ISSN 2522-6398 Vol. 6, Issue 24: 191-197, DOI: 10.25236/FER.2023.062430

Construction and Application of 'Mechanical Manufacturing Technology' Course Resource Library

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Abstract: *'Mechanical Manufacturing Technology' course is a compulsory course for mechanical design and manufacturing and its automation, mechanical and electronic engineering and other related majors. It takes mechanical manufacturing as the main line. The course content integrates a number of theoretical and practical knowledge, involving the processing and assembly of new materials, new processes and new equipment, the detection of mechanical parts, the types and selection of tools, and the selection of fixtures. The course is closely related to engineering practice and has certain challenges for teachers. In teaching, it is necessary to constantly update the course content to meet the needs of society and the times. Based on the teaching law and course outline of application-oriented undergraduate education, this paper proposes to establish a course resource library of mechanical design and manufacturing, so as to promote the deep integration of information technology and education and teaching, integrate existing course resources, take the actual work tasks of enterprises as the guide, carry out course development and design according to the project-based teaching mode, provide teachers and students with various multimedia teaching resources, cultivate students ' autonomous learning ability, and comprehensively improve the teaching quality.*

Keywords: *Course resource library, informationization, teaching reform, innovative talents, training objectives*

1. Introduction

With the rapid development of China 's manufacturing industry, coupled with the transformation and upgrading of traditional industries, the whole industry has higher and higher requirements for mechanical professional and technical personnel. In today 's era, the way to acquire knowledge is not only from the book, the classroom, but multi-faceted. China 's ' National Medium and Long-term Education Reform and Development Plan (2010-2020) ' clearly stated : ' Improve the level of teachers ' application of information technology, update teaching concepts, improve teaching methods, and improve teaching effectiveness. It can be seen that the reform led by information technology has penetrated into all aspects of economic development and social life. People 's production, lifestyle and learning methods are also undergoing profound changes. Education for all, quality education, personalized learning and lifelong learning have become important characteristics of education development in the information age. At present, in many colleges and universities, traditional teaching resources have been unable to meet the needs of education and learning development under the background of informatization[1]. Therefore, it is urgent to build a new course resource library based on modern information technology to realize resource sharing and provide strong support for innovative teaching mode.

ISSN 2522-6398 Vol. 6, Issue 24: 191-197, DOI: 10.25236/FER.2023.062430

2. The characteristics of ' Mechanical Manufacturing Technology ' course

'Mechanical Manufacturing Technology ' is a basic course for mechanical engineering and near-mechanical majors in colleges and universities. It mainly studies the basic theory of metal cutting, mechanical manufacturing process equipment, mechanical processing quality analysis and mechanical processing procedures[2] .Through the teaching of this course, students can master the basic knowledge of metal cutting principle, machine tool, cutting quality analysis and process route formulation, and have the ability to solve practical engineering problems by using the manufacturing knowledge they have learned, so as to quickly adapt to the needs of future career and economic and social development, and lay a solid foundation for high-quality applied technical talents with certain theoretical knowledge foundation and certain innovative practical ability.

3. Results and discussionThe necessity and practical significance of the construction of course resource library

3.1 Necessity of course resource library construction

In the traditional teaching of " Mechanical Manufacturing Technology, " teachers often use teaching aids, blackboard writing, pictures, video and other analysis to explain knowledge points. The ability of information storage, transmission and reproduction is limited. The single gift-based teaching method makes the " dynamic " display almost blank. With the development of information technology, multimedia teaching is widely used in most courses in colleges and universities. The image, vivid and intuitive characteristics of multimedia teaching greatly improve the teaching effect of the course[3]. But blindly using multimedia courseware, there are also some drawbacks : First, regardless of whether the teaching content is appropriate, the use of multimedia teaching, spend a lot of time and energy to make unnecessary courseware, ignoring the study of teaching methods, teachers become broadcasters and commentators, lost control of teaching. Second, too much reliance on multimedia will reduce the interaction between teachers and students, and it is difficult to play the main role of teacher-led. Excessive amount of information will also make students passively accept the course content and lack the process of thinking. In the process of making some courseware, many dazzling animations, page switching actions and sounds are added. Too fancy layout will distract students ' attention and interfere with learning.Third, the general introduction, targeted is not strong. Although as a professional course, but for different professions, different jobs on the knowledge and skills to master the focus is still different, at present, many teachers use the courseware is to learn from each other, bring doctrine, do not have their own professional characteristics, personal characteristics, the overall look similar, purpose, pertinence is not strong. Through continuous practice, it has been proved that according to the characteristics of contemporary college students, the use of modern information technology, the integration of various high-quality resources, and the construction of a universal + personality, high-quality, diversified and shared teaching resource base are the key factors to improve the quality of course teaching.

