

Construction of Professionalized Team of Maker Teachers in Colleges and Universities

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Abstract

Colleges and universities should pay attention to the construction of professional team of Maker Teachers if they want to carry out Maker Education and guide college students to innovate and start their own businesses. Based on the reality of "Internet+" and reality of "Maker Education", Colleges and universities should improve and perfect the policies and regulations of Maker Teachers, build a scientific and reasonable training system for Maker Teachers, focus on establishing a guarantee system with qualification access system as the core, strengthen external security system from the aspects of organization, funds, platform and culture, and build a specialized, professionalized and standardized team of Maker Teachers.

Key words: Maker Education; team of Maker Teachers; professionalization

Under the background of technological innovation driving social development and transformation, the Maker Movement has gestated a new form of education - Maker Education, and it has become a new paradigm of social innovation education. With the in-depth advancement of Maker Education, the construction of the team of Maker Teachers in Colleges and universities is imminent. Under the "Internet +" environment, how to build a team of Maker Teachers with strong professional quality, high professional skills and deep understanding of the needs of Maker Education has become a key constraint to the development of Maker Education in universities. Therefore, comprehensive governance and construction regarding institutions, ideas, systems, mechanisms and other aspects are essential to achieve the specialization,

professionalism and standardization of the team of Maker Teachers.

1. THE SIGNIFICANCE OF THE CONSTRUCTION OF PROFESSIONALIZED TEAM OF MAKER TEACHERS IN COLLEGES AND UNIVERSITIES

1.1 To enlighten and guide students' Maker Spirit

Teachers are the torchbearers and guides of students and they play the leading role in the open teaching activities. In the educational activities, students are in the dominant position, whose Maker Spirit is influenced not only by external environment, but also by the guidance and enlightenment of teachers. Through classroom teaching, scientific research projects, internship practice, role model demonstration and other means, teachers can lead and inspire students to cultivate their Maker Spirit, improve their ability of innovation and entrepreneurship, and disseminate Maker Culture. At the same time, teachers can transform students' learning beliefs and learning styles to promote their adaptation to “creation-based learning” and support their deep involvement in the creation-based learning process. Students will value creation, be willing to create, be good at creating, and be used to creating, which play a vital role in the effective implementation of Maker Education.^[1]

1.2 To direct and help students innovate

The essence of Maker Education is to integrate the spirit of “innovation, practice, cooperation and sharing” in the Maker Movement into education and achieve the goal of promoting human development.^[2] In Maker Education, due to the emergence of network information technology, and open source, etc., the role and effect of teachers have changed. However, the most fundamental purpose and function of promoting students' development have remained the same. The ultimate goal of teachers is to promote the overall development of the students and to give them necessary guidance and help. College teachers, especially professional teachers, often have subject knowledge, multi-disciplinary knowledge structure, and formidable interpersonal connections which are not available to ordinary students even to Maker Students. Apart from guiding and helping students, professional Maker Teachers can “encourage and organize Maker Space to carry out a variety of Maker Cultural exchange activities, showcase the creative process of creative products, and let students understand advanced technology tools, attract them to join the Maker Group and accept the innovative concept of Maker Space.”^[3] Under the guidance of teachers, students and teachers can build a learning community to help each other, effectively avoiding students' detours in innovation and creation activities.

1.3 To promote the in-depth development of Maker Education in colleges and universities

Maker Education provides a practical way for the implementation of innovative education, and its ultimate goal is to achieve innovative education.^[4] In order to promote innovation and entrepreneurship education, colleges and universities can explore and carry out a new path of innovative education centered on Maker Education. In the process of promoting Maker Education, teachers are not only the key factors and the starting points, but also the basic conditions and prerequisites. The effective development and implementation of Maker Education require a special Maker Education Curriculum System, an ideal Maker Space, Maker Education Technical Support, and a professional Maker Faculty. What we lack most is the Maker Teachers Team. Teachers must be responsible for organizing teaching, implementing teaching plans, promoting the achievement of teaching goals, and imparting knowledge. Otherwise, there will be no Maker Education at all. Therefore, to build a professional team of Maker Teachers can not only impart maker knowledge, but also provide guidance and help for Maker Space in the school, thus avoiding the embarrassing situation that “the school has created Maker Space, but there is no Maker and Maker Teachers”.

