

Research Article

Research on Platform Construction of Manufacturing Practice for Industrial Design Specialty in Colleges

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Abstract: In view of that manufacturing practice is indispensable practical link of industrial design specialty, the author analyzes the current situation of manufacturing practice in industrial design specialty and the existing problem in manufacturing practice system, discussing the necessity of research on manufacturing practice for industrial design specialty. Among them establishing the manufacturing practice factory of industrial design on campus, which lets the student enter and learn various practical skills after learning certain basic courses, or setting up the outside cooperative manufacturing practice basement, is particularly important. And then the concrete research methods and the implementation steps are put forward. On this foundation, the research conclusion on manufacturing practice for industrial design specialty is done.

Keywords: Industrial design specialty, manufacturing practice, platform construction

INTRODUCTION

Manufacturing practice is very necessary to the industrial design specialty, which not only can deepen the theory they learned, get management knowledge of production and improve the ability of engineering practices, but also can develop the comprehensive quality of the students. In recent years the college students major in the industrial design have solid theoretical basis, broad professional knowledge and a very good ability in computer and hand drawing, but the universal shortcomings are lack of the ability of practice, the knowledge of engineering practices and cannot adapt to the needs of the job quickly (Zhu, 1999), which shows that link theory to practice, especially the part of manufacturing practice in the process of education are still very weak. Strengthen the practical teaching link and enhance the relationship between theoretical teaching and manufacturing practice is the only way to perfect the development of industrial design (Jiang, 2011). So, to the industrial design, research on platform construction of manufacturing practice has a profound theoretical and practical guiding significance (Jiang, 2014).

But after the enrollment expansion of colleges, the number of students of manufacturing practice increases dramatically, which brings a lot of pressure to practice base. Especially when practicing in factory, a practice base often receives the students who are from different school at the same time. It often appears that in a day time students could practice less than three hours. In addition, one or two teacher leads dozens of students to

the production workshop to carry through manufacturing practice and the organization and management all depends on the teacher's mobile supervision, so that the manufacturing practice often walks process and students walk in from the front door and out from the back door. Teachers often could not look after them so well, truly becoming a "shepherd" (Zhang *et al.*, 2008).

Manufacturing practice is an important practical teaching link, which is very different from the theoretical study. Many students show that they don't adapt to this kind of study way of practicing in production workshop. The manufacturing practice often stays on the surface and students often sustain a short attention to one production activity or equipment. In addition, teachers lack the necessary guidance to students, so the students feel very boring in the workshop. Some students have not enough cognition to the purpose and importance of manufacturing practice and production site generally does not allow students to operate personally. Students lack of practical opportunities, so it is more difficult to enter into the practice role (Zhang *et al.*, 2008).

The purpose of this research is to improve the quality of manufacturing practice and to make students become the new type industrial design talents of good comprehensive quality which have the strong practice ability, the reasonable knowledge structure and the solid theoretical basis, so as to not only satisfy the demand of employing unit in the market, but also accord with basic rules and basic requirements of education teaching of undergraduate course.

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CURRENT SITUATION AND PROBLEMS EXISTING IN THE MANUFACTURING PRACTICE OF INDUSTRIAL DESIGN SPECIALTY

Aggravating formalization in manufacturing practice: At present, many industrial design students take a manufacturing practice with other mechanical major students. They come to the workshop which produces the automobile engine or chassis, where is completely different from the industrial design specialty. Some students just have fun there and it's merely a formality has no practical meaning. The students of one or two classes who are taken by one or two teachers to a designated enterprise, where the safety officers give some safety knowledge or the engineers give a short lesson, then they just begin the visit and practice. It's not a real manufacturing practice, because during the whole practice process, the students have never really participate in the production, they observe and record the process of production only through looking up the technological document of the factory (Peng, 2008). In the beginning, they're curious and show certain interest in it, but because they cannot participate, plus there's little to do with their specialty, so they can't exert their subjective initiative. They'll lose their interests completely two or three days later, then they'll try to avoid the teachers or even just play for fun. It becomes a vicious circle because they leave bad impressions on the practice enterprise, it will hard for them to find a practice place in future.

Many difficulties in finding practice place: First, it's really hard for industrial design specialty to find a right practice place, especially in the Northern part of China. So they have no choice but to do practice with other mechanical students. In order to get the score, they just do the formality. It loses the function to improve their practical ability, but to become a sightseeing. On the other hand, in order to provide a suitable practice place for the students and improve the practice quality, many universities even use the teacher's personal relationship with enterprise (Peng, 2008).

Second, enterprises do not like serving the practice students. As an enterprise, the first thing is to keep safety and meet the customers' desire, but not to serve the practice college students; it's only their extra social responsibility. The practice activity will increase the safety risk of an enterprise and may also bring some trouble. So enterprises tend to reject the manufacturing practice.

