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Optimization Strategy for the Reform of Applied Mathematics Teaching in Higher Vocational Colleges

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Abstract: In the face of the impact of economic globalization and cultural diversification, higher vocational colleges must provide more diversified and intelligent multi-dimensional education services for college students to promote the rapid innovation of subject teaching and improve student-centered education and teaching concepts. Based on this background, applied mathematics, as a very important basic course in higher vocational education, must carry out all-around teaching reform to continuously improve the comprehensive quality of mathematics of contemporary college students. Therefore, based on the practical experience of applied mathematics teaching and the collation and summary of relevant references, this study explores how to optimize the reform of applied mathematics from several aspects, to further improve the quality of applied mathematics teaching and the comprehensive quality of contemporary college students in mathematics by creating a new model of applied mathematics classroom teaching in higher vocational colleges.

Keywords: Higher vocational colleges; Applied mathematics; Mathematical reform; Optimization strategy

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1. Introduction

With the continuous development of education and teaching reform in recent years, training talents with strong independent learning ability, entrepreneurship, and innovation ability have long become the focus of classroom teaching in higher vocational colleges. Because of this, combined with the subject characteristics of applied mathematics in higher vocational colleges, colleges should focus on highlighting the applicability of the teaching content, improving students' comprehensive mathematical literacy to the maximum extent to truly achieve the cultivation of college students' applied ability. Therefore, it is particularly important to carry out in-depth research on the reform of applied mathematics in higher vocational colleges. Based on the characteristics of applied mathematics curriculum in higher vocational colleges and combined with relevant references, this study carries out detailed discussions to explore an innovative path suitable for the reform of applied mathematics in today's higher vocational colleges, to promote the continuous optimization of applied

mathematics in teaching resources, objectives, methods and other aspects in higher vocational colleges, and help the steady improvement of the quality of mathematics teaching in higher vocational colleges to meet the needs of talent training in the new era.

2. Research on applied mathematics teaching reform in higher vocational colleges

Higher vocational education itself has two attributes, which are higher education and vocational education, which determine the essential difference between higher vocational education and traditional undergraduate education. Specifically, higher vocational education has the basic nature of higher education, and at the same time, vocational education limits the philosophy of higher vocational education, which must have vocational characteristics.

Because of this, China's Ministry of Education in the construction of high-level higher vocational colleges with Chinese characteristics, has continuously emphasized the reform focus of higher vocational colleges must be placed on the development of students' innovation ability and training students to solve problems in these two aspects. Therefore, teachers in higher vocational colleges are required to create a diversified teaching scene, build a multi-dimensional intelligent learning space for students, guide contemporary students to carry out inquiry learning, and expand the depth of learning [1].

Applied mathematics is a very important basic subject in higher vocational education. In some sense, there are still some problems such as an imperfect curriculum teaching system and relatively single teaching mode, so it is imperative to reform applied mathematics in higher vocational education. Based on this background, applied mathematics teachers in higher vocational colleges should create diversified teaching scenarios, build multi-dimensional intelligent learning platforms and learning spaces for students, stimulate students' active learning awareness, improve their in-depth learning ability, and combine comprehensive mathematical literacy with all-round education to promote the ecological development of contemporary college students' comprehensive mathematical literacy and achieve the goal of talent training in higher vocational colleges [2].

3. Problems faced in reforming applied mathematics in higher vocational colleges

3.1. The teaching design of applied mathematics in higher vocational colleges is lagging behind

The new era requires applied mathematics teachers in higher vocational colleges to pay attention to whether college students have the consciousness of in-depth learning, focus on training college students' higher-order thinking ability and problem-solving ability, and highlight the results-oriented and ability formation as the fundamental concept of mathematics teaching. However, at present, the vast majority of applied mathematics teachers in higher vocational colleges have relatively conservative thinking concepts in the reform of applied mathematics teaching and lack the consciousness of optimizing and screening applied mathematics information, so that the content of applied mathematics teaching presented by them cannot be consistent with the goal of talent training in higher vocational colleges. This cannot satisfy contemporary college students' interest and preference for intelligent and three-dimensional mathematical knowledge [3].

Additionally, in the teaching process of applied mathematics, the presentation of mathematical knowledge by applied mathematics teachers in some higher vocational colleges is too simple and basic. The traditional method of teaching instead of educational training still occupies a dominant position in applied mathematics classes, so there is no diversified and innovative processing of applied mathematics information. If the reform idea of applied mathematics is not applied in the teaching content of applied mathematics, it cannot stimulate

the students' active learning and improve the student's learning subject status, resulting in the relatively low efficiency of applied mathematics teaching in higher vocational colleges.

