Research on the Application of Information Technology in Advanced Mathematics Teaching

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Abstract: With China's education system reform moving forward constantly, the quality requirements for classroom teaching are constantly elevated. And accompanied by the rapid development of science and technology, various modern information technologies have become an important part of classroom teaching, which can effectively arouse students' interest in learning. The author presents an in-depth analysis on the application of information technology in Advanced Mathematics teaching and further identifies its necessity, hoping that this paper may promote the overall quality and level of the classroom teaching of Advanced Mathematics.

During the classroom teaching of Advanced Mathematics, the knowledge contained appear rather boring for the students majoring on other disciplines, which makes the overall level of classroom teaching on this book less than ideal. As one of public foundation courses, Advanced Mathematics plays a very important role in the cultivation of students' comprehensive quality. Thus, it is necessary to actively explore innovative methods of teaching Advanced Mathematics. In the era of information, information technology has been widely used in all walks of life, and has made tremendous changes in production activity and daily life. The integration of information technology in Advanced Mathematics teaching can ensure the overall advancement of the level of the latter, making it more in line with the requirements of social development.

1. Main Problems in the Teaching of Advanced Mathematics

1.1 Clear Cognitive Conflict between Traditional Mathematics Teaching Theory and the Modern One.

For traditional mathematics teaching, most students deem this course as a highly professional theoretical knowledge system developed for professional courses.

In the Advanced Mathematics classroom teaching, it is important to strengthen students’ mastery of this course, as well as the memory of theoretical knowledge and formula methods [1]. While in the modern one, the practicality of mathematics knowledge is attached with great importance. In the process of classroom teaching, it is supposed to focus on the cultivation of students' practical ability, so that they can solve practical problem in life with the knowledge acquired from this course. However, there has appeared apparent deviation of teaching objectives and cultivation ideas in the teaching of this course. As the crystallization of human wisdom and an important tool for human development, Advanced Mathematics not only is favorable to strengthening the cultivation of students' rational thinking, but also contributes to accelerating knowledge dissemination knowledge. What’s more, it can enlighten students' minds and largely raise their intelligence level.

With this course, students learn to understand and summarize objective laws, thus enhancing their abstract thinking and developing a certain level of mathematical logic. Then, they will be able to use mathematics knowledge to improve the quality of learning. During classroom teaching of Advanced Mathematics, it is of utmost significance for both professors and students to actively change their own ideas and concepts and deepen the understanding of mathematics tools. In this way, students will make full use of Advanced Mathematics to solve different problems in life.

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1.2 Main Shortcomings of Traditional Classroom Teaching Model

Aiming to ensure education equality, China has always implemented national unified examination to pick outstanding talents. Under the pressure of exam-oriented education, the class has gradually become dominated by teachers, which leads to rigid classroom teaching. This is due to the fact that many professors lack correct understanding of teaching, and fail to pay attention to the interaction with students. They just disseminate knowledge and neglect the cultivation of students' ability to understand and accept, resulting in a decline in classroom teaching efficiency [2].

Because of the abundant highly abstracted content and limited classes of Advanced Mathematics, there are obvious contradictions between the writing on blackboard and oral explanation. If teachers focus on the latter only, students may have difficulty in grasping key points. And vice versa, students probably only record the contents on the blackboard, ignoring the analysis and mastery of key points.

Most classrooms in university are large lecture halls where students in back row can hardly concern the content on the blackboard. In this situation, their learning effect can be affected. In another situation, with the absent of dynamic graphical presentation, students may get deficient understanding of abstract knowledge. What’s more, there also exists difficulty of citing repetitively. For the classroom teaching of Advanced Mathematics, every class is for knowledge utterly new. If the writing on the blackboard need to be mentioned again in the next class of this course, it will be pity to lose it. While, if the teacher make analysis through oral rehearsal, the classroom teaching efficiency will also be seriously affected.

1.3 Many problems in the information-based teaching of Advanced Mathematics

In the classroom teaching of Advanced Mathematics, most of professors can fully use the multimedia courseware to make demonstrate the teaching content, which not only enhance the effect of classroom teaching but also ensure the reuse of teaching resources. However, they are still not accustomed to this kind of teaching mode. And some other professors are in poor comprehensive quality and fail to make multimedia courseware as much as they need. All these problems will lead to serious interference in applying multimedia courseware to Advanced Mathematics teaching. Although many colleges and universities have already developed multimedia teaching courseware of high efficiency, these highly-cost courseware are not universally applicable, easy to use or of aesthetic value, which leads to classroom teaching effect less than ideal [3].

Regarding the comparison between current knowledge culture and epoch development as well as quality education requirements, current learning mode is relatively single, passive and void of spirit of initiative and cooperation. This lays a sound psychological foundation for cultivating our self-regulated learning ability. As long as we professors are good at arousing and protecting students' curiosity and thirst for knowledge, create a good self-learning environment for students, take good advantage of classroom evaluation, and cultivate students' communicative and cooperative ability, students' ability to learn information technology knowledge on their own will eventually get developed and improved.