The instructors of manufacturing practice of needing to improve: The industrial design specialty starts rather late and at present very few instructors at home are the real industrial design graduates. They either major in engineer or in art (Cheng and Jiang,

2010). Those two kinds of instructors have a different way in guiding their students, which will make them confused and affects the practice results. In addition, some young teachers who just start working are arranged to instruct the manufacturing practice, though they have a higher degree, but lack of practical experience and can't guide the students properly. It will result in bad practice results.

The outmoded equipment in manufacturing practice: In the European and American countries, especially in Germany, many devices that students used for practice and experiment are the most advanced. While in our country most of the equipments are very old, especially for the industrial design specialty, they even don't have any practice devices. They have to use the equipment of mechanical engineering and automation or some other specialties, which are completely not suitable for the industrial design students. A lot of good ideas of the students can not be realized, it could only decide the students practice items by the function of the equipment. It certainly will result in lack of the ability of practice and cannot adapt to the need of work immediately.

MATERIALS AND METHODS

Building the new mode of manufacturing practice: Take our industrial design specialty for example, the original manufacturing practice mode is divided into four stages including practice mobilization, visit practice, writing practice report and taking practice open-book examination. Practice mobilization is mainly introduced the importance of manufacturing practice, practice discipline and safety education. The second stage is the principal part of practice, which is the implementation stage, in which the students enter designated factory to practice two or three weeks under teacher's leading. The third stage is the practice summary stage, in which the students write practice report after completing the practice. The fourth stage is the examination, which is taken as a main standard to measure the practice harvest of students. The effect of this practice mode is not ideal. Therefore, our subject team studies of a new mode of manufacturing practice, as shown in Fig. 1. The new mode is divided into five modules. The first module is practice preparation, which is further divided into practice mobilization, professor topic lecture and network topic study. The second module is factory practice, which is further divided visit practice, theme operation and technical personnel topic lecture. The third module is making animation, which requires the students to make an assembling animation of some component that is seen in factory. The fourth module is writing reports, including writing manufacturing practice report of DOC format and argument report of PPT format. The fifth module is argument.

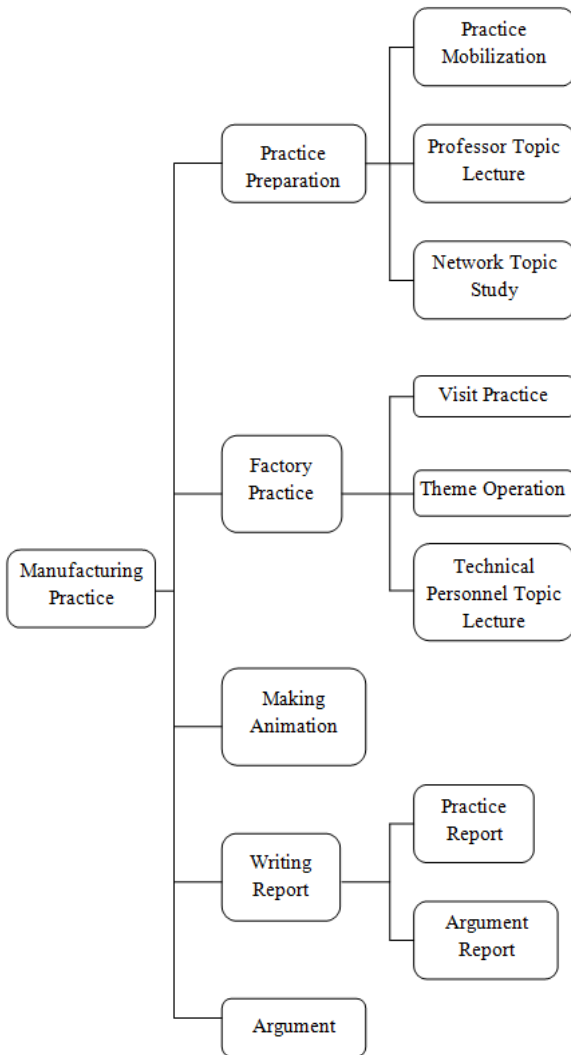


Fig. 1: New mode of manufacturing practice

The explanation aiming at individual content of module is done as below:

Professor topic lecture: The root cause why students try to avoid the teachers or even just play for fun is that the theory knowledge of manufacturing practice is not fully prepared, blind visit. In view of this, the practice preparation link increases the professor topic lecture. It could guide the student to integrate the knowledge that has learned to the practical knowledge and tell of students the key points and difficulties and the specific methods and practice.

Network topic study: In addition to listen to professor lecture, students should also get to the manufacturing practice site to learn, on which there are web site links of learning material and the video teaching, of which the content is rich, specific and intuitive. In order to restrain students on the web site to study, teachers could examine student in asking questions way, not through

the examination, one can take part in the next module of factory practice.

