

Research on the Reconstruction and Practice of Primary-Level Teaching Organization System in Colleges and Universities under the Background of Integration of Science and Education

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Abstract: The primary-level teaching organization in colleges and universities is an important basis for teaching research and talent cultivation. The disconnection between scientific research and teaching is one of the main factors that refrain high education from adapting to the society. The integration of science and education has become a new mode of primary-level teaching organization in colleges and universities. By adopting the new mode of science and education integration Qilu University of Technology creates a primary-level teaching system with “one center, three levels” through the path of “reorganization- standardization-model” and builds up kinds of distinctive primary-level teaching organizations, which promote the specialty construction and talent cultivation.

Keywords: Teaching organization, Talent cultivation, Integration

1. Introduction

Since the 1990s, the innovation team and scientific research team in Chinese universities have gradually become the primary-level organization of academic innovation in universities, and the team construction and achievements are fruitful. However, the reform of teaching organization in colleges and universities is relatively lagging behind. The form of teaching organization is still in its infancy, whether in terms of the maturity of team organization or the output of teaching team innovation^[1]. At the beginning of 2007, the education department in charge issued “Opinions of the Ministry of Education and Finance on the Implementation of Undergraduate Teaching Quality and Teaching Reform Project in Colleges and Universities” and “Several Opinions of the Ministry of Education on Further Deepening Undergraduate Teaching Reform and Comprehensively Improving Teaching Quality”, which required the construction of teaching teams and explicitly supported the cultivation of sustainable teaching teams^[2]. The primary-level teaching organization has become an important carrier of specialty construction, curriculum construction, team construction and teaching research.

In 2017, Qilu University of Technology and Shandong Academy of Sciences integrated to establish a new Qilu University of Technology. Since then the integration of science and education has become a new mode of talent cultivation. Under this background, the construction of primary-level teaching organizations centering on talent cultivation in the university has become an important subject of practical significance^[3]. Based on the mode of talent cultivation of science and education integration, some practices in reforming teaching mode have been done, and a new teaching organization system combining teaching and scientific research has been proposed, which encourages teachers to interrelate teaching teams and scientific research teams by relying on professional course groups so as to reorganize new teaching organizations, and realize the standardization of teaching organizations and teaching activities at the primary-level level under the integration of science and education. Meanwhile, it also helps to create a new mode of primary-level teaching organization with science and education integrated, train a group of high-quality faculty, and solve the problem caused by unsuccessful integration of

personnel training, scientific and technological innovation and social services in universities. Therefore talent cultivation will be improved, and the positive interaction between teaching and scientific research will also be accomplished.

2. Current Situation of Construction in Primary-level Teaching Organization in Colleges and Universities

At present, the current primary-level teaching organizations are still teaching and research sections or departments in colleges and universities, which have strong administrative attributes. In this way, courses are relatively independent, and teachers lack effective division, cooperation and share. Primary-level teaching organizations can only stay in the state of maintaining basic teaching tasks. In the operation of primary-level teaching organizations, the scientific research team, applied research team and teaching team are independent of each other, so the teaching function of the scientific research team is marginalized, and the motivation that transforms the achievements and resources from scientific research into educational resources is insufficient. Then the deep integration of science and education cannot be realized^[3].

At present, the teaching and the research is still separated from each other, and their respective functions are still continuing the division of labor and positioning, which can be seen from the separation of the teaching of the college and the research of the research institute. Each team or teaching staff is still continuing the old model. Therefore, it is urgent to find a new breakthrough for the integration model of science and education in the teaching organization level.

3. The Necessities of Reconstructing the Primary-level Teaching Organization in Colleges and Universities under the Background of Science and Education Integration.

With the integration of science and education, primary-level teaching organizations in colleges and universities has met some new challenges. Based on the integrated operation mechanism of colleges and research institutes, the construction and exploration of a new type of primary-level teaching organization combining teaching and research will help to accelerate the construction of first-class teaching staff, and realize the collaborative education of science and education, which is of great significance for the construction of first-class universities and first-class talents cultivation^[4].

In order to improve the talent cultivation mode with the integration of science and education and break through the barrier between teaching and scientific research, we need to regulate the influencing factors, and improve the educational ability of the primary-level teaching organizations of all units^[5]. We need to promote the standardization of the construction of primary-level teaching organizations, which can guide team building to effectively connect teaching and scientific research.

