

Exploration and practice of ideological and political education in the course “Physics of Semiconductor devices” in Higher Vocational Colleges from the Perspective of Craftsman Spirit

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Abstract: Craftsman spirit is the core of vocational education, the inevitable choice for the high-quality development of national vocational education, the internal demand of the development of the new era and the urgent requirement of realizing the great rejuvenation of the nation. The revitalization of the semiconductor integrated circuit industry needs “Great Gountry Craftsman”, and we also hope to cultivate, carry forward and inherit the spirit of “Great Gountry Craftsman “. Aiming at the course “ Physics of Semiconductor devices “, this paper probes into the significance and implementation path of developing the course thought and politics with the connotation of craftsman spirit, and explores the construction of a talent training mode focusing on craftsman spirit. it provides a new path for talent training in semiconductor industry in higher vocational colleges.

Key words: craftsman spirit; Physics of Semiconductor devices ; Curriculum ideology and politics

1. Introduction

Craftsman spirit is a kind of spiritual concept of pursuing excellence, exquisite quality, paying attention to detail and emphasizing excellence. It is a kind of positive and enterprising professional spirit. It emphasizes the core values such as professional skills, detail control, craft lean, quality pursuit and teamwork]. The craftsman spirit means the awakening of professional quality, the change of professional attitude and the promotion of professional realm, which embodies the national sentiment of vocational education and the spirit of great craftsmanship. Building a modern socialist country in an all-round way not only needs more skilled talents, but also needs to train a number of skilled craftsmen, masters and big country craftsmen who are "integrated with morality and technology". Higher vocational colleges are important practical platform for training applied talents with vocational skills, and ideological and political education is an indispensable link in the education system of higher vocational colleges.

Engineering majors have strong practicality and intensive technological innovation. Some students have relatively weak basic knowledge and weak self-learning ability. Teaching professional knowledge alone will lead to students' low interest in professional learning, and students are easy to get tired of what they have learned. In addition, students in economically developed areas such as Guangdong hold prejudice against manufacturing industry. To change the current situation of students' learning, it is more necessary to emphasize ideological and political education with craftsman spirit as its connotation. The professional curriculum of higher vocational colleges plays the dual role of knowledge imparts and value guidance. It is one of the important contents of ideological and political exploration in the curriculum to deeply explore the content of ideological and political education and organically integrate moral education with professional education.

2. The significance of integrating the cultivation of craftsman spirit into the course of Physics of Semiconductor Devices

The course “Physics of Semiconductor Devices” in higher vocational colleges is a basic professional course for the application of optoelectronic technology. It focuses on training students to understand the development of the semiconductor industry, master the physical principles, manufacturing processes and testing methods of semiconductor devices, and lay a solid foundation for students' employment. The course also focuses on cultivating students' innovation ability and teamwork spirit to adapt to the needs of future jobs.

With the continuous deepening of the concept of modern talent training, vocational colleges reflect on the shortcomings of traditional talent training while speeding up the development and innovation of the education mode with modern apprenticeship as the core. And emphasizing the establishment of a talent training system reform based on the “craftsman spirit”, which can help engineers constantly seek more effective technological methods and optimize the manufacturing process, so as to improve the output and quality of products. Thereby improving the output and quality of products. The spirit of craftsmanship is reflected in all aspects of semiconductor device manufacturing, and only through the pursuit of excellence and continuous innovation can the quality and performance of products be continuously improved. The development and revitalization of China's semiconductor integrated circuit industry calls for the “spirit of craftsmanship in a great country”.

The craftsman spirit is integrated into the course “Physics of Semiconductor Devices”, and the craftsman spirit is taken as the guidance to explore the cultivation mode of optoelectronic professionals. Through the pursuit of perfection and continuous innovation, the quality and performance of products are improved, while ensuring that products can work normally and can be continuously improved. It is of great significance to improve the connotation of professional teaching and promote the improvement of the quality of skilled talents.

3. The implementation path of integrating the cultivation of craftsman Spirit into the ideological and political education of Semiconductor device Physics course

1. Guide the transformation of professional knowledge through practical teaching, so that students can personally experience the connotation of craftsman spirit

Practical teaching is one of the important ways to realize the craftsman spirit. In the course of teaching, laboratory practice and off-campus practical training can be combined, so that students can personally participate in the production and debugging of semiconductor devices and feel the fun of production, so as to cultivate professional skills and work enthusiasm.

Semiconductor device experiment courses and project practices can be set up, such as the production and testing content of semiconductor devices such as PN junction, transistor and integrated circuit in the course, so that students can connect circuits, record data and verify the performance of these devices. You can also set up interesting and interesting optoelectronic product production projects, such as the production of light-emitting diodes and solar cells, so that students can make a product by themselves, which may not be plain sailing, and students are encouraged to make innovative attempts in their learning. For example, to improve the traditional semiconductor device manufacturing process or the use of new materials for semiconductor device manufacturing. Through practice, cultivate students' craftsman spirit of excellence and pursuit of excellence, encourage students to explore and innovate, improve practical ability and skill level, enhance students' ability to think and solve problems, and consolidate the theoretical knowledge of the course.

2. Diversified teaching methods stimulate students' enthusiasm for learning and realize the internalization of "craftsman spirit"

The traditional teaching mode of "teachers talk and students listen" will make students learn tasteless, resulting in class dozing off, distraction, and low learning efficiency. Whether students can be motivated to study the course and participate in the teaching process is an important factor affecting the ideological and political effect of the course.

