Research on the Cultivation of IT Talents Based on the Perspective of Craftsmanship Spirit[1]

Chao Chen [1, a] and Qun Gao [2,b]

[1] College of Information Science and Technology, Bohai University, Jinzhou 121013, China

[2] Experimental Center, Bohai University, Jinzhou 121013, China

[a] chch56@126.com; [b] bhdxgq@126.com

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Abstract. The information technology industry is an important pillar for Chinese economic development. Talents directly affect the development of various IT enterprises, which in turn affects the development of the entire IT industry. The craftsman spirit puts forward new requirements for the training of IT talents in colleges and universities. This paper starts with the analysis of the times connotation of Craftsmanship Spirit, discusses the status quo and problems of IT personnel training, and puts forward specific strategies for constructive and enforceable.

Introduction

As an important subject in the construction of an innovative country, higher education undertakes three basic functions of talent cultivation, scientific research and social services. Among them, talent cultivation is the fundamental function of higher education. The information technology industry is an important pillar for Chinese economic development and requires a large number of technical personnel at different levels [1-3]. IT major students in colleges and universities are an important part of IT practitioners and the basis for the formation and development of talents in the information technology industry. Since the craftsmanship spirit was written into the government work report in 2016, the “craftsmanship spirit” has become a hot topic in the whole society, but there are many misunderstandings in its essence.

Therefore, it is necessary to systematically explore the cultivation strategy for craftsmanship spirit of IT majors in colleges and universities, and to strive to instill the craftsmanship spirit into the whole process of student cultivation, to improve students' ability to adapt to society [4-6]. Thus we can provide high-quality IT talents for the society, contributing to the realization of the "Made in China 2025" program and developing economics [7].

Discrimination of Related Concepts

Craftsman Spirit and Times Connotation of Craftsman Spirit.

In the perspective of Chinese traditional culture, the craftsman spirit is a career pursuit of “excellence”. It is that the craftsmen pursue the exquisite craftsmanship in the process of making products, and at the same time strive to improve their skill level, thus achieve a realm of perfection. First of all, for the individual workers, the craftsman spirit is mainly displayed as meticulous work, patience, innovation, dedication and dedication [8]. Secondly, for products and services, the craftsman spirit is specific qualities and attributes of putting people first, being excellent, being as good as it gets, even the pursuing of perfectionism.

With the continuous advancement of the whole society’ deepening reform, the connotation of the craftsman spirit has also become more profound. The craftsmen spirit has also been endowed with more new connotations of the times. It means innovation that engineers and scientists strive to promote the combination of technology and economy; the professional attitude that artisans keep improving, constantly perfect their skills; the dedication that more excellent craftsman, the more high sense of identity and pride to his occupation.

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Objectives and Characteristics of IT Talents Cultivating.

Accelerating the construction of information technology in China, talent cultivation is the key [9-10]. The core of IT education is to keep education in line with technological progress and meet the needs of professional development. The textbooks are updated very quickly, and the teaching methods focus on applicability. Educational institutions pay attention to technology leadership and targetedness in the selection of teaching materials.

The characteristics of IT talents training including：

(1) cultivating students' IT professional role ability, making up for the lack of students' professional ability, practical ability and collaboration ability in traditional computer education, meeting the needs of IT enterprises, and improving the employment difficulties of graduates.

(2) training students according to the needs of enterprises for talents enabled by occupational orientation which promotes direct cooperation between schools and industry to jointly cultivate students. In the training environment with both teaching functions and production functions, students' internship results are directly transformed into enterprise products access to markets.

(3) constructing training model of craftsman which is the focus of IT talent training reform and is related to the research on demands in IT market for talents from colleges and universities. Targeted, effective, and epoch-making training can enhance the "ingenuity" awareness of college students, and cultivate the "artisans" that the society needs, the industry recognizes, and enterprises desire.

Analysis of the Main Problems and Causes in the Cultivation of IT Talents

The Concept of Craftsman Spirit has not Really Struck Deep Roots in the Hearts of Teachers and Students.

First of all the connotation of craftsman and craftsman spirit is not highly understand, considering of the influence by Chinese long-term educational concept, knowledge is superior to skills, and high degree education and qualified diplomas are still in a high position in the traditional sense of education. Both the social status and the income of modern craftsmen represented by technical and skilled talents are still not high, and the craftsmen's own development and growth channels are narrow, and career promotion opportunities are limited.The realistic dilemma of the growth and development of artisan-type talents has affected the value recognition of the society for the craftsman spirit.

