Thoughts on the Construction of MATLAB Financial Mathematics Experimental Platform

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Abstract: With the development of national economy, more and more financial mathematics professionals are needed. The design of financial mathematics experiment in MATLAB is very important for students and teachers who study in universities. Students can improve their ability to solve problems and their initiative. Teachers can get more effective ways of teaching. When building the experimental platform, we can start to change the teaching mode in the existing teaching, introduce a more scientific management platform of financial mathematics experiment in MATLAB, and at the same time, we should improve the teaching content, and design corresponding professional experiments according to the platform.

1. Introduction

With the acceleration of the pace of economic globalization, both macroeconomic and financial analysis and micro-analysis rely more and more on professionals with financial mathematics ability. So for a country, how can we cultivate a large number of professionals with excellent financial analysis ability? Here we have to mention the MATLAB Financial Mathematics Experimental Platform. The development of MATLAB financial mathematics experimental platform is based on the application of MATLAB computing software. Since the advent of MATLAB computing software in 1984, it has undergone many changes in improved versions. Now, MATLAB has been widely used in major financial institutions in the world. As we all know, financial quantitative analysis needs numerical calculation tools, and MATLAB is a financial quantitative analysis "weapon" with powerful numerical calculation function and rich toolbox. The use process of MATLAB computing software is actually the integrated application process of financial expertise, mathematical calculation and analysis knowledge and computer knowledge.

At the present stage, the major universities in China have attached great importance to the combination of financial knowledge and mathematical knowledge in the financial professional education, aiming to cultivate financial students with excellent mathematical analysis ability. For this reason, Financial Mathematics Specialty offers several courses to strengthen mathematical theory knowledge, such as "mathematical analysis", "higher algebra", "probability theory" and "mathematical statistics", and even sets up corresponding computer courses. But these courses, as compulsory or optional courses for students majoring in finance, actually increase the students'academic burden invisibly. And the biggest problem is that although students have completed these courses, because they are not well connected, knowledge points can not be communicated with each other, so most of them have forgotten, far from achieving the purpose of curriculum. Based on this, it will be of great significance to think about how to use the MATLAB financial mathematics experimental platform to link the curriculum knowledge that students have learned, so as to achieve the unified application and strengthening.

2. The Importance of MATLAB Experimental Platform for Financial Mathematics Professionals

Before discussing the importance of MATLAB experimental platform for financial mathematicians, we should first understand several applications of MATLAB in financial mathematics. Firstly, we can find some auxiliary calculation problems such as European option

price. It would be a helpless thing to calculate European options in a common way, but in MATLAB, we only need to use a simple "blsprice" function to get the result. Secondly, MATLAB has drawing function. When dealing with mathematical problems, financial mathematics students often encounter two-dimensional graphics and three-dimensional graphics calculation problems. At this time, they can quickly draw accurate graphics and complete the calculation with the help of the drawing function of MATLAB. This can not only effectively solve complex graphics calculation problems, but also save time, and can cultivate students'spatial imagination ability. Third, the numerical calculation function of Matlab can make the concept concrete, change the abstract content into the image content, and improve students'understanding of the concept. For example, abstract concepts such as the definition of limit of sequence of numbers, the definition of convergence and divergence of series of numbers and so on, if we can use the software of matlab, we can effectively let students master relevant knowledge points.
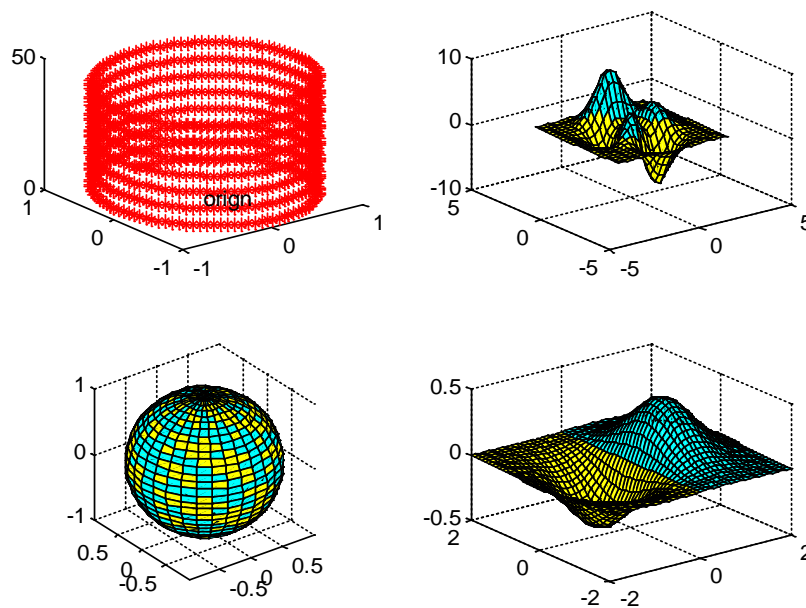