2. Necessity of Integrating Information Technology in Advanced Mathematics Teaching

Course integration is a system formed by centralizing several factors around the core of the unified system in the process of classroom teaching. Course integration refers to the unified treatment of relevant factors such as curriculum setting, teaching objectives, teaching evaluation and so on, which aims at strengthening the overall level of classroom teaching. With informationization in current age, the focused use of network technology and multimedia technology helps students acquire knowledge and strengthen the use of knowledge at the same time. During the integration of information technology in Advanced Mathematics teaching, modern computer technology can be fully utilized to innovate the original teaching methods and contents, raise the overall level of classroom teaching, and optimize the content of classroom teaching thoroughly. Furthermore, the organic integration could encourage students to actively participate in

classroom teaching and visualize abstract knowledge so as to facilitate their understanding of this course and application of mathematical knowledge. Apart from these, information technology can be used to create mathematical models during classroom teaching, so that students can understand abstract problems combing the vivid and concrete things. And in this way, students may enhance their mastery and application of mathematical knowledge through independent thinking or cooperative inquiry, stimulating their subjective initiative in the meanwhile[4].

2.1 Improving Teaching Mode through the Integration of Information Technology in Advanced Mathematics Teaching

In the rapid development of information technology, human way of knowledge acquisition can be extended to facilitate the collection, store, and processing of knowledge, and raise the efficiency of these steps. The integration of information technology in curriculum makes it possible for professors to use computer technology to expand the content of classroom teaching, so that students can have a deeper understanding of the knowledge in class.

In the process of information technology application, an analysis can be conducted with a reference of the characteristics of different knowledge, which enhances students' ability to imitate and process knowledge and intrigue their initiative for knowledge acquisition. In the classroom teaching of Advanced Mathematics, students are adults who can skillfully use computer technology to combine the knowledge of this discipline with real life. Through the integration and application of information technology in Advanced Mathematics teaching, a new classroom teaching environment can be created to encourage students to make exploration independently and realize cooperative learning, thus promoting knowledge sharing.

2.2 The application of information technology can increase students' interest in learning and ensure the quality of classroom teaching.

The use of information technology in Advanced Mathematics teaching can greatly reduce the workload of professors. Work left for them only involves putting teaching content into courseware with difficulties and key points highlighted and raise the efficiency of classroom teaching resources. What’s more, teachers can also carry out lead-in activities with a full use of dialogue, thus enhancing students' independent thinking ability. At present, there are many excellent courses available on the internet. In Advanced Mathematics teaching, teachers can just paly these excellent courses to bring freshness to classroom teaching and elevate students' learning level.

2.3 Improving the Evaluation Model of Classroom Teaching of Advanced Mathematics

Through classroom teaching evaluation, professors carry on reflection and summarization, which is helpful to enhance the learning effect of students. If professors simply take examination marks as the criterion for learning effect in the process, students will lose initiative in learning, which is not conducive to improving the comprehensive quality of students. Therefore, information technology should be used in classroom teaching evaluation to make detailed record of each student's classroom performance and daily learning status, which finally form personal growth files of each students. With the help of them, students will find their own shortcomings in time and reflect constantly, thus raising marks at last.

3. Section Three Main Ways to Integrating Information Technology in Advanced Mathematics Teaching

3.1 Integration of Multimedia Courseware in Advanced Mathematics Teaching

Multimedia courseware can integrate image, music, video and other multimedia information, and thus present information in a vivid way, making the teaching content much acceptable for students. In classroom teaching of Advanced mathematics, the organic unification of multimedia courseware and blackboard design by professors will increase students' sense of participation and deepen their understanding of mathematical knowledge. In addition, professors can design courseware multimedia basing on practical content in multimedia courseware teaching, and enhance students’

learning initiative and enthusiasm with the aid of vivid courseware. Multimedia courseware making requires professors are required to master necessary courseware making skills, use computer software proficiently, optimize multimedia courseware, and ensure the interest of multimedia courseware [5].

3.2 Integration of Mathematical Modeling in Advanced Mathematics Teaching

Mathematical modeling refers to transferring practical problems into mathematical models with direct use of mathematical symbols and language so as to simplify the design of object information in the research on practical problems. And final mathematical results calculated will be used to make judge on the actual problems. By means of mathematical modeling, the actual problems will be closely linked with mathematical knowledge, strengthen the instrumental characteristics of mathematics at the same time.

In the process of mathematical modeling, computer technology and information technology must be fully used through the organic combination of mathematical modeling in Advanced Mathematics teaching, so that students have a deeper understanding of the charm of mathematics. And students should thus have the ability to solve practical problems through mathematical modeling, thus improving the application of Advanced Mathematics.