4. The Construction of the “One Center, Three Levels” System in the Primary-level Teaching Organizations under the Background of the Integration of Science and Education

In order to promote the construction of primary-level teaching organization under the model of integration of science and education as depicted in Fig.1, we design the concept of “one center, three levels”. “One center” means taking talent cultivation as the center, adhere to undergraduate education, and return to the fundamental mission of undergraduate talent cultivation in universities. With the integration of science and education, the construction of primary-level teaching organizations in colleges and universities should adhere to the original intention of running a school that centered on talent cultivation, aim at the goal of professional talent training, and constantly innovate the talent training mode. It should sort out and improve the structure and content of course groups, and make the overall plan of course group construction according to the logical relationship of the curriculum and its position in the training program. Therefore, it gives full play to the advantages of primary-level teaching organizations in collaborative promotion.

The “three levels” means the “reorganization-standardization-model” in primary-level teaching organizations under the background of the integration of science and education. “Reorganization” means breaking the traditional administrative organization of grassroots teaching, relying on course groups to break through the barriers between teaching and research teams, encourage and support the combination of teaching and research. It also aims to promote the optimization of the team structure, adhere to the mode of mutual promotion in the combination of teaching and research, give full play to the famous

teaching staff and team leaders, by rationally matching the team members and reorganizing the new teaching organization at the primary-level level. “Standardization” means that, based on the practice of the construction of primary-level teaching organizations, the relevant index system of the construction of primary-level teaching organizations should be formulated to guide the standardization of primary-level teaching organizations. “Model” means creating a distinctive model of primary-level teaching organizations under science and education integration by setting up a model, making full use of its leading and demonstration role, and doing a good job in promoting joint construction.

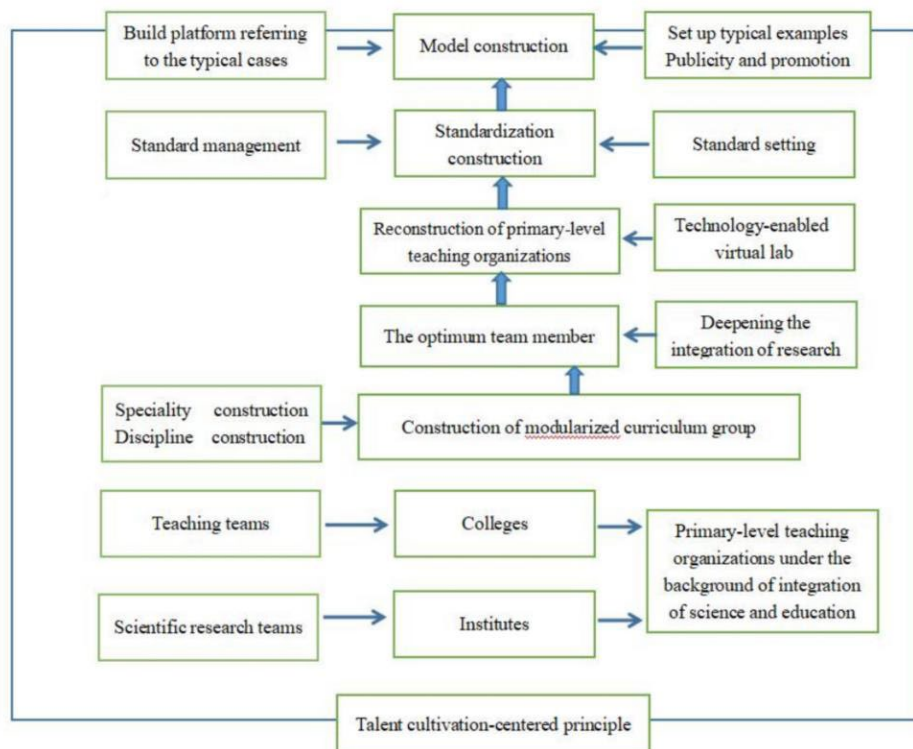


Figure.1 Design of “one center, three levels” primary-level organization construction

5. The Practice in the Construction of the “One Center, Three Levels” System of Primary-level Teaching Organizations under the Background of the Integration of Science and Education

5.1 Reorganization and Construction of Primary-level Teaching Organizations under the Background of Integration of Science and Education

5.1.1 Establishing Rules and Regulations to Encourage the Reorganization of the New Primary-level Teaching Organizations under the Integration of Science and Education

In 2020, Qilu University of Technology (Shandong Academy of Sciences) issued “The Regulations for Excellent Teaching Team Construction”, which, by establishing a team cooperation mechanism, aims to strengthen the construction of primary-level teaching organizations, innovate teaching content, methods and means, reinforce the construction of specialty and curriculum, and establish a positive “ecology system” of teaching discussion and teaching experience sharing. Centering on the goal of undergraduate talent cultivation, the University has set up a new primary-level teaching organization based on the major or curriculum platform, which promotes the teaching reform by coping with the difficult points in teaching and talent cultivation, and helps teachers to develop their teaching skills and cognition. It focuses on the public basic courses, subject (major) basic courses and professional core courses (group). The Regulations emphasizes the integration of science and education in the selection and regulation of teaching teams, encourages them to transform scientific research achievements into resources of teaching, and reorganizes the new primary-level teaching organization under the integration of science and education.

