ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202210_5(10).0067

The Teaching Reform of Ordinary Differential Equations under the Cultivation Mode of Innovative Applied Talents

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Abstract

Colleges and universities pay more and more attention to the cultivation of students' innovation ability and application ability, but due to different objective conditions, there are certain differences between local colleges and universities and famous key universities. This paper takes the teaching of Ordinary Differential Equations in the undergraduate major of a local financial university as an example, and carries out in-depth research on the teaching content, teaching methods and teaching means of Ordinary Differential Equations under the cultivation mode of innovative applied talents respectively from the existing problems of the teaching situation. To curriculum reform as an opportunity, local colleges and universities of finance and economics is summarized in the innovative applied talents training to try some of the feasibility, pay attention to the combination of theory and practice, highlight the cultivation of innovation ability to apply, mobilizing the enthusiasm and creativity of college students' learning, improving college students' ability to analyze and solve problems.

Keywords

Ordinary Differential Equations; Quality education; Innovation skills; Application skills.

1. Introduction

The National Medium and Long-term Education Reform and Development Plan (2010-2020) states, "Continuously optimize the structure of higher education, optimize the structure of disciplines, types and levels, promote the intersection and integration of multiple disciplines, and focus on expanding the scale of cultivation of applied, compound and skilled talents." It is clear that innovative and applied talents have become the strategic focus of China's higher education talent training efforts. Innovation is the first driving force leading development, which is ultimately talent innovation; the core of applied talents is "use", and the essence is to apply what you learn. Only by deepening education reform, promoting quality education and innovating education methods can we improve the quality of talent training.

The Ordinary Differential Equations is a professional course of mathematics with strong application, which is not only widely penetrated into natural sciences, but also into social sciences [1, 2], and occupies a very special position in the professional curriculum system, and has become an indispensable and important part of the knowledge structure of professional students, which has an extremely important role in cultivating students' creative thinking ability, abstract logical reasoning ability, analysis and problem solving ability. It has an extremely important role in developing students' creative thinking, abstract logical reasoning and analytical and problem-solving abilities. In recent years, many universities have attached importance to the development of the teaching of Ordinary Differential Equations and have made some useful reforms to the course teaching: Duan Baobin (2009) from Hefei University

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202210_5(10).0067

applied the theory of tiered teaching to the teaching practice of the course, focusing on the classroom teaching mode, assessment methods and teaching effects of the tiered teaching of the course. In 2009, he applied the theory of tiered teaching to the teaching practice of the course, focusing on the classroom teaching mode, assessment methods and teaching effects of tiered teaching, and clarified the specific measures of tiered teaching, so that students' independent learning ability and application ability could be improved to different degrees[3]. Qiao Zongmin (2011) from Hefei Normal College focused on the goal of training applied talents, and carried out practice and exploration of course teaching reform in terms of formulating course standards and syllabus, updating teaching contents, advocating the teaching mode of problem solving, guiding students to write small papers, opening up mathematical modelling laboratories, and developing and using online resources [4]. Huang Bin (2014) from Quzhou College proposed the concept of CBE (Competency Based Education), which takes students as the root, cultivates application ability as the core and meets the needs of employment positions, applies the CBE education model to course teaching, carries out research and practice in optimizing teaching materials, improving the teaching process, cultivating learning interest and diversifying assessment methods. Cultivate the vocational ability of college students and create practical talents suitable for the needs of society [5]. Zhao Zhong (2014) of Huang Huai College focusing on the goal of training applied talents, carried out reform and exploration of course teaching mode in terms of updating educational concepts, constructing a new teaching material system, adopting new teaching modes and strengthening scientific research service course teaching, so as to promote the cultivation of college students' problem-solving ability and practical innovation ability and improve the quality of classroom teaching [6]. Wang Rui (2017) from Inner Mongolia University of Science and Technology pointed out that in course teaching, we should not only focus on theoretical analysis and logical derivation, but also carry out teaching reform in four aspects, such as attaching importance to the application background of the course to stimulate students' interest in learning; integrating mathematical modelling ideas to cultivate students' problem-solving ability; putting forward ideas to cultivate students' mathematical thinking; and strengthening scientific research service course teaching to cultivate students' academic foresight to cultivate students' sense of innovation and problem-solving ability [7]. Zhang Li (2018) from Anhui University of Technology (AUST) comprehensively cultivated students' innovation and application ability in the course teaching through four aspects, including adjusting teaching contents to cultivate students' innovation ability; reforming teaching methods and teaching means to cultivate students' innovative thinking; reforming the course assessment and evaluation system to cultivate students' application ability; and carrying out subsequent enhancement of the course to cultivate students' practical ability [8]. Yuan Hongjun (2019) from Anhui University of Finance and Economics (Anhui) combines the characteristics of a strong liberal arts atmosphere in finance and economics colleges, and takes mathematical culture as the driving force in the course teaching process, interspersing mathematical history, mathematical ideas, mathematical perspectives, mathematical models and other elements of mathematical culture to enhance students' mathematical quality, cultural quality and ideological quality, so as to stimulate students' learning enthusiasm, innovation and application to the maximum [9]. Zhou Xia (2020) from Guilin University of Electronic Science and Technology (GUST) draws on the OBE output-oriented teaching model to explore the reform of course teaching by revising the training programme and syllabus, optimising the course teaching content and links, and improving the course assessment and evaluation mechanism, respectively, to give full play to the advantages of the OBE teaching concept and continuously improve students' independent learning ability and practical application ability [10]. In the course teaching, Zhao Lili (2021) from Yunnan University introduced the teaching method of cooperative learning, and fully mobilized students' subjective initiative and innovation spirit in learning by optimizing teaching contents,