3.2. The integration of mathematics education resources is insufficient

Based on the interest and preference of contemporary college students for intelligent and three-dimensional subject knowledge, the current vocational colleges present the characteristics of fast rhythm and high speed in subject teaching reform. Therefore, higher vocational colleges should optimize mathematics teaching resources in the reform of applied mathematics, to promote the transmission approach of mathematics teaching content to show the characteristics of multi-dimension, three-dimensional, and intelligent, to break the shackles brought by traditional mathematics teaching methods [4].

However, according to the survey and analysis of incomplete data, the vast majority of applied mathematics teachers in vocational colleges lack the awareness of the application of an intelligent environment in the process of applied mathematics teaching. The teaching content of applied mathematics is still dominated by traditional teaching, the phenomenon of homogenization is very serious, and the application of rich network resources is lacking. As a result, the teaching content of applied mathematics in higher vocational colleges is too simple, and the self-efficacy of college students in the learning process is relatively low. Therefore, applied mathematics teachers in higher vocational colleges must make full use of the virtual resources of applied mathematics, constantly strengthen the effective connection with different channels of applied mathematics teaching resources, and increase the integration of different channels of applied mathematics teaching resources to maximize the enthusiasm of students to learn applied mathematics [5].

3.3. The teaching situation of applied mathematics in higher vocational colleges is too simple

Based on the preference of contemporary college students for applied mathematics knowledge, colleges should pay attention to creating diversified and exploratory teaching scenarios by utilizing the rich and diversified mathematics education resources to stimulate students' independent learning of mathematical knowledge to the maximum extent and fully reflect their subjective cognition of mathematical problems.

However, at present, the vast majority of applied mathematics teachers in higher vocational colleges are still using relatively simple methods in creating applied mathematics teaching situations and do not fully consider the focus on student participation. Some teachers even think that students' participation in classroom teaching situations may delay their teaching progress and fail to ensure the smooth completion of their teaching tasks. Thus, this traditional teaching method restrains the students' subjective initiative in the process of applied mathematics learning and reduces the quality of applied mathematics reform in higher vocational colleges [6].

4. Optimization strategy of reforming applied mathematics teaching in higher vocational colleges

4.1. Clarify the teaching objectives of applied mathematics in higher vocational colleges

With the continuous reforming of applied mathematics teaching in higher vocational colleges, applied mathematics teachers should take scientific, reasonable, diversified, and innovative teaching design as the core teaching concept in the process of applied mathematics teaching, to clarify the teaching objectives of applied mathematics in higher vocational colleges and match the teaching content of applied mathematics with the in-depth learning requirements of contemporary college students. Thus, this can encourage contemporary college students to constantly optimize their mathematics learning ideas and effectively improve their mathematics

learning effectiveness [7].

Specifically speaking, the design of applied mathematics teaching objectives in higher vocational colleges should include the following three directions. First, by using teaching objectives with basic mathematical knowledge as the core means teaching of applied mathematics, college students can fully grasp the basic theoretical knowledge of applied mathematics and lay a solid foundation for the study of other professional courses. Second, the teaching goal with mathematics practice and application refers to the cultivation of scientific and rigorous mathematical thinking ability of contemporary college students with the help of diversified mathematics teaching, such as the ability to analyze, think, and solve problems with applied mathematics knowledge. Third, the teaching goal with comprehensive mathematics literacy refers to the integration of applied mathematics teaching resources through different channels to cultivate college students' comprehensive mathematics literacy, develop an active exploration of mathematical knowledge, positive and innovative learning attitude, and establish a correct scientific outlook and world view [8].

4.2. Fully integrate applied mathematics teaching resources of different dimensions

Rich and dynamic mathematics teaching resources have long been the main theme of applied mathematics teaching reform in higher vocational colleges. Only in this way can teachers continuously improve the comprehensive mathematical literacy of contemporary college students. Therefore, applied mathematics teachers in higher vocational colleges should firmly grasp the good development opportunity of the current knowledge and take rich and diverse teaching resources as the teaching carrier of applied mathematics. Especially in the learning process of key knowledge points, applied mathematics teachers in higher vocational colleges can make full use of various teaching resources to encourage students to carry out practical exploration of relevant mathematical problems and stimulate them to verify and solve mathematical problems in the process of hypothesis and practice to deepen students' mathematical learning ideas further.

For example, in the learning of building materials, applied mathematics teachers can make full use of advanced information science and technology means, let students draw function images with the help of computers, clearly observe the monotonicity and concavity of the function itself, accurately find the extreme point and inflection point, and thus establish derivative models. This can encourage college students to truly perceive the practicality of mathematical knowledge in the operation of computer software and achieve the desired learning effect [9].