5.1.2 Establishing a Primary-level Teaching Organization that Connects Teaching and Scientific Research at the Department (college) Level

In promoting the integration of science and education, the integration of the department (college) and the research institute provides the possibility to explore and construct the primary-level teaching organization connecting teaching and research. It also provides the “soil” for the growth of the teaching team, and provides the basis for the organic integration of the teaching team. Meanwhile, it gives full play to the advantages of scientific research resources so that they can take the opportunity of reforming classroom teaching and organically combine teaching and scientific research. The organic integration between the latest scientific and technological frontier achievements and teaching can promote the construction of course content and modules, and build course group with the integration of science and education. By relying on the construction of the course group, part of the scientific research results will be incorporated into the classroom teaching cases, and a new teaching resource case base on the basis of the integration model of science and education will be built, so as to form a positive cycle mechanism and situation in which scientific research serves teaching, while in return teaching promotes scientific research. It is a kind of coordinated development and two-way promotion, which will be helpful to cultivate the primary-level teaching organization with deep integration of science and education.

Marine Technology Science Teaching Team is “The excellent teaching team of Qilu University of Technology” in 2022. It adheres to the teaching concept that the integration of science and education will benefit research and production. By carrying out the integrated development mode of science and education, it establishes course group in Marine Acoustics, Marine Remote Sensing, Marine Optics, etc. Within each course group, regular teaching discussions, observations, exchanges and cooperation are carried out among the team members. This helps to strengthen the construction of teaching staff. Furthermore, the team carries out various teaching activities, which give full play to the team effectiveness of integrated teaching and research. In this way, it constructs the organizational system of marine technology that integrates scientific research and teaching teams, develops the modular course groups with the characteristics of the subject, makes full use of the innate advantages of collaborative research teams, and finally forms a new teaching organization system integrating teaching and research, which is a modern grassroots teaching organization at the level of secondary teaching units.

5.1.3 The Assistance from Technology in Exploring a New Type of Primary-level Teaching Organization in the Era of “Intelligence +”

After the implementation of Science and Education Integration 2.0 in our university, the university has established some departments based on colleges and institutes. The colleges and research institutes under the jurisdiction of these departments are often located in different campuses, and the construction of primary-level teaching organizations is subject to physical restrictions. Therefore, it is very urgent to accelerate the construction of virtual teaching and research room, explore a new type of primary-level teaching organization in the “intelligence +” era, and help the construction of teaching organization from the technical level [6]. For instance, the mechanical engineering and automation of the university (college) actively builds the Virtual Teaching and Research Room. On the basis of the integrated operation of the university, the teachers change their idea and adhere to the development path of “integration of science, education and production and collaborative education”. They constantly strengthen the specialty characteristics of advanced light industry equipment and intelligent manufacturing, and build a Virtual Teaching and Research Room with distinct characteristics, combination of virtuality and reality, openness and expansibility. Relying on the Virtual Teaching and Research Room, they break through the limitations of time and space and carry out “online + offline” teaching and research activities. Thus they reform the curriculum system, and optimize the curriculum system. They also build course groups, such as “Mechanical Manufacturing Technology Basis”, “Hydraulic and Pneumatic Transmission”, “Mechanical Engineering Testing Technology”, “Thermal Engineering and Fluid Mechanics” and so on. It strengthens the research and exploration of specialty construction, curriculum implementation and other aspects. It also improves the teaching quality and students’ innovation ability in scientific research, and explores the new form of teaching and research with the integration of science, education and production under the situation of new engineering, which will provide a new path for the construction of primary-level teaching organization of the department.

5.1.4 The Guidance from Ideological and Political Education---Exploration of the Path of Teaching with Integration of Professional Knowledge and Values

During the construction of course group, the ideological and political elements of the course should be dug up actively and organically integrated into teaching content of the course in order to strengthen the educational function of the course and constantly explore the approach of teaching integrating the

professional knowledge with values. The construction of course content, reform of teaching method and application of various carriers promote the effectiveness of ideological and political education and make full use of the important role of professional courses in “ideological and political education”^[7]. Meanwhile, it makes education humanized, more powerful in guiding students, and more effective in cultivating their values. For instance, in the construction of core curriculum group, the teaching team of “energy utilization, pollution and carbon reduction”, according to the characteristics of different course contents, organically integrates the excellent traditional Chinese culture, the idea of serving the country with science and technology, and the goal of “double carbon strategy” into the teaching of professional courses, which comprehensively promotes the “three-in-one education”, realizes the integration and unification of ideological and political education and professional training, and form a new teaching mode combining moral and intellectual education with innovative team cooperation.