3.3 Organic Integration of Mathematical Experiments and Advanced Mathematics

As an important part of Advanced Mathematics, mathematics experiment can deepen students' understanding of the knowledge of Advanced Mathematics and increase students' interest in learning this course [6].

In the modernized pedagogy, mathematical experiments can be displayed through mathematical software. With the development and perfection of mathematical software, there will be more functions enabling students to interact with mathematical experiments, which raise students' interest in learning and enhance their understanding of mathematical experiments.

3.4 Strengthen the organic integration of intracurricular and extracurricular activities

The content of the classroom teaching of Advanced Mathematics is pretty much, while the classroom period of this course is relatively limited. Many students fail to consolidate the content acquired from classroom teaching after class, which results in their low learning efficiency. Nevertheless, with the close integration of information technology and Advanced Mathematics teaching, the knowledge of Advanced Mathematics can be supplemented directly from the Internet platform, which encourages students to actively participate in various mathematical activities and enhances students' interest in learning [7].

In the classroom teaching of Advanced mathematics, professors can directly use multimedia to acquire knowledge related to classroom content on the Internet through the full use of information technology integration. And they can advance the processing of information technology by means of video content materials, so as to ensure the effect of the whole information processing. In the meantime, they can also fully use multimedia to expand teaching resources and enrich the content of classroom teaching with a large number of high-quality teaching resources, thus raising the level of classroom teaching comprehensively.

3.5 Integration of Information Technology and Innovative Thinking in Advanced Mathematics Teaching

During Advanced Mathematics teaching, students' imagination can be enhanced through innovative thinking, which promotes the overall elevation of their divergent thinking. Professors are supposed to fully utilize information technology to encourage students to thoroughly and actively study mathematical knowledge and more actively participate in classroom teaching, thus strengthening students' learning effect. In the information technology environment, information technology and advanced course teaching can be organically combined through the establishment of network teaching platform. The so-called "network teaching platform" is a comprehensive network platform which integrates teaching resources management and teaching evaluation. Students can

develop their own leaning logs by signing in with user name and password. This platform offers analysis of students' learning effects, which is beneficial to the overall advancement of the students' level in an all-round way. During the integration of information technology in Advanced Mathematics, various service functions should be employed to impel college students acquire knowledge of this course on their own initiative with the support of network integrated platform. By constructing students' personal materials database through the platform, professors design teaching situations that are in line with students' actual situation, and vigorously conduct fast study of mathematical problems basing on computer information technology in multimedia-assisted teaching method. Advanced Mathematics is an abstract and highly logical subject. If it is separated from the actual teaching environment, it will not stimulate students' imagination. In this way, students could easily lose interest. Adopting computer teaching, professors can obtain a large amount of data and information in a short time and create different learning environments. And by integrating pictures, videos and audio, they help students form a theoretical system of formulas, build a complete knowledge system and clarify the links between knowledge of various fields. They can also enhance students' interest in learning through demonstration of mathematical experiments [8].

4. Conclusion

Based on the analysis of the integration of information technology in Advanced Mathematics teaching, this paper summarizes the main problems in the current Advanced Mathematics teaching and puts forward the importance of the integration, which effectively promotes this integration and help enhance students' learning level.

References

[1] Liu Baoli. Research on the Construction and Application of Online Open Course of "Advanced Mathematics" in Higher Vocational Education Based on the "Internet +" Background[J]. Think Tank Era, 2019 (22): 63-64

[2] Jia Jie. Discussion on the Application of "Flip Classroom Teaching Method" in Advanced Mathematics Teaching [J]. Think Tank Era, 2019 (25): 218-219.

[3] Yang Hehua, Wu Xiaoxue and Yang Ye. Exploration of integrating mathematical modeling ideas into Advanced Mathematics Teaching [J]. Think Tank Era, 2019 (21): 165 + 174.

[4] Wang Pei. An Analysis of the Difficulties of Advanced Mathematics Teaching from the Perspective of Learning Science [J]. The Science Education Articles Collects (Early June), 2019 (06): 64-65+71.

[5] Guo Yanchun, Zheng Yanni and Zhang Fen. A Brief Analysis of the Exploration of Advanced Mathematics Teaching Mode in MOOC Environment [J] Think Tank Era, 2019 (24): 197+210.

[6] Zheng Yaru. Improving the teaching effect of Advanced Mathematics by means of network and software [J]. Microcomputer Application, 2019, 35(05): 33-34+38.

[7] Zhou Ran, Xu Xianghong. Brief Discussion on the Application of Mixed Teaching Mode in Advanced Mathematics [J]. Journal of Jilin TV & Radio University, 2019 (05): 46-47+50.

[8] Jiang Lingling, Yin Haiqing. Exploration of Hybrid Teaching Model of Advanced Mathematics Based on SPOC+Rain Classroom [J]. The Science Education Article Collects (Later May), 2019 (05): 71-72.