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202210_5(10).0067

reasonably selecting cooperative learning methods, and continuously improving teaching implementation plans [11]. Zhu Jing (2015) from the University of Science and Technology Beijing (USTB) combined course teaching with mathematical modelling, integrated the teaching ideas, teaching concepts, teaching contents and teaching cases of mathematical modelling into the teaching of day courses, took practical problems as the guide and scientific research as the means to carry out the integration of mathematical modelling into education, promoted course construction and teaching reform, and improved students' innovative ability and application ability [12].

2. Current Status and Problems in Teaching the Course

In 2004, in the major of Information and Computing Science, in 2005, in the major of Applied Mathematics, and in 2014, in the major of Statistics, Ordinary Differential Equations was offered as a professional foundation course. We have been exploring the reform of the teaching content, teaching methods and teaching tools of the course, according to the characteristics of financial institutions with a strong liberal arts atmosphere and little training in science courses, we put forward the teaching concept of "focusing on the foundation, guiding innovation, strengthening application and improving ability", with the ultimate goal of cultivating innovative and application-oriented talents and stimulating students' innovation and application.

At present, there are some teaching and management problems in the teaching process of the course, including:

(1) students are not highly motivated to learn. The "Ordinary Differential Equations" is different from the course of finance and economics, a lot of content knowledge is the understanding of logical reasoning, need the usual step by step accumulation, to pay a lot of learning time, for those students who are eager to achieve, want to take shortcuts, the learning effect will be very poor, resulting in learning initiative is not high, in the mind of the fear of psychology.

(2) The course is difficult to learn. Before studying the course, students need to learn "mathematical analysis", "higher algebra" and other basic courses to prepare, the characteristics of mathematics majors is heavy theoretical analysis, so the course teaching focus on theorem derivation and analysis, course content and training mode copy other science and technology institutions of higher education, resulting in our students feel pressure in learning.

(3) The traditional classroom teaching mode. The teacher is authoritative, and the students memorise what the teacher says at the lectern, ignoring the process of digestion and absorption. When it comes to solving example problems, the teacher will directly give the complete solution process, lacking the opportunity to give students independent thinking, so that students will only memorise but not adapt.

(4) Traditional assessment methods. The final grade of the course mainly comes from the usual grade and the final grade, of which the usual grade has a small proportion and is highly subjective. The final grade is a closed-book examination, which can make a certain objective evaluation of the mastery of knowledge, but it is often stuck to the content of the books and the assessment form is single, which cannot scientifically evaluate the learning effect of students.

(5) Innovative training is not enough. The course teaching only focuses on the inculcation of book knowledge and does not fully mobilize students' consciousness of learning; it lacks the combination of course knowledge and scientific research projects and does not effectively train students' innovative ability; the fixed assessment method makes students focus only on marks and neglects the cultivation of analysis and problem solving.

(6) Insufficient practical training. Only focus on teaching basic concepts, basic theories and basic solutions, seldom explain how to construct mathematical models to solve practical

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202210_5(10).0067

problems, not to achieve theoretical connection with practical, lack of course experimental classes, not effective training of students' application ability.

