Research on Cultivation Approach of 'Craftsman's Spirit' of Graduate Students in Engineering

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ABSTRACT

Craftsman's spirit is one of guiding ideologies for cultivating masters in engineering, which is indispensable professional spirit and moral thought for scientific research personnel, and it is necessary for contemporary graduate students to integrate into the society and realize transformation of scientific research achievements and career development. Education institutions of masters in engineering should pay attention to important connotation of three aspects in 'craftsman's spirit' cultivation, namely respect for teachers, dedication and excellence pursuit. They focus on 'craftsman's spirit' infiltration in all links of talent cultivation. Tutorial system is organically combined with 'modern apprenticeship', and practice teaching of cooperation between colleges and enterprises is organically combined with industry-university-research in the training mode, thereby perfecting the cultivation approach of craftsman's spirit.

KEYWORDS
Craftsman's spirit, graduate student in engineering, cultivation approach.

IMPORTANCE OF CULTIVATING 'CRAFTSMAN'S SPIRIT' OF GRADUATE STUDENTS IN ENGINEERING

Craftsman's spirit also should be endowed with temperament and connotation of the new era in current era of innovation. It not only contains firmness, practice, excellence pursuit, innovation and other spirit elements [1], but also includes design originality, quality excellence, skill continuous improvement and endless spiritual pursuit of production. It is a teacher-discipline spirit of respecting teacher and education, meticulous manufacturing spirit, and entrepreneurship spirit of getting rich and establishing morality, innovation spirit of pursuing excellence and practice spirit of combining knowledge and action [2]. Currently, graduate students in engineering have the following tough situations of insufficient momentum in business innovation, low service awareness, inadequate teacher-discipline spirit, weak moral establishment awareness, weak thinking rigorousness, etc. due to narrow knowledge structure, unbalanced quality education, deviation in teacher-student relationship, omission of values and ethics education, etc.

The reasons can be analyzed from the following aspects: firstly, deviation in humanistic quality education leads to insufficient momentum in business innovation. Higher education in engineering has similarities with vocational education in China, namely strong pertinence of daily skill training and preferred guarantee of employment guidance. In addition, higher education only attaches importance to

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impacting professional knowledge and training skills for long term, and neglects
acquisition of humanistic quality [3], and engineering college students' existing
knowledge structure is only based on mastering of professional knowledge, and
they are lacking cultural knowledge.

Secondly, quality education imbalance leads to weak service consciousness and
teacher's spirit deficiency. Currently, quality education of college students in
engineering has more obvious deficiencies. Meanwhile, novel education pursues
'teaching-learning' realm and 'equal teacher-student' relationship with the
development of social economy, which has been deviated during development.
Students have weak discipline consciousness and low self-control ability, and the
feature are particularly striking among engineering colleges which are mainly
composed of boys.

Thirdly, omission of the values and ethical education lead to weak moral
establishment awareness. Students in engineering colleges accept theoretical
contents of ideological and political education mainly from ideological and political
textbooks. Though the connotation and values have certain guiding role for
professional spirit cultivation of college students in engineering, it has low
pertinence aiming at the special group of college students in engineering. It is
necessary to carry out corresponding vocational education and engineering ethics
discipline aiming at concrete practice in engineering. On the contrary, several
universities set related courses for education only, most universities and colleges
are generally lack of such education in engineering ethics education in China
engineering colleges and universities, and they are especially lack of ethical
responsibility and ethics education in engineering practice, which are mainly
manifested as unclear positioning of engineering ethics education, old-fashioned
teaching contents and teaching methods, deviation from professional education, etc.
[6]

Finally, weak thinking rigorosity leads to frequent 'more or less' problems in
engineering practice. 'Excellence pursuit' is an important feature of craftsman's
spirit in ancient China. It corresponds to 'more or less spirit'- people are satisfied
with half a bucket of water and accept 'more or less' state rather than pursuit of
'excellence'. The situation is embodied as follows for China college students in
engineering most intuitively: the internship link of teaching practice is generally
related to a large number of practice experiment and data processing. Some students
do not operate in accordance with specifications, who are lack of mastery of
national standard and industry standard, and do not focus on experimental accuracy
and forge experimental data, etc. Students cannot distinguish "fact judgment" and
"value judgment" easily after entering the stage of higher education due to deficient
thinking training and education guidance at the stage of basic education and
elementary education, thereby it is not beneficial for college students in engineering
to comprehend and cultivate logical thinking habits [7].