The Lack Courses on Craftsman Spirit in Education Program.

There is still lack of the targeted teaching materials on artisan cultivation and are short of comprehensive and scientific curriculum teaching system in current colleges and universities. The lectures and career planning courses on craftsmanship have become a form of “walking through the field”, and there is not even a corresponding teacher to attend classes.

The Evaluation System on Cultivation Effect of Craftsmanship Spirit is Backward.

At present, the evaluation system for the cultivation of craftsman spirit in colleges and universities is single and relatively backward. Tests are used to judge whether a student has the craftsmanship spirit in most colleges and universities. The effect of this evaluation is obviously short of objective and comprehensive. As an important aspect of humanistic literacy, the craftsmanship spirit of students is not evaluated only through tests and we need a system evaluation system whose evaluation subject, evaluation content, and evaluation method all should be improved.

School-Enterprise Cooperation is Still at A Superficial Level.

It is very important to strengthen the practical ability in the training of skilled talents. School-enterprise cooperation can provide this links that are in line with actual production. Strengthening school-enterprise cooperation is an important way for cultivating the craftsmen spirit for skilled talents. Schools and enterprises have a clear division of work, from professional planning, equipment, qualified teachers, to employment, and they can complement each other and share resource. However, the willingness of enterprises to participate in the training of talents in colleges and universities is relatively low, and school-enterprise cooperation still has a large development dilemma in the training of skilled talents.

Suggestions on Craftsmanship-Spirit-oriented Cultivation Strategy for Knowledge-based Innovative IT Talents

Based on Knowledge-type Practical Ability.

In the era of knowledge and high technology as the leading force, the mastery and application of system knowledge for IT talents is reflected in the cultivation of their practical ability. The teaching based on practical activities needs to transform the teaching process with the "learning by using" activity mode, and reconstruct the evaluation system based on the "usefulness" of knowledge.

Practical ability is of people what extent to use existing information to carry out transformational realities in social environmental activities. For students of computer major, there are very high requirements for their practical innovation ability, and the practice innovation education can not only deepen students' mastery of theoretical knowledge, but also enhance students' computer system design and program development ability. According to the requirements of IT enterprises, especially software service outsourcing industry, for students' practice and innovation ability, we construct a practical teaching system and start from four aspects: content, process, method and assessment.

Focused on the Training of Innovative Talents.

The innovation capacity of IT talents refers to the ability to propose new inventions, new products, new technologies and even new theories, and to make new improvements, innovations and breakthroughs to existing products, technologies and theories. Innovative talents should have a sense of innovation that they are not afraid of convention and dare to transcend; rich and diverse innovative ideas; the professional skills to put innovative thinking into practice.

The university's innovative IT talent training system is formed by a variety of factors, such as teacher's teaching, management services, teachers' research and practice capabilities, and the construction of practice bases. The construction of college students' innovation ability system is shown as Fig.1.