In order to cultivate innovative applied talents, in view of the problems existing in the teaching of the course, in-depth research on curriculum reform is carried out from the aspects of teaching contents, teaching methods and teaching means of the course under the mode of cultivating innovative applied talents, respectively, and a scientific and effective plan is concluded, focusing on the combination of theory and practice, which has far-reaching practical significance for cultivating innovative applied talents with financial characteristics.

3. Research on the Teaching Content of Ordinary Differential Equations Under the Cultivation Mode of Innovative Applied Talents

3.1. Development of Course Standards and Syllabus

In view of the problems in the teaching of the course, according to the basic requirements of the objectives of each science major, combined with the actual situation, reflecting the characteristics of financial institutions and highlighting the cultivation of innovative application ability, we have formulated the course standard and syllabus of Ordinary Differential Equations. Through the course, students can master the basic concepts and theories of ordinary differential equations, the basic ideas and methods of solving several types of differential equations in a systematic way, so that they can do a good job in the subsequent professional courses. At the same time, the course will link theoretical knowledge to practical applications, strengthen the cultivation of students' innovative ability, proficiently use ordinary differential equations to establish mathematical models to solve practical problems, and train students' innovative thinking, application awareness and the ability to solve practical problems. Experimental classes are added to train students' hands-on practical skills by explaining mathematical software to realise numerical and approximate solutions to differential equations.

3.2. Selection of Quality Course Materials

Teaching materials are the knowledge carriers that reflect the teaching content and teaching methods, and are the basic tools for teachers to impart knowledge to students and for students to systematically study the curriculum and acquire knowledge, and are the basic guarantee for improving the quality of teaching and achieving the objectives of talent training. The good or bad choice of teaching materials directly affects the teaching effect of the whole course. At present, there are many teaching materials for Ordinary Differential Equations, but they all focus on abstract theoretical derivation and skillful formula calculation, and lack the cultivation of innovative ability and application ability. In order to ensure the quality of teaching and improve the teaching effect of the course, we choose a combination of classical textbooks and supplementary lectures, and select the textbook *Ordinary Differential Equations (3rd edition)* compiled by Wang Gaoxiong and others, which is a national planning textbook of the Eleventh Five-Year Plan of the Higher Education Press. The bibliography is based on *Ordinary Differential Equations and their Applications - Methods, Theory, Modelling, Computers* by Zhou Yicang et al. and *Tutorial on Ordinary Differential Equations* by Ding Tongren. Considering that both the textbook and the bibliography are highly theoretical and academic in nature and not suitable for cultivating students' innovative and application skills, the content of the textbook is adjusted and supplemented in the lectures to cover the following topics: (1) Using ordinary differential equations to construct mathematical models to solve practical problems. (2) Numerical solutions and approximate solutions of ordinary differential equations and their computer implementation. (3) First-order and higher-order linear difference equations and their solutions. (4) Integral equations and their solutions. (5) Selected readings from scientific papers. Through a combination of classical textbooks and supplementary lectures, students will

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be able to identify and solve various types of equations, master the existence uniqueness theorem for solutions of ordinary differential equations, understand numerical methods for approximating solutions of differential equations, and master the basic methods for constructing mathematical models of ordinary differential equations from real dynamic problems.

3.3. Setting of the Course Content

To determine the system of knowledge learnt around the syllabus, to organise the teaching content reasonably according to the mode of training innovative and applied talents, to make appropriate arrangements, additions, deletions and adjustments to the content of classical textbooks, to emphasise mathematical modelling, practical applications and mathematical software operations, to ensure that the course content is more scientific and suitable for cultivating students' innovative and applied abilities. The content of the course ensures that the theory, methods, modelling, applications and computers of ordinary differential equations interpenetrate and complement each other, allowing students to appreciate the role of what they have learnt in solving practical problems. The optimised teaching content specifically includes:

(1) On the basis of retaining the core content of ordinary differential equations, increase the teaching content of practical applications, use differential equations to establish mathematical models to solve practical problems, and select appropriate models according to chapter content, such as Malthus population model, Logistic population model, fixed asset depreciation model, archaeological dating model, biological population ecology model, SIR infectious disease model, Weak predation model, solution concentration model, Bob Beamon long jump record model, suspended chain line model, mechanical vibration model, artificial satellite orbit model, etc. to integrate the course content with practical applications.

(2) As the basic theory of the solution of first-order differential equations is mainly an abstract mathematical theorem, this part of the teaching content is reduced and the focus is on the existence uniqueness theorem of the solution.

