Mathematical Modeling for Education-Applications to Promote Teaching - Building Teaching Mode of Applied Talents

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Abstract — **Analyzing current opportunities and challenges of colleges admissions, combined with the current situation faced by mathematics teaching, the author proposed reform measures and the expected goals. From the transformation of teachers functions to mathematical modeling education, engineering courses will be incorporated into the curriculum of Mathematics. Increasing application cases into mathematics teaching, gradually build a mathematical model for Education-Applications to Promote Teaching mode of applied talents.**

Keywords — *Mathematics teaching; Mathematical modeling; Application cases; Flipped classroom; Training of personnel*

I. OPPORTUNITIES AND CHALLENGES OF COLLEGES ADMISSIONS

February 24 , According to "Hebei Province, Hebei Province Department of Education 2016 Education Important" conference, From 2016 onwards, Hebei will merge to recruit undergraduate two batches, three batches of undergraduate students.

After the merger, two batches of undergraduate divided into three grades，following equality volunteer files investing, each volunteer can fill a maximum of ten colleges, which is five more than that in 2015.

Work Points (2016)of CPC Hebei Provincial Education Committee and Hebei Province Department of Education, five in which twenty-three elements involved in higher education.[1]

One. Strengthening and improving the moral education. Further play the role of classroom education positions, leading campus cultural activities.

Two. Optimize training mechanism in the University. Consolidate application type, compound talents training school targeting body.

Three. Deepen the Reform of Colleges innovation and entrepreneurship education.

Four. Deepen the examination and enrollment system reform. Recruit undergraduate two batches, three batches of undergraduate students, further optimize batch of college admission and voluntary settings.

Five. Promote the employment of college graduates.

Work Points are action guide of our recent works. Not only to conduct classroom education, should moral education be carried out simultaneously. We will continue to consolidate the application type, compound talents training school targeting body.

The major changes of combined enrollment make us to face strong challenge.

One is the challenge of declining quality of students. With grade volunteers increasing, will increase opportunities for candidates to apply for undergraduate second installment colleges. Many students would only be admitted to the undergraduate three batches and to select repeat to senior middle school. The admission will present a situation of losing high scores students and the admission line of score will decline. For teachers, the teaching stress is inevitable.

Another one is the challenge to promote the competitiveness of high school. Undergraduate second installment colleges have national financial support, advantages school property and cheaper tuition. Our competitive capital is comprehensive strength of the school. Capital strength admissions. We will prove by strength that students come to this school is worth it. Students can also learn valuable knowledge and skills. This brought teachers not only pressure of social aspects but also pressure of innovation and reform.

However, no incentive with none pressure, the challenge will also give us the opportunities. The combined enrollment has a certain sense of eliminating social prejudices, and to promote equal employment. At the same time, we also need to further enhance our competitive strength. Updating education concepts and change teaching ideas to meet the application requirements of talents mode, which is also a teachers' training. We must withstand the pressure to meet the challenges. Because mathematics courses played the role of students logical thinking and scientific problem solving skills while other programs cannot be replaced [2,3].

II. PROBLEMS FACED BY THE TEACHING OF MATHEMATICS

At present, in the process of learning in math class，students demonstrated by the state roughly three. The ones Learn well are not solid of knowledge, learning bad always sleepwalk, and the ones do not want to learn indifference. The reason is that some students score low starting point with poor knowledge base. Some students mind impetuous, do not interested in the curriculum. There is no prospect of graduation. Even truancy, all kinds of excuses for leave, poor self-discipline, play phone on class, became a mobile phone overuse. They do not work hard in the classroom, and did not learn after class. In fact, this is a common phenomenon in many batches of undergraduate colleges or vocational institutions are present. We have been actively exploring effective methods to address this phenomenon.

Student employment-oriented, take career development as the goal, qualified personnel training for the community. Let the courses vivid (student participation), compaction （contact with professional），demanded （market demand）. Mathematical as a basis of discipline towards applied technology transformation has become imperative.