2. DIFFICULTIES IN THE CONSTRUCTION OF PROFESSIONAL TEAM OF MAKER TEACHERS IN COLLEGES AND UNIVERSITIES

2.1 Lack of a dedicated construction plan for the team of Maker Teachers

At present, the development of Maker Education in China is in the ascendant, but it is still in the early stage. In the universities, the development of Maker Education is based on the establishment of Maker Space platform with gradual improvement on the supporting facilities of software and hardware. However, the domestic launch of Maker Education started late, and the reform of Maker Education promoted by universities has not been attached great importance to by the school leaders and decision-makers. Apart from that, the lack of foreign experience leads to the imperfection of the overall development plan of Maker Education. Most of the policy plans issued are encouraging or guiding principles and opinions, and no special plan for the construction of the team of Maker Teachers has yet been formulated. In addition, teachers' posts in Colleges and universities are still divided into scientific research, teaching, management and teaching management posts according to the nature and content of their work. There are no special types of posts and no special training and education plan for Maker Teachers, which can not meet the needs of the growing development of Maker Education.

2.2 Lack of professional education and training for Maker Teachers

In the exploration and research on Maker Education, the Maker Education Curriculum System has not yet been formed. Most of the university teacher training is carried out for professional research and business needs. There is no scientific and systematic training system for Maker Teacher Education. At present, colleges and universities are short of the education and training plan for Maker Teachers, specialized training textbooks and training curriculum systems, as well as specialized training teachers. There is no in-depth research and exploration on the goals, training methods, training content, and evaluation of training effects of Maker Education. In this case, even if there is a school to carry out similar training of the Maker Teachers, mostly in the form of lectures, forums, meetings, showing the characteristics of loosening and fragmentation, can not be called a complete and scientific training system of Maker Teachers. At the same time, the central government and local governments have neither the training plan for Maker Teachers, nor the specific requirements for the training of the Maker Teachers. The school-based Maker Training is in the process of exploration, and it is impossible to introduce relevant standards and rules. Therefore, the entire Maker Teacher Training is in a spontaneous state, and the process of systematization and curricula of Maker Education is developing slowly due to the lack of teachers.

2.3 The structure of Maker Teachers is unreasonable

Generally speaking, the higher the degree of specialization and professionalism of teachers, the higher the proportion of full-time teachers, the stronger the ability and the higher the quality. The structure of the Maker Teacher Team also determines the degree and level of specialization and professionalism of teachers. For the time being, the team of college Maker Teachers are mainly part-time, so full-time, specialized and professional Maker Teachers are lacking. Most of the instructors in the Maker Base or Maker Space are the internship practice base teachers, professional teachers, tutors, or school administrators. There are few instructors with specialized knowledge background and specialized information or network learning. They are more responsible for equipment management or business guidance, and students are still in a dominant position. The role and significance of teachers are greatly reduced. Students are more willing to join the maker circle or link the creators with similar interests through the network, to solve problems by themselves and to innovate ideas and concepts. Hence, although the maker base or center in the universities has given the makers a certain platform, the teachers are not matched seriously. In some schools that start Maker Education earlier, star teachers and Maker Teachers have played an important role. They are either information technology teachers, physics teachers, or

teachers who teach other subjects.^[5] Maker Teachers' ability to use new technologies is particularly important. However, the teachers currently engaged in Maker Education in China are either information technology teachers or general technical teachers.^[6]