In addition to teachers and students, the service objects of the resource library also include social students such as enterprise employees and continuing education. Based on serving enterprises and serving the society, the course teaching resource library has become an open platform with effectiveness, professionalism and practicality.

3.2 The practical significance of the construction of course resource library

" Mechanical Manufacturing Technology " course is a compulsory course for mechanical design and manufacturing and its automation, mechanical and electronic engineering and other related majors. It takes mechanical manufacturing as the main line. The course content integrates a number of theoretical and practical knowledge, involving the processing and assembly of new materials, new processes and new equipment, the detection of mechanical parts, the types and selection of tools, and the selection of fixtures[4]. These knowledge will progress and develop with the changes of the times. Therefore, it is necessary to constantly update the course content in teaching to meet the needs of society and the times. Secondly, the basic course of mechanical manufacturing involves a variety of processing methods, which is very demanding for teachers ' knowledge reserve. In addition, it is closely related to engineering practice, which is challenging for teachers. The establishment of teaching resource library provides a knowledge window for teachers and students, which greatly shortens the time of resource acquisition and improves the efficiency of teachers ' work and students '

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learning.Thirdly, teachers can use the original resources to update and reorganize them to update the resource library, such as the modular fixture module. Because there are many kinds of fixtures, and their specific structures are often determined by the structure, shape and size of the workpiece, different tooling cases need to match different fixtures. However, most of the parts in the modular fixture belong to standard parts or basic parts, so only the basic parts and standard parts of the resource library need to be recombined and assembled according to the positioning and clamping requirements of the workpiece, which greatly reduces the workload of modeling and design. Digital teaching resources are favored by teachers and students in colleges and universities because of their multi-dimensional, hierarchical and diversified characteristics.[5] The construction of the teaching resource database of the basic course of mechanical manufacturing is of great practical significance to help teachers prepare lessons efficiently and promote teaching reform.

4. Construction of ' Mechanical Manufacturing Technology ' course resource library

4.1 The construction principle of resource library

The teaching resource library serves for education and teaching. It integrates teaching methods, teaching design, teaching means, information technology and so on into the course content. It must pay attention to the universality, practicability and advancement of resources, so as to facilitate teachers to better use teaching resources in teaching, optimize teaching design and comprehensively improve teaching effect. The construction and design of the teaching resource library of " Mechanical Manufacturing Technology " course should follow the following basic principles.

(1) Practicality principle

The purpose of the teaching resource library is to serve teaching. The content of the resource library must first meet the course standards, and can clearly reflect the course outline and teaching objectives, rather than the simple stacking and listing of digital resources. It is not only conducive to teachers ' teaching, but also conducive to students ' learning, and can indeed bring about the improvement of teaching effect.

(2) The principle of integrity

The resources of the teaching resource library involve various types such as electronic lesson plans, electronic textbooks, courseware, pictures, animations, short videos, and production practice cases. Each type has several different formats. Therefore, in order to maximize the role and benefits of the teaching resource library, it is necessary for the teachers involved in the construction to carefully screen, process, optimize and innovate the teaching resources, and then integrate and layout them to ensure the overall unity of the system page design.

(3) Advanced principle

The course of " Mechanical Manufacturing Technology " is closely related to enterprise production, and materials, processes, technical equipment are constantly developing and updating. As the main output end of mechanical technical talents, application-oriented undergraduate colleges need to impart more advanced and cutting-edge knowledge to students. Therefore, teaching resources should be constantly updated and optimized with the development of society and specialty to ensure the advanced nature of the resource base.