III. CHANGE OF TEACHERS' FUNCTIONS

Students and teachers are the fundamental basis of the school. Cultivate outstanding students is a manifestation of competitiveness. A new teacher of applied technology university cultivating students should have multiple functions. Teaching function ，Oriented function ，Supplementary function，Innovative function which are our goal.

First is teaching function, as academic tutors of students. The concept is called a mentor is different from the previous teacher. Teach students knowledge from the general sense, the role of the dominant learning into guided learning, promoting learning. Ideal state is the teacher and student mutual promotion and common development.

Second is oriented function, as life mentor of students. Teachers not only to guide students to learn, but also can also to pass them a lot of positive information and positive energy. According to an ideal teacher-student relationship, teaching and learning relationship accounted for only 17.3%, subordinate relationship 17.3%, while the sum of family relations and friendship accounted for 65.4%. As a good teacher should be the student's family and friends. We must become guiding students from student management. Not only with good scores to make friends, but also pay more attention to students no interest in learning to become their friends. Achieve an ideal state.
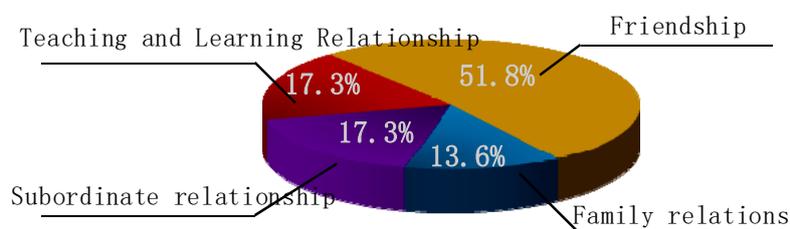
Ideal teacher-student relationship

Fig.1

Third is supplementary function, as an auxiliary. The rise and development of MOOC and Micro Lesson, so that teaching is no longer confined to the classroom. Students can obtain course information through the network means. They unrestricted school level, teacher level, to achieve the purpose of sharing quality teaching resources. However, students still cannot independently complete the course content, or independently ineffective. Teachers still need coaching and guidance to the field, where teachers play a supporting role in learning. Through the micro-lesson also

increased the students and teachers of communication, increase interest in learning. We should actively research and experimentation, whichever is the director, to avoid it short, widening teaching ideas. We are gradually micro-lesson video recording and constructing mathematical resource sharing course. Linear algebra resource sharing course get the first prize in provincial education information contest 2014.

The last is innovative function. Teachers continue to explore, to study, to practice, to reflect, to innovate. The

frontier knowledge of discipline will be strip in a steady stream into the classroom. Infiltrate scientific research methods and cultivate research capacity [5,6,7,8].

IV. MATHEMATICAL MODELING FOR EDUCATION-APPLICATIONS TO PROMOTE TEACHING

Reform of teaching content should despise theory, emphasis on application; contact professional courses; latter part of the course to be learned in advance; learning mathematics change into use mathematics; focus on mathematical literacy.

Select the teaching content with the principle of moderate and enough. Simplify theory, highlighting the way of thinking. Break the original curriculum, deleting too difficult, too complex and not practical content. Change the course subject-oriented curriculum into professional guide curriculum. Background outstanding applications and serve in professional courses.

In the teaching of mathematics courses, latter part of the course to be learned in advance, to arouse students' interest. Pay attention to explain the basic concepts, basic theory and method of thinking. Dilute the strict proof of the theorem. Strengthen the use of applications to explain theorems. Give students more space to think, encourage students to participate in analysis to discuss issues, develop divergent thinking and innovation [4].

Here are our selected cases related professionals.