2.4 The quality of Maker Teachers varies

Teachers are the driving forces for guiding and promoting Maker Education. They should be equipped with basic abilities including superb learning ability, excellent information technology application ability, solid STEAM subject knowledge, inspiring and inducing teaching ability, and harmonious interpersonal circle.^[7] In addition, Maker Teachers should be able to accurately grasp the new role orientation between Maker Students, and change their roles from the perspective of learning community. They must also have strong innovation quality, innovative thinking and innovative ability, who are leaders and outstanding representatives in the team of teachers. It can be seen that Maker Education puts forward higher requirements on the quality of Maker Teachers, and also poses a severe challenge to the training of college Maker Teachers. Nevertheless, due to the high degree of differentiation and refinement of disciplines in colleges and universities, teachers with interdisciplinary and multi-disciplinary knowledge backgrounds are few and rare. Moreover, teachers have absolute authority in academic professions, which gradually evolve into academic power. Under the influence of the traditional teacher role, teachers are still in a dominant position. They are unable to change their leading role in the short term, which also seriously affect the improvement of the quality of Maker Teachers. As a result, the overall quality of the faculty in colleges and universities varies, and the levels of ability are different. They are still unable to shoulder the heavy responsibility of promoting the development of Maker Education.

3. THE REALIZATION PATH OF THE CONSTRUCTION OF PROFESSIONALIZED TEAM OF MAKER TEACHERS IN COLLEGES AND UNIVERSITIES

3.1 Perfecting the policies and regulations for the development of Maker Teachers

Specialization is a sociological concept, which refers to the process in which an ordinary professional group gradually conforms to professional standards and becomes a specialized occupation and obtains corresponding professional status within a certain period of time.^[8] The professional construction of Maker Teacher team is inseparable from the perfect of national policies and regulations. On the one

hand, within the framework of existing policies and regulations such as *the Teacher Law of the People's Republic of China*, *the National Education Law of the People's Republic of China*, and *the Higher Education Law of the People's Republic of China*, provincial-level governments or educational authorities should make special policies to guide colleges and society to pay more attention to Maker Education. It is necessary to define the qualification criteria, training and professional titles of Maker Teachers. On the other hand, colleges and universities that carry out Maker Education should formulate Maker Teacher policies in line with the development of the school according to the upper-level legal norms or policies, formulate the development plan for Maker Teachers, clarify the construction plan and highlight the status and function of the team of Maker Teachers, strengthen the system construction and standard operation, establish a sound mechanism regarding employment, management, training, and evaluation, and gradually perfect the policy and norm system for teachers' development.

3.2 Constructing a scientific and reasonable professional training system for Maker Teachers

Colleges and universities should establish and improve the professional training and evaluation system for Maker Teachers, which mainly focuses on building an open and diversified education and training system. In the training system, the "entry barrier" should be strictly controlled. In the recruitment process, we should synthesize academic qualifications, academic, innovative and teaching abilities, break the inherent "only academic qualifications" thinking pattern, and recruit high-quality talents both inside and outside the University by the way of results display or on-site guidance. In the meantime, it is necessary to apply a probation period to Maker Teachers, and stipulate that they will be determined to stay in the university by passing the evaluation during the trial period of 1-2 years. Furthermore, the training model for Maker Teachers needs innovation. Canadian scholar George Simmons describes the phenomenon of "decentralization" of knowledge in the Internet age: "Decentralization of knowledge subverts the communication formed by others (experts, editors) in the dissemination of traditional knowledge, allowing individuals to connect in the way they discover."^[9] On the basis of the consideration on "Internet +" and the characteristics of Maker Education, it is important to clarify the training objectives, training targets, training content and training forms, focusing on changing the existing teacher training mode and the current situation of school-led training discourse power. In order to improve the pertinence and initiative of the training, Maker Teachers and students should take the passive-oriented and active-assisted way, choose the content and mode of the training, and adopt the "supermarket shopping" training method. In addition, senior experts with subject knowledge from inside and

outside the universities and members of the Maker Alliance can be invited to serve as training teachers. Students and Maker Teachers can also invite professional training experts in their field of study to give speeches. Maker Space should establish a flexible resident mechanism, and widely attract experts with different backgrounds to form a cross-border mentor's team.^[10] Finally, a scientific evaluation system should be made, which emphasizes on strengthening the integration of entrepreneurship education into daily education management. The evaluation system highlights the achievement of the goal of makers, the achievements of the makers and the conversion rate as well, and major innovators will be rewarded.

