The Predicament and Countermeasure to the Training Plan of the High-Tech 3D Printing Professionals in Colleges and Universities

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Keywords: 3D Printing, Advanced Technology, Professional, Talent Cultivation.

Abstract. The deep revolutionary development of 3D printing technology has brought unprecedented opportunities and challenges to the manufacturing industry. By comparing the changes of the present production methods and the old ones and combining the advantages and characters of 3D printing technology, this paper analyzes the knowledge system that is supposed to be mastered and interprets the dilemma and countermeasures to the talent training plan of the high-tech 3D printing in colleges and universities through the combination of the theory and the practice. It is hoping this paper may put forward feasible ideas for the training of 3D printing talents in colleges and universities.

The training of high-tech talents not only determines the level of the industry, but also is the main position struggled by the manufacturing industry for the right to speak. 3D printing with its outstanding professional and practical characteristics combines the features of industrial design and art design and integrates plastic arts, industrial technology as well as appearance art. Under the new format, the manufacturing industry urgently needs the support of 3D printing technology to solve the problem of quantitative production and refinement. Therefore, the bridge link function of high technical skill type talented persons plays a crucial role.

1. The Structure and Knowledge Requirement of 3D Printing Talents

Talents of high-tech 3D printing can be divided into four levels according to their position at the industry chain. The first type is the technical research and material development personnel. This type of person has the highest technical requirements. They must be familiar with material and manufacturing processes and should have a keen knowledge-updating insight. The second type is the 3D printer production, research and development personnel. The third type is the 3D printing service and outsourcing personnel. And the outstanding feature of this kind of talents is the high requirement for their practical ability and application technology and a high knowledge reserve for the combined analysis of technology and equipment. The forth type is the 3D printing marketing business talents who are closer to marketing personnel. They are the compound talents with lower requirements for technical innovation and material science. Limited by the school conditions and technological innovation, there is still a great distance between the training of 3D printing technical talents in colleges and universities and the actual demand. Therefore, it is hard to make a sharp judgement on the technological innovation in the field. That is way school education has its own hysteretic nature.

2. The Dilemma in the Training of the 3D Printing Skilled Talents

2.1 The Shortage of the Compound Teachers

Since 3D printing technology is a new interdisciplinary technology, its technical features determine a strong intersectional and complementary trait of its knowledge. Thus, technical personnel are required not only to be capable of operating the equipment with ease, but also mastering, as a support, relatively
complete knowledge of material and information processing, which, consequently, leads to the lack of teacher resources for the talent training.

2.2 Teaching Platforms and Resources are Scare in Colleges and Universities

Constrained by capital and technology, the 3D technology platform has not been fully established in colleges. And for those that have been established, due to the lack of technical personnel, the equipment is shelved and became a decoration. The contribution made by the equipment to talent development is limited. And at the same time, the speed of the industrial revolution and the response of the school authority are comparatively slow. Technically, the people trained are already out of date right after graduation.

2.3 Conventional Thinking Generally Ignore the Technological Revolution

Many people are still in the early stages of understanding 3D technology and their minds are not yet fully opened. And there is a big gap between the curriculum design in the universities and the most cutting-edge 3D printing technology in the world. There is a gap between the education of printing technology and the practical application demand of the enterprises. As a result, a training program, which is oriented to the demand-driven market, can thoroughly solve this problem with the methods such as the integration of schools and enterprises, curriculum construction, clear ability requirements and the internalization of knowledge structure on the purpose of improving talent training project.

3. Countermeasures and Ways out

The training of the high-tech 3D printing talents is based on the core principle of the improvement of comprehensive ability of the professionals which is achieved through the interaction of the features such professionals, market and technology as well as the corresponding five module design. The propositional connotation of each module and implementation behavior is made clear with the dynamic adjustment of the industry. This five-in-one highlights the roles and functions of the five modules. It is oriented to the demand-driven market, and realized through the combined power of the construction of teaching platform, cooperative education, innovation and entrepreneurship, achievements transformation and teaching practice and training. And finally a professional product design practice system for the comprehensive application of 3D printing technology is established through the longitudinal indicators designed to link with the curriculum and the horizontal linkage of five modules so as to improve the comprehensive ability of 3D printing professionals.

3.1 The Construction of a Scientific Teaching Platform

A scientific teaching platform should be constructed by setting up a 3D printing lab so as to ensure basic experimental teaching needs. A sound management system and standard resources with timely improvement and adjustment are also needed to be equipped. Apart from that a network learning and distance teaching platform based on 3D printing should be built to meet the needs of a web-based instruction in the new ear. Finally real-time dynamic cloud acquisition is also a necessity so that it is convenient for teachers and students to learn and improve learning efficiency.

3.2 Cooperative Education

We will strengthen the construction of practice and training bases. And on the purpose of broaden students’ learning channels and horizons and at the same time drill their practical ability. We will combine the classroom teaching and enterprise production practice with the help of the intensive project training of the enterprise to strengthen the effect of teaching practice, stimulate students’ innovation ability and expend their professional vision. We will also improve the construction of teaching staff. The teaching and project training given by enterprise engineers is basically based on the
enterprise 3D printing project. The design of the teaching links is reasonable and the results are rigorous and scientific. As a result, students’ practical ability and their professional quality will be greatly improved.

3.3 Innovation and Entrepreneurship

Combined with the provisions of national innovation and entrepreneurship 4.0, we build a bridge to communicate with the outside world through the laboratory, so that innovation and entrepreneurship can enter the laboratory. By encouraging students to participate in competitions such as the National 3D Printing Innovation Design Competition, 3D Printing Creative Design Competition and Industrial Design Competition, we offer them opportunities to master the knowledge of cutting-edge design and material technology on the purpose of enhancing the confidence of talent training, clarify their professional cognition.

3.4 Mass Innovation Service and Achievement Transformation

Mass innovation service and achievement transformation is the touchstone of talent training. To some extent, it illustrates the effect of the comprehensive practice of 3D printing and it is also a reference standard to measure the quality of professional personnel training and effective channel to realize the transformation of talent, technology and market. Through the incubation and successful achievement transformation of the 3D printing projects in colleges, we can have a better understanding of the market dynamics and predict the occurrence of industrial changes. In addition, efforts are made to build and improve a 3D printing technology research and development innovation system with the market as the main body, university education as the platform.

3.5 Training and Employment Promotion

The construction of 3D printing practice base and students’ employment practice ensure the quality of the last link in the talent training system. The feedback of the internship unit and the level measurement are used to solve the problems appeared in the product design professionals training. It is the main way to realize the social identity of product design professional and putting to good use the subjective initiative of the professionals.

On the whole, in the training of high-tech 3D printing professionals in colleges and universities, we should, first of all, strengthen the training and construction of the teaching faculty specialized in 3D printing technology, a teaching team with a reasonable structure and full-time and part-time teachers. At the same time, incentive policy is to be used to mobilize teachers’ enthusiasm in innovative teaching. Secondly, we should define the task of technological innovation and fault tolerant mechanism with timely response, establish the corresponding information release platform and pay close attention to the cutting-edge technology of 3D printing so as to cultivate students’ interest in learning and stimulate their sense of innovation. Finally, the implementation of in-depth school-enterprise cooperation which is guided by market demand is necessary. With all of the methods mentioned above and the joint training as the model, the training of high-tech 3D printing professionals is made possible in the field.

Acknowledgement

Fund: the general subject of the "13th five-year plan" for education and science in gansu province in 2019, "research on ways to train high-tech and skilled talents for 3d printing in colleges and universities" (GS [2019] GHB2158)

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