PID control system in PLC and calculus：

- Principle of conventional PID control system
  Input: Control deviation $e(t)$
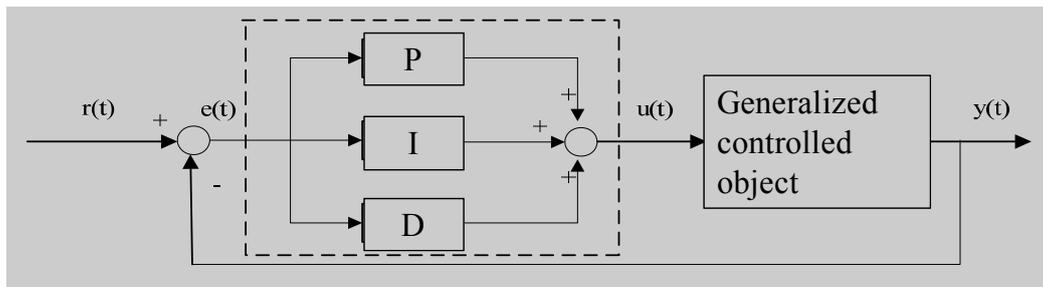 Output: A linear combination of Deviation Proportional (P), Integral (I) and Differential (D)

Fig.2 Principle of conventional PID control system

Mathematical formula used here is

$$u(t) = K_c (e(t) + \frac{1}{T_I} \int_0^t e(t)dt + T_D \frac{de(t)}{dt})$$
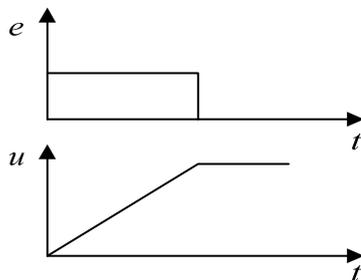
(1)

- Integral (I) Control regulation

Fig.3 Integral (I) Control

Mathematical formula used here is

$$u = S_0 \int_0^t edt$$

(2)

Output of the regulator will continue to change as long as the deviation $e(t)$ exists. Until the error is zero, regulator output becomes stable. It does not change.

- Proportional (P), integral (I), differential (D)-binding regulatory:

Mathematical formula used here is

$$u = K_c e + S_0 \int_0^t edt + S_2 \frac{de}{dt}$$

(3)

or

$$u = \frac{1}{\delta}(e + \frac{1}{T_I}\int_0^t edt + T_D \frac{de}{dt}) \qquad (4)$$

Related applications will continue to be added to the curriculum. By applying the case, combined with the construction of training mode. Teaching methods and techniques commonly used in mathematical modeling. Analysis of practical problems，reasonable assumptions of the model, appropriate use of mathematical tools. Including establishment of model，solving problems，the results and the proper interpretation of the model and application of the model. Guide students to master commonly used methods, such as numerical methods, optimization theory, graph theory, regression analysis and mathematical programming method. Introduction MATLAB, SPSS, and other related software.

Since 2008, the students we train continuously achieved outstanding results in the American Mathematical Contest in Modeling, access to award 38. These achievements and our training model are closely related.

Practice has proved that the modeling training mode with its unique influence in cultivating students' creative play an active role in practical ability to enhance the employability and competitiveness.

Mathematical modeling not only develops students cultural classes combined with practical knowledge and solves practical problems, but also fostering teamwork and research capabilities. In addition, mathematical modeling is highly competitive for student's engineering awareness, the overall quality of scientific spirit, employment or postgraduate.

Modeling education plays an important role in the mathematics curriculum system and teaching content reform. Mathematics curriculum as the carrier，modeling runs through professional practice education，enrich and improve the content and form of practice teaching. Teaching mode change from "teach-based" to "student-centered", from "impart knowledge" to " develop skills ". Through mathematical modeling let students to take the initiative to learn or search for knowledge, and actively read the professional literature, reference. Ultimately, achieve teaching mode of applied talents as Mathematical Modeling for Education-Applications to Promote Teaching.

V. CONCLUSION

Modeling education played an important role in finding talent, personnel selection, personnel training. It reinforces the role of education oriented ability. It develop the intelligence of students and ability to explore. It stimulates the students thirst for scientific knowledge and expertise in

essence. It helps to improve interest in learning mathematics and attention on mathematics. The introduction of cases of professional expertise and promote the docking of mathematical knowledge. But also to promote the improvement of mathematics teachers update their knowledge and teaching level. We expect excellent results.

CONFLICT OF INTEREST

The authors confirm that this article content has no conflicts of interest.

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