivation of ability, especially the ability to find, analyze and solve problems in real life, which in the long run makes students' learning power weaker. The main goal of learning is to pursue high scores, which causes

most students to have insufficient internal motivation to learn and a weak sense of "gain", which leads to students' lack of motivation to study after they arrive at university, and without the supervision of parents and teachers, some students let themselves play games and so on to waste their studies.

### ***2.2 Students' learning initiative is not strong***

Most of the traditional teaching mode is that teachers speak, students listen, so that students have little opportunity to actively explore and gain knowledge, students mostly receive knowledge passively, and students' ability to explore knowledge and learn independently is weak, which causes students' learning ability to be weak, and the ability to acquire new knowledge is weak, which leads to students to college, teachers do not review and practice a point of knowledge repeatedly, students are not thorough, and the ability to learn on their own is poor.

### ***2.3 Insufficient novelty of teaching content***

The content of "Advanced mathematics" is many and difficult, at the same time, the teaching time is tight, most of the school textbooks remain the same year after year, and the content taught by teachers in the classroom also remains the same year after year, so it is hard to adapt to the needs of the new era, which makes students feel useless when they learn, and don't know how to use when they use, so the students' learning innovation is weak.

### ***2.4 The rigid way of teaching evaluation***

The traditional teaching evaluation is score-only, which cannot stimulate teachers' enthusiasm to implement quality education and students' interest in learning, resulting in students' weak innovation.

In the learning process of students, learning motivation, learning ability, learning perseverance and learning innovation are intertwined and complement each other. Insufficient learning motivation and weak learning ability will lead to insufficient learning perseverance and weak learning innovation; on the contrary, learning perseverance can provide a strong guarantee for the improvement of learning motivation, learning ability and innovation.

## **3. Measures to Improve the Learning Power of "Advanced Mathematics" Curriculum Reform**

The existing learning power of students is different. From the perspective that undergraduates can enhance their lifelong learning power and their ability and quality can continuously achieve benign development by themselves, the following methods can be adopted to reform the course of "Advanced Mathematics", build a benign interaction between students' learning power and mathematics courses, improve students' learning power of mathematics courses and other subsequent courses, effectively improve the quality of education and form benign lifelong learning power of students.

### ***3.1 Reform of teaching contents and teaching methods of "Advanced mathematics"***

First, adopt case study teaching in the teaching of "Advanced mathematics", design some cases according to students' specialties and integrate them into classroom teaching, so as to effectively improve classroom activity and realize "High Order, Innovation & Challenge" in the process of classroom teaching. In this way, we can combine mathematics and practical problems, enhance students' interest in learning, analyze and solve problems, and achieve knowledge objectives.

Second, in the era of big data, we can integrate mathematical modeling and mathematical experiments into the teaching of "Advanced Mathematics", design open experimental projects, and let students experience the research process and solve mathematical problems by using basic mathematical software such as Matlab, so as to improve the higher order, innovation and challenge of "Advanced Mathematics" course and give students a sense of "access". This enhances the advanced, innovative, and challenging nature of the Advanced Mathematics course and gives students a sense of access to it.

Third, teachers should not only teach, but also educate people. Therefore, we can introduce curricular ideological and political education into the teaching content of "Advanced Mathematics", so as to cultivate students' sense of social responsibility in addition to the logical thinking of mathematics, and make "Home Country Feelings" become the inner driving force of the new era talents. In order to

improve the overall quality of students.

Finally, the development of the new era requires that the teaching of "Advanced Mathematics" is no longer about teachers speaking and students listening, teachers are no longer in the main position, but in a leading position. Teachers can use a variety of platforms such as Rain classroom, MOOC, flipped classroom, etc. to carry out online and offline hybrid teaching to guide students to learn independently, and the improvement of ability is the primary prerequisite for acquiring new knowledge and continuous and sustainable improvement.

### ***3.2 Reform of the way of learning "Advanced Mathematics"***

The most important educational content is not the fact of education, but the method, which is far more important than the fact. Therefore, it is better to teach someone to fish than to teach him to fish. Therefore, the reform of learning style is the first step to improve learning power. Combining with the attributes of higher mathematics and the characteristics of knowledge content, students should form their own way to acquire knowledge under the guidance of teachers, not just rely on the short time of classroom communication, but also exercise and form methods to improve their ability, methodology and world view to acquire new knowledge.

#### ***3.2.1 Build a teacher-student learning community and establish a three-dimensional and multi-dimensional interactive learning approach.***

The teacher-student relationship should break the traditional orientation of the past and form a partnership. Students change from traditional listeners to practitioners who actively build their own knowledge system. Students actively pre-study through literature search and form pre-study reports before class according to the teacher's requirements, enter the classroom with questions, actively collide with the teacher's combed knowledge content during class for thinking and methods, realize the solution of confusion, consolidate and improve knowledge content and thinking logic, and independently complete expanded content after class. After the class, the students will complete the extension contents independently and form assignments and reports, and do creative work to learn and consolidate the knowledge contents, forming a closed-loop process of knowledge learning and ability exercising in a clear line. Along with the above obvious process of learning, there is also the auxiliary learning process, that is, the process of using a variety of interactive software for timely communication, such as MOOC, Learning pass, Rain classroom and other new media tools, you can communicate with teachers, classmates and other timely learning problems, and get timely auxiliary support to achieve three-dimensional, multi-dimensional interactive learning.

#### ***3.2.2 Under the guidance of academic tutors, they actively go out of the classroom and participate in social practices and various competitions to enhance the intrinsic quality of learning.***

At present, our students have established a perfect class mentor system, mostly by young and strong doctoral teachers as mentors. Students can consult with their teachers in a timely manner, build their own career development paths, plan their personalities, abilities and development paths rationally, realize purposeful exercise and enhancement, focus on production internships and practice opportunities in the process of going out, understand the needs of society and enterprises, and improve their various knowledge and abilities in a targeted manner. Students actively participate in various competitions, such as the mathematical modeling competition for college students, to complete the training process of problem identification, problem analysis, problem solving and consolidation and migration, and to enhance the ability elements.

### ***3.3 Reform of teaching evaluation of "Advanced Mathematics"***

Students' learning effectiveness should be evaluated not only from the usual homework and final exam results. It is necessary to highlight the proportion of evaluation of process evaluation elements. Encourage students to expand their content and literacy through a variety of ways during the week, and to develop a positive leadership role. And process evaluation should highlight the construction of evaluation elements, such as students' ability to discover and condense scientific problems by scientific literature search; students' ability to simplify and analyze multi-element mathematical problems; students' ability to solve mathematical problems by using multiple software techniques; students' ability to summarize and transfer to other problems; students' ability to use mathematical tools to solve mathematical problems in actual competitions, etc. All of the above should be included in the process evaluation parameters of course learning as long as supporting documents can be

provided, to encourage students to learn and use mathematics well and to achieve creative learning.

#### 4. Conclusions

In this study, a sample of first and second year students from provincial universities was analyzed for the course "Advanced Mathematics". Based on the basic nature and importance of "Advanced Mathematics" course, the construction of "Advanced Mathematics" course is especially important. The construction of "Advanced Mathematics" course from the perspective of improving students' learning power and lifelong growth provides a general method that can be extended to other courses, and a sample survey study can be conducted regularly to make timely and targeted adjustments to form a closed loop of talent cultivation, which can greatly improve the teaching quality of "Advanced Mathematics" can be greatly improved and the quality of talents cultivation can be improved.

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