(4) Standardization principle

The teaching resources of " mechanical manufacturing technology " include four parts : theoretical knowledge, practical teaching, experimental teaching and expansion and strengthening. These resources should follow the technical specifications and standards of national information resources when constructing, and provide convenience for teachers to share and transfer resources between different platforms.

4.2 The content of the resource library

The construction of the resource library is based on the teaching law and course outline of the applied undergraduate education, and the existing course resources are optimized and integrated to promote the deep integration of information technology and education and teaching. At the same time, taking the cultivation of practical ability as the central point, students strictly follow the national and

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industrial standards in the process of course learning. According to the project teaching mode, the course development and design are carried out, and the actual work tasks of enterprises are taken as the guide to cultivate students ' autonomous learning ability and improve the quality of talents.

The construction and application of digital teaching resource library breaks through the limitation of traditional teaching time and space, effectively monitors students ' learning situation, and is conducive to the implementation of diversified evaluation standards of teaching effect. The teaching resources required by the " Mechanical Manufacturing Technology " course have a wide range of radiation and a variety of types. It not only needs to use software in some professional fields, such as UG, Auto CAD, CAXA CAPP, etc., but also needs to use some information technology processing software, such as Dreamweaver, 3ds max, Flash, Premiere, Photoshop, Fireworks, etc., to make some materials that can reflect the processing process, production equipment and equipment, industry status and trends. This is still a great challenge for teachers. Therefore, only by formulating effective measures can it be more conducive to the construction and application of teaching resource library.

The " Mechanical Manufacturing Technology " course resource library is a teaching material center that collects multimedia materials such as text, pictures, animation and video required for teaching, mainly including textbook library, picture library, video library, and test question library.

(1) Text. It includes electronic teaching plans, syllabuses, electronic teaching materials, course schedules, learning guidance, experimental training guidance, etc. Through the learning guidance of each chapter and section, learners can understand the specific learning requirements, learning objectives and learning methods, so that students ' learning can be purposeful and targeted. Through the guidance of experimental training, students can understand the purpose, method and content of experimental training, the structure, operation method, use specification and matters needing attention of instruments and equipment, and improve students ' comprehensive exercise skills and practical operation ability.

(2) Pictures and animation. Pictures are stored in the form of JPG. 'Mechanical manufacturing technology ' has a large number of machine tool appearance, machine tool parts and machine tool transmission system of the physical pictures and animation, such as the thermal deformation of the machine tool, the composition of the size chain, lathe power chuck structure, two-way multi-chip friction clutch, a variety of typical clamping devices. The animation is based on the teaching design. The animation process fully shows the internal structure, system transmission principle and operation method of each mechanism, which greatly improves the teaching effect.

(3) Video. Videos are stored in AVI format. In addition, it also includes teaching videos related to teaching, demonstration or explanation of difficulties in the teaching process, equipment operation and process flow in practical teaching, so as to help students master the key points of operation as soon as possible.

(4) Teaching courseware. Based on the existing textbooks, video multimedia technology is used to create a live classroom form and create a classroom teaching atmosphere on the network. The content of the courseware is refined, the illustrations are rich, the focus is prominent, and the color matching between the text and the background is emphasized.

(5) Test question bank. It is mainly self-test, self-test questions and mid-term and final simulation test questions. There are chapter exercises and comprehensive exercises. The types of questions include filling in the blanks, judgment, selection, short answer, analysis, calculation and so on. The chapter exercises are helpful for students to check the understanding of basic concepts, basic theories and basic methods ; comprehensive exercises are designed with application and difficulty as the core to enhance students ' comprehensive application ability of knowledge.

(6) Case library. For some practical production problems with practical guiding significance and teaching-oriented significance, guide students to make a comprehensive analysis and formulate a processing plan for parts. The main purpose is to cultivate students ' comprehensive analysis ability to solve practical problems by using their professional knowledge. The choice of cases is typical and authentic.

(7) Literature. It is mainly for some accumulated experience materials, including cutting amount manual, fixture atlas, surface roughness, mechanical standard parts library, pneumatic component library, student work display library, etc., as well as the relevant national standards of the machinery manufacturing industry and the relevant national excellent course website links and other information, as well as a large number of cutting edge, hot spot, wide influence articles and classic famous teaching

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materials, works, etc., which is conducive to teachers and students to find information, help teachers ' scientific research work and students ' course design, graduation design completion.

