

The Necessity, Path, Evaluation and Optimization of Constructing a Teacher-student Community in Teaching of Science and Engineering Universities from “Comprehensive Education”

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Abstract: In science and engineering universities, in order to improve the actual effectiveness of classroom teaching, it is necessary to establish the relationship between courses and students. A key focus and effective breakthrough in establishing the above relationship lies in constructing a teacher-student community in classroom teaching. At the same time, constructing the above-mentioned community also requires the joint efforts and collaborative promotion of teachers and students. Only in this way can we more effectively play the leading role of teachers and the main role of students in the classroom teaching, and truly achieve the maximization of the teaching effect of courses. This article mainly researches the necessity, path, evaluation, and optimization mechanism of building a teacher-student community in the classroom teaching in science and engineering universities.

Keywords: Courses in Universities; Community of Teachers and Students in Classroom Teaching; Path; Evaluation Mechanism; Optimization Mechanism

1. Introduction

Currently, in order to improve the effectiveness of classroom teaching in science and engineering universities, it is necessary to establish the link between courses and students. An effective focus in establishing the above-mentioned link is constructing a teacher-student community in classroom teaching. Meanwhile, constructing the above-mentioned community requires the joint efforts and promotion of teachers and students. Only in this way can we more effectively play the leading role of teachers and the main role of students in the classroom teaching, and truly

achieve the maximized effectiveness of the courses teaching. Based on the understanding above-mentioned, this article mainly researches the necessity, path, evaluation, and optimization mechanism of building a teacher-student community in the classroom teaching in science and engineering universities.

2. The Necessity of Constructing a Teacher-student Community in Classroom Teaching in Science and Engineering Universities from the Perspective of “Comprehensive Education”

2.1 The Need for “Cultivating Virtue and Talent”

Promoting the construction of a teacher-student community in the classroom teaching in science and engineering universities from the perspective of “comprehensive education” is an inevitable requirement for implementing the task of “cultivating virtue and talent”. According to the “Guidelines” issued by the national education management department in 2020, in order to implement the fundamental task of “cultivating virtue and talent”, it is necessary to carefully grasp and solidly implement the unity of value shaping, knowledge transmission, and ability cultivation. Comprehensively carrying out the construction of cultivating talent in courses means integrating the guidance of values into knowledge transmission and ability cultivation, guiding and assisting students in establishing the correct “three views”. Meanwhile, it is necessary to make various courses work in the same direction, coordinate and cooperate, form a joint force and synergistic effect in education, and build a comprehensive framework for education work. [1] According to the above requirements of the “Guidelines”, the construction of a community of teachers and

students in the classroom teaching in science and engineering universities is also an inevitable requirement for implementing the fundamental task of “cultivating virtue and talent”.

With the proposal of the “three comprehensive education” concept by the highest level organization of the country, universities have explored new ideas on the issue of “how to cultivate talent”. [2] At present, China’s universities have gradually formed a comprehensive system of cultivating talent for all members, processes, and aspects. [3] Meanwhile, “three comprehensive education”, “five comprehensive education” and “cultivating virtue and talent” have become important keywords in the talent cultivation work of universities. Constructing a teacher-student community in classroom teaching in science and engineering universities from the perspective of “three comprehensive education” has profound significance for ultimately achieving the overall goal of “cultivating virtue and talent”.

2.2 The Inherent Requirements for Improving the Courses Teaching Quality

In current China, courses should theoretically be a type of processes that involve both teachers and students. Among them, teachers should play a leading role, while students should also play a subject role. The improvement of the quality of courses teaching not only requires teachers to strive to optimize teaching methods and processes, but also requires active participation and independent exploration from students. Based on the above understanding, it is necessary to combine the actual situation of teachers and students to find a focal point or breakthrough point that can enable teachers and students to jointly play a role in classes. In science and engineering universities, to improve the teaching quality of courses, it is first necessary to establish a connection between courses and students. An effective focus and key breakthrough in establishing the above-mentioned relationship lies in promoting the construction of a teacher-student community in classroom teaching of courses. Only in this way can we more effectively play the leading role of teachers and the subject role of students in the teaching of courses, so as to truly achieve the maximization of the teaching effect of courses.

At the same time, in science and engineering universities, it is also necessary to establish a connection between courses and students. To establish the above-mentioned relationship, it is necessary to allow teachers and students to participate in the courses together. In other words, it is necessary to promote the construction of a teacher-student community in classroom teaching in science and engineering universities, which is an inherent requirement for improving the courses teaching quality.