3.3 Creating a professional quality assurance system centered on qualification admittance for Maker Teachers

The professionalization of Maker Teachers is not only a construction concept and idea, but also an institutional form. In order to realize the professional construction of Maker Teachers, it is necessary to establish a corresponding quality assurance system. The core of it should be the Qualification Admittance System for Maker Teachers. The standards and level of the system should be improved, so as to reflect professionalism, normalization and professional characteristics of Maker Teachers in Maker Education, to clarify the knowledge standards, teaching standards, guiding students' ability, communication and cooperation level, practical innovation ability, etc. of Maker Teachers. The qualification admittance system should become the external quality assurance system to realize the professionalization of Maker Teachers. Firstly, the qualification accreditation of Maker Teachers calls for improvement, which requires scientific and standardized, perfect and sound qualification procedures. The norms, requirements, procedures and other normative contents of the qualifications for Maker Teachers need clarification. The education authorities of the provincial governments will have unified identification and unified approval, then establish regional Maker Teacher resource pool. Secondly, a sound qualification assessment system needs to be developed. To eliminate the teacher qualification lifelong tenure, certain evaluation period should be set, and the assessment should be carried out and re-identified after the expiration due to the fact that Maker Teachers must always maintain the frontiers of professional subject knowledge and understand the dynamics of network information technology. Thirdly, a system of title level for Maker Teachers should be built. According to the results of Maker Education, the achievements of the makers, the conversion rate, and the results of teaching and research, Maker Teachers can get junior, intermediate and senior titles. The existing practice of assessing titles in colleges and universities according to the time limit can be broken on the basis that the effect of makers will become an important evaluation indicators.

3.4 Improving the external security system for the construction of professional team of Maker Teachers

The construction and development of professional team of Maker Teachers requires the support of organizational security, fund guarantee, platform construction, campus culture and other comprehensive security systems. First of all, it is necessary to raise the awareness of the leaders in decision-making on the education of the innovators, and to incorporate the construction plan of the driving force of innovators into the overall plan of the construction and development of the institutions of higher learning. To formulate a scientific and rational construction and development plan, to clarify the organizational framework and management system of the school, and to clarify the division of responsibilities among departments, a team for the construction and development of Maker Teachers can be set up jointly by the Personnel Department, the Teacher Development Center, the Innovation and Entrepreneurship Center, and the Academic Affairs Office in school. The team is fully responsible for the construction and development of creative teachers, and improves the organizational and institutional guarantees. Second, enough and special funds for the construction of the team of Maker Teachers should be allocated to encourage Teachers to combine their majors, academic characteristics and school features together, to study abroad, to conduct internal and external training and exchange, and to integrate Maker Education into daily teaching and research. Third, we should build a platform for the development of Maker Teachers under the sharing of resources. In addition to the existing student maker workshops and maker centers, it is necessary to set up a diversified maker development platform, such as maker development alliance established jointly by governments, enterprises, colleges, and research institutions. A regional maker development alliance or Maker Teacher development alliance can also be formed to promote communication and cooperation among Maker Teachers. Besides, the upgrading of the resources and equipment of maker platform will be strengthened, so that the resources of regional universities, enterprises and governments as well as institutional and resource barriers can be broken. Hence, we can realize resource sharing, high integration, and common progress and development. Finally, we must also use media to promote the culture of group makers. Colleges and universities should use the O2O model to publicize the Group Maker Culture, work together online and offline, and establish the ecosystem of maker service platform.

^[11] We need to integrate the essence of Maker Culture -- the spirit of innovation, into the campus culture, to strengthen the culture of innovation and entrepreneurship, to form a strong atmosphere for the innovation of all employees within the university, to promote the growth of innovative and entrepreneurial talents, to create a benchmark for maker students and teachers and to update the talent training model to stimulate the creativity and innovation of students and teachers.

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