4.3. Create excellent scenarios for applied mathematics problems

An efficient mathematics classroom cannot be without the creation of exploratory mathematical problem scenarios. This is because exploratory mathematics problems are more likely to stimulate students' higher-order thinking in mathematics, continuously improve their comprehensive mathematical literacy, and thus provide strong support for the solution of practical mathematical problems. For example, when teaching derivative concepts, applied mathematics teachers can first organize college students to use the online learning platform to consult derivate-related content, obtain certain information, and then lead them to have group discussions, try to guide them to use the relationship between derivatives and independent variables to teach derivative concepts and symbols, and encourage them to deduce relevant formulas by themselves. Thus, college students can think more thoroughly about mathematics problems and cultivate their higher-order thinking in mathematics.

Moreover, applied mathematics teachers should further broaden the representation of applied mathematics learning problems, set a variety of mathematical problems in the classroom teaching process, and expand the representation of exploratory mathematical problems to stimulate college students' self-efficacy, enable them

to carry out independent learning, and enhance their learning self-confidence. For example, when explaining the content of series limits, teachers can put forward the nature of series limits through problem-solving. This kind of mathematical problem situation creates a strong mathematical problem exploration situation that fully arouses the enthusiasm of contemporary college students to consult mathematics-related materials and then think, analyze, and solve mathematical practical problems [10].

4.4. Utilize information technology to enrich learning processes

Applied mathematics teachers in higher vocational colleges can utilize online learning platforms to publish applied mathematics learning tasks and set up some open mathematical inquiry questions. College students can study applied mathematics problems through the online discussion area via group cooperation and inquiry. In the whole learning process of applied mathematics, teachers can check the progress of students' tasks anytime and anywhere through these teaching platforms, and timely answer the questions encountered by students in the process of mathematics learning, to facilitate the smooth transfer and consolidation of college students' applied mathematics knowledge in the process of independent exploration, thus improving their independent learning ability.

For example, in the study of definite integral and its application, applied mathematics teachers can set mind mapping tasks, requiring college students to draw mind maps of indefinite integral and definite integral using relevant software, and design the drawing process into thematic micro-lessons for group sharing and reporting. Applied mathematics teachers should also organize teachers of other specialized courses and college students to conduct overall scoring and selection of micro-lessons to stimulate students' motivation to learn mathematics knowledge independently.

4.5. Innovate and optimize the learning evaluation system of applied mathematics

In the process of learning applied mathematics, it is bound to produce a lot of procedural data. To effectively collect, analyze, and utilize these data, it is necessary to have a multi-situation integration evaluation system, so that applied mathematics teachers in higher vocational colleges can obtain effective evaluation results, and use the evaluation results to carry out continuous optimization of the teaching process, and truly realize the optimization goal of teaching by evaluation and reform. The study of applied mathematics in higher vocational colleges can be changed to a more intelligent direction via this method.

Therefore, applied mathematics teachers must make full use of the data processing and analysis function of information technology to carry out detailed dynamic analysis of students' learning progress to interpret data and scientifically predict students' learning situation to provide strong evidence support for the result evaluation of applied mathematics. Additionally, to ensure the real and effective results of curriculum evaluation, applied mathematics teachers can also carry out multi-subject evaluation in the evaluation process. That is, to mobilize campus experts, industry leaders, and first-line enterprise representatives to reasonably participate in the whole process of course evaluation, comprehensively examine college students' independence and initiative in the process of acquiring applied mathematics knowledge to grasp college students' mathematics learning more comprehensively.

5. Conclusion

Applied mathematics teachers should be required to innovate and adapt to the situation to ensure the smooth progress of reforming applied mathematics teaching in higher vocational colleges. This can effectively change the problems that the traditional applied mathematics teaching method is outdated and the assessment method

is too simple. By adhering to student-centered teaching and the training of professional ability as the teaching focus, applied mathematics knowledge and practical life can be connected. Thus, it can continuously improve the comprehensive quality of mathematics of college students and build a new ecological applied mathematics classroom teaching model in higher vocational colleges. It also emphasizes the autonomy of college students in the process of mathematics learning and stimulates students' active learning consciousness. Only in this way can colleges comprehensively improve the scientific and efficient applied mathematics teaching in higher vocational colleges, draw out professional learning characteristics, meet the urgent demand for high-quality applied talents in the new era, and achieve accurate teaching.

Disclosure statement

The author declares no conflict of interest.

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