2.3 The Need for Comprehensive Development of Students

According to the “Guidelines” issued by the national education management department, talent cultivation in higher education institutions is a composite process that combines and organically unifies education and talent cultivation. To build a high-level talent cultivation system, it is necessary to integrate the courses work system, effectively carry out courses cultivating talent construction, and effectively solve the “two skins” problem of professional education and courses cultivating talent. We should focus on building a high-level talent training system and continuously optimize the courses cultivating talent work system, teaching system and content system. We need to deeply explore the courses cultivating talent resources contained in various courses and teaching methods, so that students can cultivate profound knowledge, insights and good character in their daily learning, and strive to become comprehensively developed and capable national builders and successors.

As a part of China’s educational concepts, the concept of “three comprehensive education” embodies student-centered approach [4], and its connotation is in line with the current laws of comprehensive development among student in science and engineering universities in China. “Three comprehensive education” is a necessary condition to meet the needs of students’ comprehensive development, and also a necessary path to cultivate students’ correct worldview, outlook on life and values. [5] The implementation of courses cultivating talent and constructing a teacher-student community in classroom teaching in science and engineering universities from the perspective of “comprehensive education” helps to create a positive campus atmosphere

for students to actively progress and promote their healthy and comprehensive development, thus truly realizing the blooming of hundreds of flowers and the blooming of spring in the garden.

3. The Path of Constructing a Teacher-student Community in Classroom Teaching in Science and Engineering Universities from the Perspective of “Three Comprehensive Education”

In the perspective of “comprehensive education”, not only teachers are one of the subjects of education, but students are also one of the subjects of education. This is because not only do teachers have the function of educating and cultivating students, but students also have the function of self-education and self-management. Based on the above-mentioned understanding, in the practice of constructing a teacher-student community in the classroom teaching in science and engineering universities, it is not only necessary to fully play the leading role of teachers, but also to actively play the role of students as the subjects. Specifically, efforts can be made to promote the practice above-mentioned from the following two aspects.

3.1 Teachers Should Integrate Some Elements and Links of Cultivating Talent into Courses Teaching Based on the Actual Needs of Teachers and Students, and Promote the Practice of Curriculum Cultivating Talent Construction in Courses Teaching

In the practice of constructing a teacher-student community in classroom teaching of courses, teachers should actively play a leading role, consciously and proactively integrate some elements and links of curriculum cultivating talent into courses teaching, and promote the practice of curriculum cultivating talent construction in courses teaching. Specifically, in the process of promoting the construction of cultivating talent in the above-mentioned courses, teachers can start from the following aspects.

3.1.1 In terms of content, teachers can provide both general content and highlight key content based on the professional characteristics of students

In terms of general content, teachers should focus on guiding students to establish firm

ideals and beliefs through education, and enhance and improve the content supply of curriculum cultivating talent around political identity, patriotism, cultural literacy, constitutional and legal awareness, national security awareness and cognitive ability, virtue cultivation, etc. [6] Emphasis should be placed on silently strengthening students’ ideals and beliefs and cultivating patriotism, strengthening virtue cultivation, increasing knowledge and insight, cultivating a spirit of struggle, and enhancing the comprehensive quality of students in classroom teaching. At the same time, in terms of key content, teachers can also highlight some key aspects of curriculum cultivating talent construction in a targeted manner based on the actual situation and specific characteristics of students’ respective majors. [7] For example, for students majoring in science or engineering, in course teaching, it is necessary to combine the education of position, viewpoints and methods of China’s guiding thoughts with the cultivation of scientific spirit, thus cultivating and enhancing students’ ability to correctly understand, analyze and solve problems. For students majoring in science, emphasis should be placed on strengthening the training of scientific thinking methods and education on scientific ethics, cultivating and strengthening their sense of responsibility and mission to explore the unknown, pursue truth, and climb new heights in the field of science. For students majoring in engineering, it is important to strengthen their engineering ethics education, educate and guide them to establish the spirit of craftsmanship as well as inspire their determination and responsibility to serve the country with technology.

3.1.2 In terms of form, teachers can choose reasonable and effective forms based on the actual needs of teachers and students as well as courses teaching needs

Specifically, teachers need to have a comprehensive and in-depth understanding of their own reality, students’ reality, and courses teaching needs. Based on the actual needs of teachers and students as well as courses teaching needs, reasonable and effective forms should be selected by teachers to carry out cultivating talent in courses. The above-mentioned forms mainly include the following aspects. Firstly, in terms of teaching resource forms, generally speaking, in most cases, using

teaching resource forms such as PPT and teaching videos is relatively reasonable and effective. Secondly, in terms of teaching organization forms, adopting task-based cooperative groups or small teams is more suitable and effective. Thirdly, in terms of teaching practice forms, adopting teaching organization forms such as case-based teaching, discussion based teaching, and thematic teaching is relatively practical and effective.