**Craftsman's spirit is the guiding ideology of educating and cultivating talents in
eering**

Basic research serves engineering research, and engineering research nurtures
basic research. In postgraduate qualifying examination, craftsman's spirit is an
entrance exam question. The craftsman's spirit is an economic question related to
"made in China transformation to wisdom in China and Chinese product transformation to Chinese brand" under the major background that world great powers upgrade manufacturing industry and improve the competitiveness. We further discover that craftsman's spirit is also a cultural exam question in contrast to historical coordinates and social psychology. Humanistic education starts with cultivation of complete and sound "person" rather than unilateral and tool-based 'craftsman'. Human ultimate care of moral value, perfect pursuit to action and psychological peace are matched with craftsman 's spirit. Therefore, the training of engineering talents should depend on the link of humanistic education, and humanistic education should be applied for casting craftsman soul, educating craftsman mind, and creating craftsman charm.

**Craftsman's spirit is necessary professional spirit and moral accomplishment for scientific research talents**

It is undeniable that some group impetuous and incorrect values will conduct and affect contemporary college students naturally in current social transformation period. A significant number of graduate students are always regarded as people with 'grandiose aims but puny abilities' by employers. College students select to vote with their feet and hop jobs frequently once they meet setbacks in individual career development, and they constantly search starting points in own careers. 'Craftsman's spirit', as a spiritual concept and even value, just teaches graduate to be persistent and attentive. Only graduates with good professional spirit can become experts and technical masters in the industry, and they can stand out in the future career. If cultivation of craftsman's spirit thereof can be strengthened in the process of shaping students' spiritual quality, the additional value of human capital will be greatly enhanced, which is beneficial for employment and future career development of contemporary universities.

**Craftsman's spirit is the need for contemporary graduate students to integrate into society and realize the transformation of scientific research achievements and career development**

Craftsman's spirit is a culture formed in craftsman's skill and character inheritance, which is the epitomized expression of professional dedication spirits. "Craftsman's spirit" belongs to the scope of professional spirit. It is professional value orientation and behavior manifestation of employees, and it is concrete understanding integrating technical rationality and value rationality of supreme spiritual achievements of industrial civilization development. It unifies professional spirit, professional attitude and humanistic literacy. It is divided into three levels: professional spirit necessary for craftsmen dedication and meticulous technical work; good professional attitude necessary for craftsman loyalty and dedication to technical work; higher humanistic quality necessary for craftsmen enjoyment in technical work [1]. Therefore, 'craftsman's spirit' has three major characteristics: professionalism, professionalism and humanism. Craftsman's spirit' originate from occupational education only by grasping the essence definition of 'craftsman's spirit', which also can reach general knowledge education. It originates from industrial civilization, which further enters post-industrial civilization [2].
CONNOTATION AND REQUIREMENTS OF 'CRAFTSMAN'S SPIRIT' CULTIVATION FOR MASTERS IN ENGINEERING

There is a certain degree of misreading in training specifications of engineering professional craftsmen. Talent training is the first mission of universities and colleges. The first-class graduate student education is necessary for first-class universities. Traditional graduate education training has the phenomena of 'emphasizing knowledge and neglecting practice; emphasizing theory and neglecting skills' during talent training positioning and process, thereby leading to insufficient practice ability and innovation ability of graduates and deficient theoretical attainment. In fact, cultivation of master craftsmen in engineering is prominently different from applied craftsmen cultivated by undergraduate colleges and universities as well as craftsmen cultivated by vocational schools in modern education system. Masters in engineering not only emphasize solution of the first-line technical problems and but also have a certain degree of technical innovation ability. It should be further emphasized that the students should have the ability of mastering cutting-edge technology and academic innovation. In addition, craftsmen master skills on the one hand, they also have certain aesthetic feelings, noble social responsibility and pursuit of excellence and continuous innovation on the other hand.

Currently, China has entered the era of mobile Internet, craftsman's spirit is not old-fashioned on the one hand, and it is treasured on the other hand. 'Extreme thinking' and 'iterative thinking' in Internet thinking belong to modern interpretation of craftsman's spirit. The deeper connotation of craftsman's spirit refers to human values. The craftsman's reverence for nature and devotion to works and own concentration comprehension is integrated into the craftsmen, thereby promoting continuous development of society and continuous brilliance of human civilization. The ancient 'craftsman' is commonly known as a handicraftsman. It refers to a person who is skilled in mastering a skill and making a living. The first industrial revolution happened with the development of productivity, socialized mass production form appears, the connotation of the craftsman is also changed, and craftsman refers to a person who is responsible for the first-line concrete operation of production and services or provides services by own skills. 'Craftsman's spirit' belongs to the spiritual category, and it is the value orientation and behavior pursuit of practitioners. It is professional thinking, professional attitude and professional ethics under the influence of certain life philosophy. Specifically, craftsman's spirit should include several following aspects at least:

Respect for teachers and emphasis on truth -origin of craftsman's spirit

The teaching of ancient skills mainly includes family teaching and mentoring. Masters and apprentices live, eat and work together during the period of apprenticeship. Masters not only should teach the living skills of apprentices. Certain professional attitudes and ethics are taught to apprentices. Apprentices should be independent and self-reliant. Respect for teachers is the origin of craftsman's spirit. Respect for teachers refers to respect for skills and compliance with professional ethics. Emphasis on truth refers to emphasis on rules, and the person can become a qualified craftsman by respect and application of rules only.
Dedication - foundation of craftsman's spirit

Dedication is the strength source of craftsman's spirit. The Analects of Confucius says that those who know the person as well, and of those who were not as good as music. Dedication is the highest realm, and the best career mentor. It is the realm which can motivate human work enthusiasm, dedication passion and creative inspiration as far as possible.