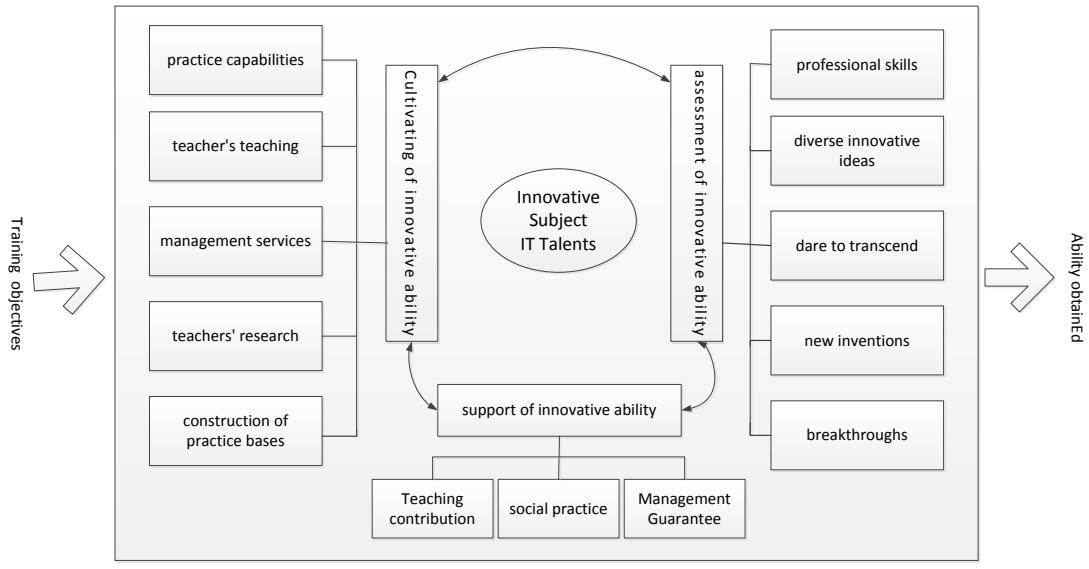

Figure. 1 Innovation Ability Training System for IT Talents

Oriented by Craftsmanship Spirit.

IT industry has the characteristics of high technology content, fast technology updating and large amount of knowledge content, which makes the demand for talents with craftsmanship more urgent. In fact, the IT industry is an industry that combines technology-intensive and labor-intensive. On the one hand, because it has high requirements for the professional level of talents in product development and design, the IT industry is technology-intensive; On the other hand, due to the low academic requirements for the installation, testing and maintenance of IT products, even if employees

with junior high school education can meet the requirements after short-term training, it is labor intensive. The training focus of the craftsman spirit is shown in Table 1 below.

Table 1 The cultivation focus of Craftsmanship spirit of IT talents

	technology intensive	labor intensive
Knowledge and Skill	Express feasibility analysis Develop system specifications Build abstract models Design technical requirements Design functional structures	Interface art design Software quality inspection Test program application software installation Software daily inspection
Professional role	Software analyst; Project manager; System architect; Software programmer	Software tester; Software implementer; System maintenance personnel
Craftsmanship Spirit	Dedication, Professionalism, Patience, Focus, Persistence, Persistence, Innovation, Creativity, Coordination, Green, Openness, Sharing	Diligent, Pragmatic, Law-abiding, Honest, Committed, Moral
Cultivate Strategy	Subtly infection from campus culture construction; Teacher's words and deeds; Teaching activity design; Curriculum setting; Innovation in practice	

Conclusion

In conclusion, on the basis of analysis of the main problems and causes at the present, we propose the suggestions on the cultivation of IT talents from the perspective of craftsmanship spirit based on students' knowledge-type practical ability focusing on innovation ability. As a result of this research, one can see that the cultivation model has a positive future in college IT education.

References

[1] L. J. Li: *Teaching Research on IT Talent Occupation Roles under the Multiple Intelligences Perspective* (MS., Bohai University, China 2015), p.27.

[2] J. Su, Y. H. He. Inspur: IT also needs "big craftsmen", *Openings*. Vol.1(2017), No.19, p.56-59.

[3] V. S. Avram, From Theory to Practice: The Multiple Intelligences Theory Experience in a Romanian Secondary School, *Procedia-Social and Behavioral Sciences*, Vol.1(2014) , No 116, p.5020-5024.

[4] X. Tan: *Research on the Countermeasure Analysis of Brain Drain in Chinese Enterprises* (MS., Capital University of Economics and Business, China 2014), p.19.

[5] Y. Y. Zhao: *Research on the Cultivation of Craftsmanship Spirit of University Students Based on Industry 4.0 Background* (MS., Southwest University of Science and Technology, China 2018), p.29.

[6] X.Z. Zhuang, The Spirit of Craftsman from the Perspective of Multi Dimension: Analysis and Interpretation, *China Higher Education Research*. Vol.1(2017), No.5, p.92.

[7] G. F. Yan, L. Zhang, The educational dimensions and cultivation approaches of craftsman's spirit. *Journal of Higher Education Management.* Vol. 11(2017), No.6, p. 67.

[8] J. J. Liu, Craftsmanship and its contemporary value, *Studies in Ideological Education.* Vol.1 (2016), No.10, p.36.

[9] Q. Zhao, Research on the Cultivation of Innovation and Entrepreneurship Ability of University IT Talent, *Education Modernization*. Vol.1 (2018), No.33, p.51-52.

[10] Z.H. Wei, The design of learning activities in the flipped classroom focusing on understanding, *Journal of Guizhou Radio & Television University*. Vol.1(2018) No.3, p.64-67.