3.2 The Exploration and Innovative Practice of Guiding Students to Carry out Cultivating Talent in Courses by Teachers

In the practice of constructing a community of cultivating talent between teachers and students in the courses, in addition to fully playing a leading role, teachers should also guide students to actively play a subject role, adhere to the integration of theory with practice, and enable students to combine the relevant theoretical content of courses with their professional or theoretical knowledge expertise, actively participating in the classroom teaching of courses, give full play to one's enthusiasm, initiative, and creativity in the cultivating talent of courses, and work together with teachers to promote the construction of a teacher-student community in the cultivating talent of courses.

3.3 Maintaining Positive Interaction between Teachers and Students in the Construction of a Teacher-student Community in Classroom Teaching of Courses

In the construction of a teacher-student community in classroom teaching of courses, teachers and students should maintain a positive interaction. On the one hand, students should objectively and comprehensively evaluate the courses' content, form, and effectiveness taught by teachers as well as provide practical and effective opinions and suggestions for teachers to further optimize teaching content, form, and effectiveness, thereby promoting teachers to better improve teaching content, form, and effectiveness. On the other hand, teachers should also actively guide students to participate in the exploration and innovation of cultivating talent in courses teaching, and objectively and comprehensively evaluate and provide feedback on the content, form, and effect of students' participation in

the above practice. They should also provide targeted and effective opinions and suggestions for further improvement and enhancement, thus promoting students to actively and effectively participate in the cultivating talent practice of courses.

4. The Evaluation Mechanism for the Construction of a Teacher-student Community in Classroom Teaching in Science and Engineering Universities from the Perspective of "Three Comprehensive Education"

The evaluation mechanism for the construction of a teacher-student community in classroom teaching in science and engineering universities from the perspective of "three comprehensive education" mainly includes the following three parts.

4.1 The Evaluation Index System for the Construction of a Teacher-student Community in Classroom Teaching of Courses

The evaluation index system for the construction of a teacher-student community in classroom teaching mainly includes the following two aspects.

4.1.1 Specific indicators

In practical terms, the evaluation system for the construction of a teacher-student community in classroom teaching should mainly include the following specific indicators: legitimacy, regularity, purposefulness, and recognition from relevant parties.

4.1.1.1 Legitimacy

Specifically, legitimacy refers to the practice of constructing a teacher-student community in classroom teaching of courses, which should comply with national laws and regulations, especially those in the field of education. Legitimacy should become the most important and fundamental indicator for evaluating the construction of a teacher-student community in classroom teaching of courses. At any time and under any circumstances, the practice of constructing a teacher-student community in classroom teaching should not violate the indicators of legality.

4.1.1.2 Regularity

Specifically, regularity mainly refers to the fact that the practice of constructing a teacher-student community in classroom teaching

should comply with objective educational and teaching laws, especially the objective laws of courses. Therefore, regularity should also become an important evaluation indicator for the construction of a teacher-student community in classroom teaching of courses.

4.1.1.3 Purposiveness

Specifically, purposiveness refers to the practical effect of constructing a teacher-student community in classroom teaching of courses. This effect mainly refers to the effect of this practice on the teaching of courses. It specifically manifests as a promoting effect or positive impact on improving the teaching quality.

4.1.1.4 Stakeholder recognition

Specifically, recognition refers to the practice of constructing a teacher-student community in classroom teaching of courses, which should be recognized by the teaching management department of the school's courses, and jointly recognized by teachers and students, especially students. In addition, if necessary and possible, relatively independent third-party evaluation agencies can also be introduced. That is to say, the practice of constructing a teacher-student community in classroom teaching should also be recognized by third-party institutions.

4.1.2 The internal structure of the specific indicators above-mentioned

Among the above-mentioned indicators, legitimacy should be given top priority, and legitimacy should be used as the indicator to guide other indicators. In addition to legality, purposiveness and regularity should be placed in the second most important position, followed by the recognition of relevant parties. However, these indicators are not isolated from each other, but are interrelated. For example, legitimacy and regularity have commonalities to a certain extent. There is generally a positive correlation between purposiveness, regularity, and stakeholder recognition to a certain extent. In short, these indicators are interrelated and together form a complete indicator system. For this system, it is necessary to apply it appropriately and reasonably based on the different positions of each indicator. It should not be viewed equally, nor should any indicator be underestimated or ignored.