(8) Forum. It provides a channel of communication for students and teachers, which can display students ' homework and self-created works. Students, students and teachers can learn from each other and answer questions on the spot. It is also convenient for teachers to find out the problems existing in students ' learning in time, so as to solve them in classroom teaching.

4.3 System and ecological construction of resource library

The construction of digital resource library is a systematic project, and the builders should think and act from the perspective of system integrity. Systematization is different from modularization. It emphasizes the system architecture of the resource library, such as the object of resource use, the talent training program, the use method of the " Mechanical Manufacturing Technology " course, and the starting point is holistic.

The resources in the teaching resource library of " Mechanical Manufacturing Technology " course convey information such as knowledge, manufacturing equipment, and the development of manufacturing technology, while science and technology are constantly breaking through and progressing. Therefore, resources are alive. Ecological construction means that the construction of teaching resource library should meet the needs of resource growth, use dynamic development vision to build resources, and optimize and improve according to teaching needs and technological development, so as to better serve the education and teaching work of colleges and universities.

5. Application of resource library

(1) Pre-class preview-online autonomous learning.

The construction of the resource library is based on the full study of the talent training program, combined with the design and manufacturing requirements of the mechanical industry, and the technical personnel of the enterprise to jointly create teaching videos and design training projects, build a multimedia teaching platform for the " Mechanical Manufacturing Technology " course, and provide rich multimedia resources for students to preview before class. In the platform, students can consult the knowledge point materials arranged by teachers, watch courseware, video, animation, micro-course and other resources for pre-learning, and consult relevant materials in the teaching resource database in a targeted manner. We can also carry out specific discussions and exchanges on this platform, so as to truly form a virtuous circle of finding problems, solving problems and cultivating innovative thinking. According to the analysis of the students ' mastery of the pre-class test, the teacher makes a targeted classroom implementation plan.

(2) Classroom learning-Online and offline mixed teaching.

In the process of classroom teaching, teaching resources such as teaching plan, multimedia courseware, teaching video, homework, discussion and expansion are applied to the classroom, and real cases of enterprises are introduced. The knowledge learned by students in the preview stage is applied to real cases, so that students can understand the application of knowledge points in practice and stimulate students ' interest in learning. Teachers adjust the focus and strategy of classroom teaching according to the preview homework completed by students before class, and give effective explanation and guidance to the common problems in the process of students ' preview, so as to improve the efficiency of classroom teaching. At the same time, it is supplemented by check-in, answering, questionnaire, topic discussion, scoring and other activities to enhance the exploratory, challenging and interesting nature of learning.

(3) After-school review-online extended learning.

For a knowledge point that is not mastered, students can repeatedly learn to watch the relevant teaching resources in the resource library until they understand and master it. The excellent homework, innovative project achievements, competition works and graduation design of previous students are also displayed on the platform to broaden students ' horizons and enhance their learning space . The course of " Mechanical Manufacturing Technology " not only requires students to master basic knowledge, but more importantly, it is necessary to enable students to have the ability to design processing technology, the ability to use knowledge, and the rigorous and meticulous work style. Therefore, evaluation is particularly important. In the after-school and assessment and evaluation links,

ISSN 2522-6398 Vol. 6, Issue 24: 191-197, DOI: 10.25236/FER.2023.062430

first of all, use the network teaching platform to publish after-school homework to detect students ' mastery. In the assessment and evaluation, the guidance questions are set in the class, and the students ' participation and performance are recorded. At the same time, the group mutual evaluation function of the network course platform is used to allow students to participate in the evaluation and fully mobilize the students ' initiative.

6. The effectiveness of the resource library

The teaching resource database of " Mechanical Manufacturing Technology " is constantly updated and improved in use, which brings new vitality to traditional teaching, plays a positive role in both teaching and learning, and achieves good teaching results.

(1) Enrich and improve the teaching methods, and provide students with a learning environment that is easy to accept knowledge.