First, we can turn the classroom into a stage, so that students can participate and shine. For example, boring and difficult knowledge points can be turned into classroom games, so that students can deeply understand physical concepts in the game. For example, when it comes to the movement of electrons, several groups of students. In each group, respectively representing a nucleus and an electron) can perform the movement of electrons around the nucleus on the stage. When it comes to crystal structure, some students have poor spatial sense. It can provide magnetic rods for students to put out easy-to-understand cubic structure, diamond structure and face-centered cubic structure in class, which can help students understand the more complex but common sphalerite structure in semiconductor materials. Students give full play to their imagination, exercise their hands-on ability, and stimulate their enthusiasm for learning. Secondly, flipped classroom was used to assign topics one week in advance on the cutting-edge technology, development bottleneck, "lack of core" and other topics in the semiconductor industry, which were divided into groups to do after class. Each group made the collected information into videos and displayed them in class, so that students could give full play to their subjective initiative and innovative consciousness, and also exercise their expression. We can also collect video materials such as the development of large semiconductor enterprises, Huawei Zhongxing incident, interviews with Chinese manufacturing entrepreneurs, and the Top ten advances in Science in China 2022 to enrich the classroom teaching content. In addition, we can also ask the front-line engineers of the enterprise to come into the class and tell the semiconductor stories around them to the students.

Through diversified teaching methods, the classroom teaching atmosphere is more active, and the students' enthusiasm and initiative have been improved, so as to ensure the ideological and political teaching effect of the course. At the same time, in order to realize the internalization of the craftsman spirit in the diversified teaching methods, teachers and teaching managers should clearly understand and transmit the value of the craftsman spirit, and according to the actual needs of students, flexibly use a variety of teaching methods to lead students to experience the craftsman spirit, and constantly promote the semiconductor device physics education to become more effective.

3. Introduce artisan characters to cultivate students' correct values and sense of mission

The craftsman spirit embodies the inherent requirements of socialist core values and becomes a new practical carrier for cultivating and practicing socialist core values. Higher vocational education should focus on cultivating students' correct values and help them get more satisfaction from work so as to better adapt to the working environment and interpersonal relationships. Introducing artisan figures can help higher vocational students better understand and strengthen their sense of values and mission. Taking example as the benchmark can motivate students to become semiconductor practitioners with professional ethics, continuous progress, collaborative development and other concepts, pay attention to ecological environmental protection and actually fulfill social responsibilities.

Artisan figures are often outstanding representatives of the industry, who have made outstanding achievements in their field and made outstanding contributions to the development of the industry. In the Physics of Semiconductor Devices course, examples of craftsman figures are introduced, such as Huang Kun, founder of Chinese semiconductor, Xie Xide, mother of Chinese semiconductor, Lin Lanying, pioneer of Chinese semiconductor materials, Nobel Prize winners in physics Isamu Akasaki, Shuji Nakamura, and Koonan Amano. They feed the cause with enthusiasm, in order to persist in fulfilling their beliefs, tell about the role models in the semiconductor field in the class, introduce their achievements and encounters, guide students to think independently, understand the efforts and spirit of the craftsmen to work hard and pursue excellence, which will inspire students to pursue excellent quality in the semiconductor industry, improve themselves, and contribute to the prosperity of the industry.

4. Build a teaching team with the spirit of artisans

At present, vocational colleges only take the construction of "skillful craftsmen" type teachers who are familiar with professional skills

and good professional accomplishment as the basis and guarantee for training students. Only in this way can we cultivate the “virtuous and artistic craftsmen” with good professional accomplishment and social satisfaction. In daily teaching, a mixed teaching team can be implemented, and industry experts and enterprise skilled craftsmen can be invited to teach courses with higher theoretical and practical level to teachers and students; To help teachers improve their professional ability and quality by carrying out “practical practice” teacher skill competition. Backbone teachers and young teachers in the school can go deep into the grassroots of enterprises to exercise, enhance practical experience, improve business level and education and teaching ability, and introduce excellent corporate culture into the campus. The teachers establish a team form of solidarity, cooperation and mutual help, and regularly carry out symposia and seminars to improve the overall level of the school’s teaching staff. In addition to imparting knowledge and skills to students, teachers should also teach how to master their own ideas and techniques, accurately evaluate their own work, and strive to make every classroom teaching and experimental teaching into excellent ones, so as to truly benefit students[12-14].

In short, the integration of craftsman spirit into the thinking and politics of semiconductor device physics course requires a practical implementation path, diversified reference to the overall situation, based on students, focus on practice, enhance open vision and innovative thinking, and make extraordinary use of the advantages of craftsman spirit to promote the reform and development of the course, and lay a more solid foundation for students’ future learning and development.

4. Conclusion

The ideological and political education of semiconductor device physics course needs to realize leap-forward development through the integration of craftsman spirit. The guidance of ideological and political education can help students establish correct professional concepts and professional ethics, improve students’ comprehensive quality and innovation ability, and cultivate applied talents who can adapt to future work. We should continue to pursue the updating of teaching and learning at any time, better expand the horizon and ideas of teaching, and make the course of Semiconductor Device Physics become a practice base for training vocational skills and craftsman spirit. Only with the spirit of craftsman, we can truly master the physics of semiconductor devices, create better products or make new innovations, and improve their own work level and competitiveness.

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