Fig.1. Three-dimensional graphics styles derived from drawing functions

As MATLAB has so many functions, there are at least two important points for the construction of financial experimental platform.

2.1 Improving Students' Self-regulated Learning Ability

The above several important functions of Matlab can effectively help students solve the professional problems encountered in learning. For students majoring in finance, they often need to deal with the problems of mathematical calculation, trend prediction and analysis, or two-dimensional graphics and three-dimensional modeling. If there is no professional MATLAB experimental platform to help deal with related problems, students will become helpless in learning, and can not complete the relevant learning tasks at all. If this time can be carried out with the help of MATLAB software, it can not only solve the related problems efficiently, but also improve the students'ability of automatic operation, design and comprehensive use of knowledge.

2.2. Effective Enhancement of Teachers' Teaching Effectiveness

At present, most of the teaching classes adopt traditional teaching methods, and the teaching effect has not made a breakthrough. But after the application of MATLAB experimental platform in teaching, it can provide teachers with more means of teaching. With the help of MATLAB experimental platform, some problems encountered in the conventional teaching can be solved by graphics. For example, teachers use the advantages of the platform to provide students with targeted explanation of difficult problems, which can enable students to image the relevant knowledge, but

also can effectively absorb knowledge.

3. How to Build the Financial Mathematics Experiment Platform of MATLAB

Because MATLAB has many excellent functions, it plays an important role in both student groups and teaching work, so it is worth thinking about how to combine MATLAB computing software to build financial mathematics experimental platform.

3.1 Innovation of MATLAB Teaching Model

In the teaching work of colleges and universities, the former software teaching classes often adopt the method of teaching before learning, which divides teachers'imparting knowledge and students' learning knowledge into two steps. The effect of this teaching method is not as good as imagined, because in most cases, students do not necessarily do enough homework in advance, which is not unfavorable to the realization of experimental results. If the previous teaching methods can also have merits, it is limited to the introduction stage of MATLAB teaching. However, in the process of financial mathematics experiment teaching in MATLAB, this traditional teaching mode can not meet the requirements. Then, the effective method is to introduce the relevant experimental teaching management system. In China, a university has introduced a management system of experimental teaching, which greatly improves the role of MATLAB experimental platform. Because through this system, the teaching mode can be changed, so that teachers can distribute relevant experimental tasks to students before class through this system, and also can distribute some relevant materials at the same time, which is beneficial for students to fully understand the teaching content in the experimental class before class. In addition, teachers can fully interact with students through the system, which is the best teaching effect.

3.2 Improving the Teaching Content of MATLAB Experimental Platform

In order to train more talents who can solve financial problems in the future and meet the requirements of financial professionals in the talent market, it is necessary to reform the teaching content of MATLAB experiment with the times. For example, by adding topics closely related to financial computing and modeling, the experimental purpose can be more clear, and the ability of financial mathematics students to solve financial problems by using MATLAB tools can be enhanced. In order to cultivate financial mathematics professionals, demonstration experiments, verification experiments, design experiments and comprehensive experiments have been added in a university in China. When teaching the basic knowledge of MATLAB, teachers use demonstration experiment to teach the basic knowledge of MATLAB. Validation experiments are mostly used to enhance students'understanding of abstract concepts or principles, such as linear analysis theory, probability calculation, financial statistics and other professional knowledge. At this time, relevant validation experiments can be set up so that students can better complete experiments through MATLAB to achieve the teaching effect. Designing experiments is mostly in the field of computer programs, which is equivalent to training students to use MATLAB computing software, edit corresponding computing programs, and solve simple or complex computing problems. This kind of design experiment is more to train students to use MATLAB to design programs independently, to cultivate automatic initiative and to give full play to students'talent and ability in programming. The last one is the comprehensive experiment, which is the most practical teaching experiment. It exercises the students'comprehensive ability, because it needs to test the students' understanding of financial calculation problems, the use of mathematical programs, the creation of models and the self-design of computer programs, etc. all of which need to be considered and completed by students. In this way, we can improve the teaching content of MATLAB Financial Mathematics Experimental Platform, and cultivate more professional graduates.