5.1.5 Deep Integration to Form a Mode of “Old and Young, One Person for Each Lesson” in Course Group Construction

To build a primary-level teaching organization that integrates teaching and research, it is necessary to clarify the matching relationship between the scientific research team and the teaching research team, realize the deep integration of the scientific research team and the teaching research team, and arrange the corresponding teaching team for the young teachers in scientific research team, which will comprehensively improve the teaching level of the scientific research team. Teaching is considered the release point and the goal is to improve professional scientific research and teaching ability. Then the comprehensive quality of teachers can be continuously improved in the teams ^[8]. For example, the “inorganic non-metallic materials engineering teaching team” of the school (college) pays attention to the integration of professional scientific research team and teaching team when reorganizing the team, and adopts the “6+1” team integration mode. They attaches great importance to the training of young teachers, and gives full play to the role of young teachers’ mentoring system by adopting the ways of “paired assistance”, “the old helped the new”, etc. Each member of the scientific research team is responsible for participating in the construction of a course, which build a situation of “old and young, one person for each lesson” course group construction.

5.2 The Standardization Construction of Primary-level Teaching Organization under the Background of Integration of Science and Education

Exploring the standardization construction of primary-level teaching organizations is an important starting point for standardizing and guiding the construction of primary-level teaching organizations and teaching regulation. Under the background of the integration of science and education, the standardization construction of primary-level teaching organizations mainly starts from the four first-level indicators of standardizing the establishment of institutions, working mechanism, work content and security mechanism, and strengthens the organizational form and personnel composition in the establishment of institutions, so as to ensure the supporting relationship between primary-level teaching organizations and other organizations such as specialties, courses (groups), teaching and research teams, etc. It also encourages to carry out interdisciplinary teaching activities among course groups (groups) and specialties, explore a new type of primary-level teaching organization in the era of “intelligence +”, which innovates teaching and research forms, and promote joint construction and sharing in a wider range. In terms of personnel composition, the head of the primary-level teaching organization should be reasonably arranged, and the members of the teaching and research team should be reasonably matched to ensure the rationalization of the structure. In terms of working mechanism, basic norms and daily operation should be emphasized. In terms of work content, we should continue to cultivate values of talents, take students as the center, and ensure the implementation of teaching in accordance with the basic system of teaching operation. We should carry out a reform on classroom teaching, and strengthen the construction of teaching staff. In terms of guarantee mechanism, we should strengthen organizational guarantee, system guarantee and incentive and evaluation guarantee. In addition, it can also highlight its own characteristics according to the actual situation.

5.3 The Construction of a Model Primary-level Teaching Organization with the Integration of Science and Education

On the basis of standardization construction, relevant regulation documents like excellent primary-level teaching organization regulations have been issued, and scientific and rigorous selection index system has been formulated to select a group of typical primary-level teaching organizations with the integration of science and education. The project construction and funding support shall be given, the

target assignment shall be signed, and the construction objectives, contents, measures and output results shall be defined. The cultivation period shall be 2 -3 years, and the evaluation shall be carried out after the period is over to make sure that the corresponding representative teaching results can be produced. The qualified primary-level teaching organization with the integration of science and education can be approved as a model of primary-level teaching organization with the integration of science and education. For the model teaching organizations, it is necessary to increase publicity, build communication platforms, regularly carry out communication, observation and discussion activities to set an example, and achieve mutual promotion.

6. Conclusions

The construction of primary-level teaching organization is helpful to promote the innovation and reform of primary-level teaching organization mode in colleges and universities. Under the background of the integration of science and education, the “reorganization” of the primary-level teaching organization should be carried out to promote the standardization of the construction of the primary-level teaching organization under the background of the integration of science and education, and the route construction of the “reorganization”-“standardization”-“model” of the primary-level teaching organization should be accelerated, so as to build the first-class teaching staff and lay the foundation for the construction of the first-class undergraduate colleges and the overall improvement of the quality of talent cultivation. The “reconstruction”-“standardization”-“model” construction of primary-level teaching organization not only needs a lot of exploration and practice, but also needs the correct policy support and a guarantee for financial support in order to stimulate the teams’ vitality of innovation, and make sure of the healthy development of primary-level teaching organization with the integration of science and education.

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