Excellence pursuit - performance of craftsman's spirit

Craftsman's spirit is performed through specific creation or service process, excellence is the direct performance of craftsman's spirit. It is a dynamic and long process. Craftsmen need to resist outside interference, who can stand out from ordinary people with concentration and persistence. Excelsior craftsman's spirit originates mainly from the craftsmen's own long-term technical practice accumulation and rational thinking of technical skills. Previous invented products or skills under improved innovation in order to get the 'better' technology products or services.

The innovation concept is the guarantee of beauty respect feeling of craftsman's spirit. 'Novelty' is also another form of expression of 'beauty'. It is the innovation idea of ancients if you can make things better for one day, you should make them better every day and never stop doing this. 'Insistence of seeking novelty in change, seeking progress in change and seeking breakthrough in change' is the innovation concept of General Secretary Xi Jinping. The concept of innovation is the basic quality of one excellent craftsman, who can be undefeated in fierce competition and then durable in the competition trend by innovating methods. 'Spirit of refinement' is expressed as 'excellence pursuit' in idiom.

RESEARCH ON APPROACHES OF CULTIVATING 'CRAFTSMAN'S SPIRIT' OF MASTERS IN ENGINEERING

Emphasis on penetration of 'craftsman's spirit' in all links of graduate student talent training

The cultivation training curriculum of postgraduates is systematic and scientific. Discipline crossed education and comprehensive teaching characteristics are embodied in curriculum system setting, thereby providing sufficient knowledge education background for training student craftsman's spirit. Meanwhile, the students' personality cultivation and innovation ability improvement are encouraged during ideological and political education, students are inspired for avoiding parrot behaviors, and students should have independent thinking and opinions to questions, and even guts and courage to question ancients. Students are encouraged to be practical and excellence-pursuit during research and study in all aspects. They not only should be mindful, steadfast, dedicated, rigorous, focused and persistent, but also should penetrate the spirit in all aspects of action, learning, etc. They not only should persist in own major and constantly pursue innovation, but also should be indomitable to 'mistakes'. More importantly, they should be concentrated and submerging in the numerous and complicated environment. They should withstand loneliness, temptation and direction during attentive action.
Combination of tutorial system and 'modern apprenticeship'

Cultivation of students (apprentices) is regarded as the core on the basis of cooperation between colleges and enterprises. Course is regarded as the link. It is a talent cultivation mode which is supported by deep participation of schools and enterprises as well as deep guidance of teachers and tutors [11]. The following transformation appears compared with students of traditional schools in modern apprenticeship: students are transformed from students to apprentices due to identity transformation. The learning sites include both school and the first line of production. The learning mode is also changed from mere theory to alternation of work and study.

Organic combination of Industry-university-research by practical teaching of university-enterprise cooperation

Cultivation of advanced talents with craftsman's spirit is the same as one industry. The development has competitive advantage, and competition has comparative advantages. Effective interaction of applied undergraduate universities and colleges with student supply side (senior middle school and technical schools) and graduate demand side (enterprises) is required during 'whole chain' talent cultivation system. It is reflected as coordinated education long-term mechanism of government, school, enterprise and society in the whole process of recruitment, cultivation and employment. Applied undergraduate colleges and universities should pay attention to student 'supply side', young students and universities should be focused for cultivation of craftsman's spirit. Student 'demand side' is also focused. Corresponding talents are cultivated for enterprises, market and social economic development demands. Specifically, one is student 'supply chain'. Craftsman's spirit is formed for long term. It is a slow process, interaction and exchange with front-end schools of university education should be strengthened. The applied college talent training target requirements should be transferred to the non-higher education end as soon as possible, the other is student 'training chain'. The humanistic spirit of professional ability is emphasis, the interaction with enterprises should be strengthened, enterprises are invited to participate in school talent training objectives and professional talent standard formulation; professional setting and evaluation adjustment exit mechanism participated by experts from related industry, institutions and enterprises should be established, and the professional structure should be optimized.

Industry-university-research cooperation is an important link of realizing scientific research results in production. It is also an important carrier of craftsman's spirit cultivation. Training units of graduate students in engineering should make full use of the platform to carry out 'craftsman's spirit' experience education, practice education and development education. Craftsman's spirit cultivation is organically integrated with graduate student research training. It is converted into invisible forces of growth and development of educators.

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