The construction of the teaching resource database of the course " Mechanical Manufacturing Technology " has promoted the reform of teaching methods and teaching methods, making teaching methods more novel, teaching methods more advanced, and teaching content more abundant. Some abstract teaching contents or phenomena that are difficult for students to understand and difficult to express by traditional teaching methods can be vividly and intuitively displayed through the comprehensive functions of pictures, texts, sounds and images, so as to mobilize students ' enthusiasm, initiative and creativity in learning and deepen students ' understanding of what they have learned. For example, when talking about the law of cutting layer deformation in metal cutting process, students feel abstract about the formation process of chips and the content of three deformation zones during cutting, which is difficult to understand. If supplemented by pictures and animation demonstrations, students can obtain certain perceptual knowledge and deepen their understanding of this part of knowledge.

(2) Improve the creativity and learning initiative of both teachers and students.

Teachers can adjust teaching strategies, teaching content and teaching progress in time according to the teaching situation, realize independent and inquiry-based personalized teaching, and enhance teachers ' awareness of participation and interest in teaching. At the same time, due to the opening of the teaching resource library and the sharing of resources, students can more easily obtain a large amount of information in a limited time, broaden their horizons, expand their knowledge, provide guidance for students ' extracurricular learning, and improve their ability to find problems, analyze problems and solve problems. In addition, the construction of teaching resource library can avoid the fatigue of teachers ' blackboard writing in class, and focus on the organization and teaching of classroom teaching content, which greatly improves the teaching effect of teachers and students ' interest in learning, and is conducive to the cultivation of students ' innovative consciousness. Through research and interactive learning, students have been further improved in the theory and practice of innovative design. A large number of excellent works ' multi-functional loading power-assisted mechanical vehicle ' and ' a kind of Ferris wheel stereo garage ' have won the second prize in Hebei Mechanical Innovation Competition.

(3) It plays a supporting role in professional teaching reform.

The construction of the resource library can reasonably and effectively integrate the scattered resources on the network and various reference tutorials in the field of mechanical manufacturing. Students use the Internet to collect information, deal with problems, discuss and communicate, highlighting the student-centered. Teachers only create a teaching situation for students and guide students to solve problems through independent learning. In this process, teachers should first collect and obtain teaching information in order to effectively guide students ' questions. This can increase the intensity of teachers ' information learning, and comprehensively improve the level of teachers ' information theory and technology, so as to promote teaching reform. In teaching, teachers change from the main body of teaching activities to the organizer, guide and helper of the teaching process, and students gradually become participants and executors of the learning process. The construction of the resource library has opened up new ideas and directions for the education and teaching of higher vocational colleges, and has played an effective role in accelerating the reform and development of educational concepts.

(4) Increase classroom capacity and improve teaching efficiency.

In the traditional teaching process, teachers ' blackboard writing and drawing waste a lot of time.

ISSN 2522-6398 Vol. 6, Issue 24: 191-197, DOI: 10.25236/FER.2023.062430

There is often little interaction between teachers and students in the classroom, and students ' questions about the course content cannot be answered in time. The course resource library contains rich teaching resources such as teaching documents, case pictures, micro-courses, animations, etc., with a large amount of information and refined content. The practical and open network platform meets the students ' personalized and independent learning needs, effectively expands the class capacity, and significantly improves the teaching efficiency.

(5) Students ' learning efficiency is effectively improved.

The rich course resources in the resource library, with pictures and sounds, increase the amount of information for students to learn, create an excellent learning atmosphere for students, improve learning interest and learning initiative, and make the learning time move forward. Teachers have time to interact with students in the classroom, conduct problem guidance, project design, and periodic evaluation. Students have more time to participate, fully mobilize the enthusiasm of learning, while broadening the scope of knowledge, but also effectively improve the students ' practical and innovative ability.

7. Conclusion

The course resource library of " Mechanical Manufacturing Technology " is the carrier of course and teaching reform. It is the result of education and teaching reform. It provides learners with rich learning resources, expands learning space, cultivates teamwork spirit, independent learning ability and innovation ability, meets the needs of learners ' personalized learning and lifelong learning, provides reference for the construction of other course resource libraries, and plays the role of radiation and service of high-quality resources.

Acknowledgments

This work was financially supported by hebei province education department education teaching research reform and practice project fund (2021GJJG397).

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