(3) To master various methods and ideas for solving ordinary differential equations, such as (i) elementary methods of solving first-order differential equations: equations in separable variables, chi-square equations, linear differential equations, Bernoulli equation, Riccati equation, fully differentiable equations, first-order implicit equations, Clairaut equation, parametric solution methods, variable transformation methods. (ii) Basic solutions of linear equations of the second order: linear chi-square equations with constant coefficients, linear non-chi-square equations with constant coefficients, Eluer's equation, linear chi-square equations of the second order with variable coefficients, higher order equations that can be reduced in order, constant variational methods, power series methods. (iii) Basic solution methods for systems of linear equations: exponential matrices, basic solution matrices, systems of linear chi-square equations with constant coefficients, systems of linear non-chi-square equations with constant coefficients, characteristic root methods, constant variation methods.

(4) Supplementary teaching of difference equations, in the field of economic management, the equations of discrete functions and their differences, the methods and ideas of first order linear difference equations and higher order linear difference equations, combined with the spider web model analysis of practical applications.

(5) Approximate and numerical methods and their computer implementation, using mathematical software to assist in the learning of course content, such as graphing vector fields, plotting integral curves, computing numerical solutions to differential equations, computing iterative sequences and approximate solutions.

(6) Supplementing the teaching of integral equations, some typical examples of examinations and techniques of calculation are introduced.

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202210_5(10).0067

Through the course content, students will develop their creative and application skills in a comprehensive manner. Students will not only be trained in rigorous mathematical thinking, but also be able to appreciate the role of course knowledge in solving practical problems; they will not only learn how to solve various types of differential equations, but also master the supplementary learning of mathematical software.

4. Research on the Teaching Method of Ordinary Differential Equations Under the Cultivation Mode of Innovative Applied Talents

4.1. Adopting a Heuristic Teaching Method

In the traditional classroom teaching, the lecturer only focuses on imparting course knowledge on the podium, lacking communication with students, which is one-way knowledge instillation, what the teacher talks about on the podium, what the students remember below, ignoring the process of digestion and absorption. This "lecturing" and "cramming" teaching mode has many disadvantages. In order to cultivate students' innovative ability and application ability, the classroom adopts heuristic teaching methods, truly takes students as the main body of teaching, fully mobilizes the enthusiasm of learning, and allows students to learn consciously and actively. When explaining the course content, we focus on giving the ideas and methods of analysis step by step without explaining too much and too detailed, inspiring students to think independently and guiding them to grasp the core and essence of the problem. For example, when explaining the method of integral equations, you can first ask students: what is the relationship between integral equations and differential equations? Once students have answered this question through reflection, the method of solving integral equations can be easily grasped. By answering questions and interacting with students in real time, problems can be identified in time. If they encounter problems that cannot be solved in class, they can be allowed to find out the problems, analyse them and solve them independently by consulting literature after class, so as to develop students' creative and application skills.

4.2. Increase Research on Exploratory Teaching Methods

The course teaching is to disseminate the existing scientific knowledge, while scientific research is to explore the unknown scientific knowledge, combining scientific research and course teaching effectively, can cultivate students with certain scientific research quality. Through case study teaching methods, the latest scientific research results are compiled into cases, and the materials are taken as close as possible to the students' economic management problems. Through case study teaching discussions, the exchange of knowledge between teachers and students is promoted, helping students to understand and flexibly apply the content of the course, combining theory and practice closely, and playing the role of case study education. Teachers combine their own subject research to guide students to scientific research and encourage them to read scientific papers and literature when explaining the content and methods of the course. For example, when explaining integration factors, the textbook only gives two simple types of integral factors for monadic functions, while there are infinite numbers of integral factors, students can be guided to find other expressions for integral factors by searching the literature, and further encouraged to research more general methods for solving integral factors and write small papers for publication. Through a combination of lecture and training, in-class and out-of-class, textbook knowledge and scientific research, students will be able to develop their innovative thinking and cultivate their creative abilities.