4.2 Specific Evaluation Rules for the Construction of a Teacher-student Community in Classroom Teaching of

Courses

The specific rules for evaluating the construction of a teacher-student community in classroom teaching should include the following points.

4.2.1 Specific provisions for the application of the above-mentioned indicator system

Specifically, it refers to the specific regulations on the time, location, and conditions for the application of evaluation indicators for the construction of a teacher-student community in classroom teaching of courses. For example, in the evaluation of the overall construction effectiveness, subject evaluation, undergraduate teaching evaluation, first-class or key majors and curriculum construction, professional certification, and teaching performance evaluation of science and engineering universities or departments, the situation and effect of constructing the cultivating talent teacher-student community in courses can be regarded as one of the important indicators to consider and balance. In addition, when hiring, selecting and training teachers, conducting comprehensive assessments as well as awarding excellent teachers, the specific situation of courses teachers participating in the construction of curriculum cultivating talent and the actual teaching effectiveness can also be considered and measured as one of the important indicators. In addition, in the recognition and reward of various achievements such as teaching achievement awards and textbook awards, the requirements for curriculum cultivating talent are strengthened and highlighted, and the excellent achievements in the construction of cultivating talent in courses are effectively supported.

4.2.2 Incentive and constraint mechanisms that are compatible with the application of the above-mentioned indicator system

Specifically, it refers to the specific provisions on the reward and punishment measures that should be taken based on the evaluation of constructing a teacher-student community in classroom teaching using the above-mentioned indicators. [8] For example, in terms of being evaluated as excellent practice, teachers and classmates who have made contributions can be given certain material and spiritual rewards. On the contrary, for practices that are evaluated as poor or even very poor, teachers and students who participate can be made

aware of their shortcomings and efforts through admonitory conversations, supervision and guidance, and actively pursue progress.

4.3 The Evaluation and Implementation Path or Implementation Method of Constructing a Teacher-student Community in Classroom Teaching of Courses

The evaluation and implementation path or implementation methods for the construction of a teacher-student community in classroom teaching mainly include the following three aspects.

4.3.1 Self-evaluation by teachers and students
Specifically, teachers and students should objectively and comprehensively evaluate the process and effectiveness of their participation in the construction of a teacher-student community in classroom teaching of courses, in order to help each other more effectively improve the actual effectiveness of their participation in the above-mentioned practices and promote the construction of a teacher-student community in classroom teaching of courses.

4.3.2 Mutual evaluation between teachers and students

Specifically, teachers and students should objectively and comprehensively evaluate the process and effectiveness of each other's participation in the construction of a teacher-student community in classroom teaching of courses, in order to help each other more effectively improve their actual participation in the above-mentioned practices and promote the construction of a teacher-student community in classroom teaching of courses.

4.3.3 Third professional evaluation

Specifically, it is possible to seek or introduce third professional evaluation institutions and personnel to objectively and comprehensively evaluate the process and effectiveness of teachers and students participating in the construction of a teacher-student community in classroom teaching of courses [9], in order to help teachers and students improve their actual participation in the above-mentioned practices more effectively, and thus better promote the construction of a teacher-student community in classroom teaching of courses [10].

5. Optimization Mechanism for the Construction of a Teacher-student Community in Classroom Teaching in

Science and Engineering Universities from the Perspective of "Three Comprehensive Education"

The practice of constructing a teacher-student community in classroom teaching is not achieved overnight, but needs to be continuously optimized according to the teaching needs of courses, the needs of cultivating talent construction in courses, and the actual changes of teachers and students. Therefore, it is necessary to explore and establish an optimization mechanism for the construction of a teacher-student community in courses based on the teaching needs of courses, the needs of cultivating talent construction in courses, and the actual changes of teachers and students. The optimization mechanism for the construction of a teacher-student community in classroom teaching should mainly include two aspects.