Through the construction of the experimental platform mentioned above, the students'ability of financial mathematics experiment in MATLAB has been further strengthened. In one statistic, the students were divided into two groups. One group had received the targeted teaching of MATLAB Financial Mathematics Experimental Platform, and the other group only accepted the ordinary

learning mode. In a prescribed time, the same number of students were surveyed about the completion of the experiment. It was found that the number of students who had received the platform learning was far more than that of the students who had not received the platform learning. The specific data are as follows:
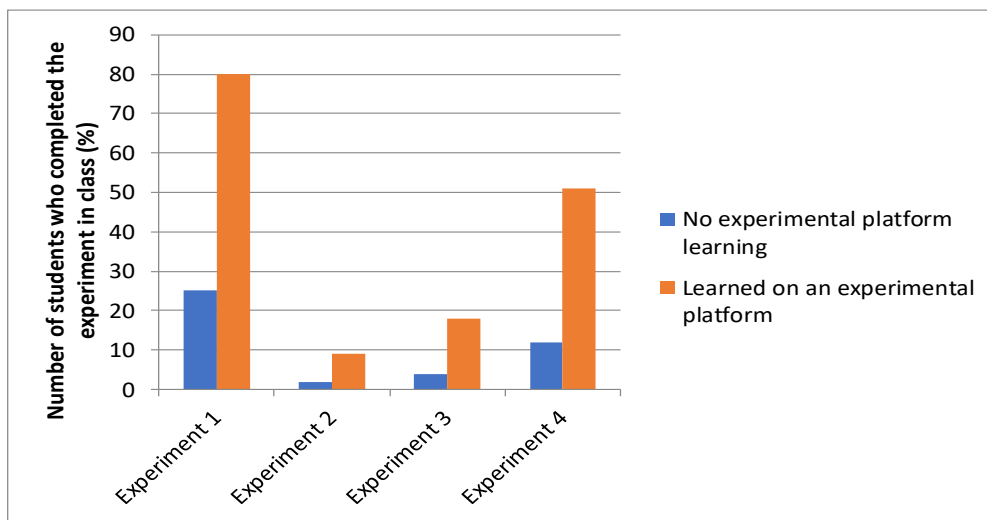

Fig.2. Statistical comparison of acceptance/non-acceptance of experimental platform learning

4. Conclusion

For the development of the whole society, the role of financial mathematics professionals is very important. Their figures not only appear in various types of enterprises, helping enterprises to analyze basic financial problems, assisting enterprises to carry out the analysis of capital investment and development trend, but also in the national strategic level, making suggestions for the future development of the country. It is in this context that the role of MATLAB financial mathematics experimental platform is more prominent. It can not only provide students with a powerful learning platform, better grasp the knowledge of financial mathematics, better link the financial expertise, mathematical knowledge and computer program knowledge that they have learned, improve the ability of solving problems comprehensively, but also help teachers to accomplish teaching tasks systematically and scientifically, and achieve the goal of training talents.

References

[1] Dai K, Zeng S, Huang L, et al. The Application of Mixed Software Simulation Platform Based on Multisim and MATLAB for Electric Specialty Experiment Teaching[C]// International Conference on Computational Intelligence & Software Engineering. 2009.

[2] Rong H U, Jun Z. Construction of Financial Mathematics Experimental Teaching Platform Based on MATLAB [J]. Journal of Guangdong Polytechnic Normal University, 2018.

[3] Gu H, Wei Z. An experimental study of college teaching based on Matlab software[C]// Fifth International Conference on Intelligent Computation Technology & Automation. 2012.

[4] Yuan S, Wang H, Shen G. Integrated Teaching Platform of Computer Control System Based on Matlab/RTW [J]. 2011.

[5] Li Y F. The Application of MATLAB Software on the College Network Teaching Platform of the Mathematics Experiment [J]. Applied Mechanics & Materials, 2011, 55-57:1459-1463.