4.3. Emphasise the Teaching Method of Mathematical Modeling

The discovery of Neptune in history is through the differential equation model to calculate the position before observation. By making connections between mathematical methods and practical problems and constructing mathematical models to solve them, it can better help

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202210_5(10).0067

students' understanding of book knowledge. The theory, methods and practical applications of the course are closely integrated to develop students' practical application skills. During the course lectures, small practical models are selected and interspersed with the corresponding differential equations content to let students feel the charm of mathematical modelling. After the lesson, the original problems of the American Student Mathematical Modelling Competition or the National Student Mathematical Modelling Competition are then selected for students to team up and simulate to bring into play their sense of teamwork and achieve the purpose of solving practical problems. For example, the first-order linear differential equations are interspersed with the Malthus population model, the Logistic population model, and then expanded to include the SIR infectious disease model and the new coronavirus pneumonia infectious disease model that is currently prevalent worldwide. The practical implications of the solutions are given by building differential equations from a real-world context and applying what they have learned from the textbook to solve the equations. Through mathematical modelling students are made aware that knowledge requires continuous practice and that it comes from and is applied to life.

4.4. Introducing a Mathematical Culture Approach to Teaching and Learning

The introduction of mathematical culture in the teaching of the curriculum enhances students' mathematical, cultural and intellectual qualities, and stimulates motivation, creativity and application. By interspersing the historical facts of mathematics and linking various types of differential equations together by using time as a clue, people as a clue and events as a clue respectively, students can more clearly recognise the intrinsic connections between knowledge points and enhance their interest in learning. By dissecting the mathematical ideas, students can perceive to know what they know. For example, the existence uniqueness theorem of the solution of the initial value problem of differential equations is a basic theorem in the course, and its theoretical proof is abstract and complicated. Firstly, students will be able to understand the importance of converting equivalence into uniqueness of existence of solutions to integral equations; secondly, they will use the stepwise approximation method to construct a sequence of stepwise approximating functions to find solutions to integral equations with the help of limit tools; finally, they will argue for uniqueness of solutions to integral equations. By tapping into mathematical perspectives, the role of analogy can be achieved, for example, the constant variation method for linear nonhomogeneous differential equations, which is an analogous perspective in mathematics; for example, the variable transformation methods widely distributed in first-order differential equations, higher-order differential equations, and first-order systems of differential equations, which can be mathematically generalised to general laws and conclusions based on differences in the replacement of independent and dependent variables. The introduction of mathematical culture into the teaching of the curriculum is conducive to the development of students' creativity and application skills.

5. Research on Teaching Means of Ordinary Differential Equations Under the Cultivation Mode of Innovative Applied Talents

5.1. Promoting Teaching Reform with Policy Documents

In order to further strengthen the cultivation of students' innovation ability and application ability, realize students' quality education and improve their employment competitiveness, administrative departments at all levels have issued a series of relevant policy documents, including: *Opinions of the Ministry of Education on Deepening the Reform of Undergraduate Education and Teaching and Comprehensively Improving the Quality of Talent Training, Anhui University of Finance and Economics Student Discipline Competition Management Measures, Management Measures for Graduation Internship of Anhui University of Finance and Economics,*

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202210_5(10).0067

Construction and Management Measures of School-Enterprise Cooperation Practice Education Base of Anhui University of Finance and Economics, Anhui University of Finance and Economics Uses Modern Information Technology to Carry out Teaching Reform Accreditation Guide, Anhui University of Finance and Economics Undergraduate Demonstration Course Construction Management Measures and *Credit Recognition Guide for Innovation and Entrepreneurship of Anhui University of Finance and Economics.* These policy document gives the concrete measures and detailed rules for the implementation of personnel training in the course teaching, the policy document as a guide, aiming at the problems currently makes the corresponding teaching reform, to better serve the cultivation of the innovative applied talents.

5.2. Sharing Teaching Resources Through the Internet Platform

There are now many teaching resources on the Internet, including catechisms, micro-lessons, multimedia courseware, electronic lesson plans and course videos, and students can access these learning resources through their computers with the help of the campus network. In addition, with the continuous development of mobile networks, smartphones can also be easily connected to the Internet. App, Weibo, WeChat and QQ on mobile phones can be used for course learning regardless of time and space constraints, and learning is completely open, as long as they are willing to do so anytime and anywhere. In the course teaching, the convenient advantages of the online platform are given full play to share course teaching resources. A model course website is created to upload multimedia courseware, lecture videos and teaching documents to the website to facilitate independent learning by students, allowing teaching and learning to be interactive, truly achieving the purpose of teaching and learning together, effectively improving the singularity of traditional teaching methods and making up for the lack of classroom teaching hours. The website has an interactive exchange area for teachers and students to answer questions and exchange, students can post their doubts and difficulties encountered in the learning process, and teachers can solve them in a timely manner, while practical assignments can also be assigned, and students can discuss feasible solutions online, which can enhance the interaction between teachers and students, and cultivate students' independent learning ability and practical application ability.