5.1 The Optimization Mechanism of Constructing a Teacher-student Community in Classroom Teaching in Teaching Content

5.1.1 Teachers should keep up with the times and update the teaching content of courses

Specifically, teachers need to understand the teaching needs of courses, the needs of cultivating talent construction in courses, and the actual changes of teachers and students. It is worth noting that teachers must understand the actual needs of students for courses teaching, as well as their own ideas and expectations for participating in cultivating talent construction in courses. In this regard, teachers can conduct surveys and research to gain a comprehensive and detailed understanding of the aforementioned needs, ideas, and expectations of students. Then, based on understanding the above situation, teachers need to promote the structural reform of the supply side of courses content according to the needs of teaching, the needs of cultivating talent construction in courses, and the actual changes of teachers and students. They should solidly integrate some elements and links of curriculum cultivating talent into the teaching resources and process of courses, actively explore and practice. Meanwhile, efforts should be made to achieve a relative match between the supply and demand of teaching and the construction of cultivating talent in above-mentioned courses, so as to more effectively promote the construction of a

community of teachers and students in courses, and further improve the teaching quality of courses.

5.1.2 Teachers should guide students to optimize the cultivating talent content in courses based on the actual needs of teachers and students and teaching needs

Specifically, teachers should guide students to have a comprehensive and in-depth understanding of the teacher's actual situation, their own reality, the actual situation of other students in the teaching class, as well as the needs of teaching and the construction of cultivating talent in courses. On this basis, teachers should actively guide students to continuously optimize the cultivating talent content in courses based on the actual situation and practical needs mentioned above. The optimization of the above content should also follow the principle of integrating theory with practice, which can effectively combine the theory and cultivating talent in courses with the actual professional knowledge of students, thereby promoting the construction of a teacher-student community in classroom teaching and improving the teaching quality of courses.

5.2 The Optimization Mechanism of Constructing a Teacher-student Community in Classroom Teaching in Teaching Forms

5.2.1 Teachers should scientifically and reasonably optimize the teaching form of courses

Specifically, teachers should liberate their minds, seek truth from facts, keep up with the times, explore and innovate, and optimize teaching forms in a timely manner according to the needs of teaching, the needs of cultivating talent construction in courses, and the actual changes of teachers and students. Specifically, it is necessary to comprehensively and deeply understand the needs of teaching, cultivating talent construction in courses, and the actual changes of teachers and students, and choose a more reasonable and effective form to carry out cultivating talent in courses teaching that not only meets these practical needs but also conforms to the constantly changing reality of teachers and students, so as to more effectively promote the construction of a teacher-student community in classroom teaching of courses, and improve the teaching quality of courses.

5.2.2 Teachers should guide students to

optimize the form of cultivating talent in courses based on the actual needs of teachers and students and teaching needs

Specifically, in addition to guiding students to optimize the cultivating talent content of the courses, teachers should guide students to have a comprehensive and in-depth understanding of the actual situation of the teacher, their own reality, the actual situation of other students in the same teaching class, as well as the needs of teaching and cultivating talent construction in courses. On this basis, teachers should guide students to choose more reasonable and effective forms to participate in constructing of cultivating talent in courses based on the actual needs of teachers and students, the needs of teaching, and the needs of cultivating talent construction in courses. This will better promote the construction of a teacher-student community in classroom teaching and improve the teaching quality of courses.

6. Conclusions

The necessity above-mentioned mainly includes the need for “cultivating virtue and talent”, the inherent requirements for improving the courses teaching quality as well as the need for comprehensive development of students. In terms of the path above-mentioned, teachers should integrate some elements and links of cultivating talent into courses teaching based on the actual needs of teachers and students, and promote the practice of curriculum cultivating talent construction in courses teaching. Meanwhile, the exploration and innovative practice of guiding students to carry out cultivating talent in courses by teachers. In addition, maintaining positive interaction between teachers and students in the construction of a teacher-student community in classroom teaching of courses. The evaluation mechanism above-mentioned mainly includes the evaluation index system for the construction of a teacher-student community in classroom teaching of courses, specific evaluation rules for the construction of a teacher-student community in classroom teaching of courses as well as the evaluation and implementation path or implementation method of constructing a teacher-student community in classroom teaching of courses. The optimization mechanism above-mentioned includes the optimization mechanism of constructing a teacher-student community in

classroom teaching in teaching content and forms. Specifically, in terms of the optimization mechanism in teaching content above-mentioned, the teachers should keep up with the times and update the teaching content of courses. Meanwhile, teachers should guide students to optimize the cultivating talent content in courses based on the actual needs of teachers and students and teaching needs. In addition, in terms of the optimization mechanism in teaching forms above-mentioned, teachers should scientifically and reasonably optimize the teaching form of courses. What's more, teachers should guide students to optimize the form of cultivating talent in courses based on the actual needs of teachers and students and teaching needs.

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