5.3. Discussion Classes to Improve Research Skills

Traditional classroom teaching tends to adopt one-way knowledge inculcation, with teachers only focusing on explaining at the podium and students becoming listeners sitting down and accepting the whole thing, which is a kind of passive learning, lacking interactive communication between teachers and students, and encountering solutions to example problems, teachers will directly give the complete solution process, lacking opportunities for students to think independently. In order for the teacher to keep track of the learning effect of students, convert students from listeners to actors, and convert passive learning into active learning, select some of the lecture content for students to take to the podium, through the pre-course layout for students to prepare beforehand, and the teacher to give some help to encourage students to complete bravely. By taking the stage to explain the course content, students can effectively develop their self-learning skills, research skills, language skills and the ability to play on the spot. By allowing students to actively participate in the content of the lecture, through interactive discussions and dialectical analysis, students can think independently about the issues, increase their motivation to learn and can better grasp the course knowledge. Let students freely form teams to discuss, bring into play the unity spirit of teamwork, be brave to overcome difficulties and apply what they have learnt to solve problems, so as to cultivate students' innovation and application ability.

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202210_5(10).0067

5.4. Implementing Multiple Forms of Scientific Assessment

The traditional assessment method is mainly through the final examination results to measure the learning effect of students, the examination is often stuck in the book knowledge, take the closed-book examination method, students will course knowledge rote memorization can also get high marks, but do not have a complete understanding of the course knowledge, can not do to know the reason, the assessment form is single, can not be scientific evaluation of each student's learning situation. We reform the traditional assessment method, adopt a more scientific and effective evaluation system, implement multiple forms of assessment, and change the single final examination into "usual assessment + practical application + final assessment". The usual assessment mainly reflects the students' learning in the course, from classroom interaction, website discussion, post-class assignments and so on. The practical application mainly reflects the practical activities in the course, from social service, mathematical modelling, laboratory work and so on. The final assessment mainly reflects the mastery of course knowledge, from final examinations, course papers, research reports and so on. Each type of assessment has its own weighting, and the teacher scores each student independently before calculating the overall grade, which enables a more scientific evaluation of each student.

5.5. Open Labs to Increase Experimental Classes

In order to improve students' innovative and hands-on skills, a certain number of class hours are chosen to offer laboratory classes. Experimental classes are an important part of teaching where theory is linked to practice and where book knowledge and practical applications are effectively combined. The application of Matlab mathematical software to the teaching of the course, the study of numerical solutions and the plotting of images, the demonstration of dynamic approximations to approximate solutions, and the handling of theoretically complicated or unsolvable equation calculation problems, all provide an intuitive way for students to grasp the course knowledge. The laboratory also explains how to construct mathematical models to solve practical problems. As the amount of data in these problems is often large, the use of computers for data analysis can bring great convenience, as well as further analysis of the dynamic evolution of the models and future development trends. By making full use of the resources of the existing laboratories and practical training centres in the College and opening up the laboratories to students, students can enhance their practical application skills through forming interest groups, simulating skills competitions, participating in research projects and completing course experiments, etc., so that they can quickly adapt to the operational needs of real jobs after graduation.

6. Conclusion

At present, all higher education institutions are trying to promote the construction of "double first-class", how to better cultivate the first-class talents needed by society, as a local financial university, should continue to strengthen the cultivation of innovation and application ability of college students. In the course of teaching, we should focus on the combination of theory and practice, put the cultivation of innovation and application ability of college students in the first place, conduct comprehensive and in-depth research on the teaching contents, teaching methods and teaching means under the innovative and application-oriented talent cultivation mode, and summarize the feasible practices of the course teaching reform. Through these studies, the elements of talent training can be activated to gradually meet the market demand for high-end applied talents, close to the frontier needs of modern science and technology development, and form an innovative applied talent training model with dynamic adaptability and quality feedback function.

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202210_5(10).0067

Acknowledgments

This paper is supported by the Key Project of Postgraduate Education and Teaching Research of Anhui University of Finance and Economics (cxjhjyzdi1813), Research and Reform Practice Project of New Liberal Arts and New Medical Science of Anhui Provincial Education Department (2020wyxm008) and Model Course for Postgraduates of Anhui University of Finance and Economics (Theory and Methods of Economic Forecasting) .

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