Factory practice: The factory practice is the principal part of practice. But as the number of students is constantly increasing, the practice quality could not be ensured. In the new mode, the instructor leads the student to carry on the visit practice aiming at the practice content of every day in the first and then divides group and sets theme for students and lets students to carry on the practical operation. Finally, inviting technical personnel make topic lecture. As this making pointed practice every day could make students get a bigger profit.

Making animation: Industrial design specialty requires students to understand the mechanical internal structure, to understand certain processing technology and process. So having students make an assembling animation of some component that is seen in factory would have the important meaning. This not only can restrain students seriously and deeply practice, also can greatly increase students' computer level. Nowadays the enterprises have high requirement of computer ability for the students of industrial design, through this training, it could better meet the needs of the enterprise and lay a solid employment foundation for the future.

Writing report: Writing reports not only contains writing manufacturing practice report of DOC format, but also contains writing argument report of PPT format. The manufacturing practice report is a complete review and summary the student makes to practice. But not as an argument report, the argument report should make an illustrated PPT format, at the same time, the animation that is made before should also link to it.

Argument: The argument link is to supervise students further seriously for manufacturing practice and to write a report. Instructors raise pointed questions according to the content of practice report, inspecting students the master degree to practice basic requirements and the serious degree of manufacturing practice. According to the content of practice report and argument report, the making quality of animation and the argument situation, the final result is confirmed. Argument link is an important supply to the objectively evaluate the manufacturing practice result of students.

Building stable manufacturing practice basement: Industrial design specialty must pay attention to the manufacturing practice, increasing the proportion of manufacturing practice, so that to really cultivate applicable talents to meet market demand. However, above all, increasing the proportion of production practice needs to have a stable manufacturing practice basement. Therefore, building stable manufacturing

practice basement is very important. The most stable manufacturing practice basement is to establish the manufacturing practice factory of industrial design on campus, which lets the student enter and learn various practical skills after learning certain basic courses. And university could also set up the outside cooperative manufacturing practice basement, which relies on the university, establishing the cooperation relations with surrounding industrial design enterprise or the manufacturer related industrial design and which allows the students under teacher's leading to practice and participate in practical manufacturing in factory. Young students are very creative. They could inject fresh life for the enterprise, so as to make knowledge quickly into productivity and increase the interest to study and also earn some income, reducing the family burden. But the most important is to master relevant knowledge of skills, get some working experience and after graduation, directly to the corresponding jobs, really achieve the purpose of improving practice ability (Jiang and Cheng, 2013).

Building scientific and rational instructors troops:

The instructor of manufacturing practice in production practice process is in the leading position, which is the guarantee of practice effect and the prerequisite improving practice quality. Practice teaching in factory and theory teaching in classroom have many differences. The instructor of manufacturing practice not only should guide students in practice contents and the methods, but also should take full responsibility for the thought, discipline, safety and other aspects during manufacturing practice. So as a qualified instructor of manufacturing practice not only need strong practice ability, but also need the rich manufacturing experience, being responsible for work, having dedication and a certain management ability and interpersonal skills. The instructor of manufacturing practice should be able to reasonably arrange practice content and practice order and every day before practice arrange practice tasks clearly and timely solve all kinds of problems encountered in the practice process. In order to establish a scientific and reasonable instructor troop, the experienced old teacher should preach, help and take the young teacher, such that not only the young teacher's service quality is increased, but also the construction of the instructor troop is strengthened and most of all, the quality of practice is ensured. In addition, to the more fixed practice place, the engineering and technical personnel, design personnel could be made full use as instructors, through speaking, exchanging, training and other ways to employ. They came from the first manufacturing line, having rich practice experiences and could carry out more intensive interpretation. At the same time, it could encourage teachers to learn in enterprise, improving teachers' practice ability (Jiang and Cheng, 2013). Because the

industrial design itself is a practical subject and if the teachers do not experienced a lot of practice, it is very difficult to teach well the course of manufacturing practice.

Building a set of suitable and advanced equipment for manufacturing practice:

Most colleges in China at present grand less value to industrial design specialty, which has caused far less financial input, as a result, the supporting facilities could not keep up with the development, the manufacturing practice equipment is out of style and even the own equipment is not possessed, which is not conducive to the development of industrial design specialty. So universities must try to realize open source, strengthening the hardware construction, to promote the progress of manufacturing practice with the improvement of hardware. But the injection of capital can not blind, which should have a direction and the practicality and urgency of acquired equipment must be considered (Jiang, 2014). Meanwhile, the existing abundant base experimental facilities in mechanical major in engineering colleges and universities also should be made good use, optimizing the allocation of resources, meeting the needs of manufacturing practice teaching and really providing the necessary security which trains the practical ability and innovative ability of students.

RESULTS AND DISCUSSION

At present, our country has become the largest manufacturing bases of the world, but the severe shortage of excellent industrial design talents especially the practical talents has restricted the sustainable development and become a bottleneck for industrial upgrading (Tang, 2008). So it becomes very urgent to perform the research on manufacturing practice and develop many very capable and practical talents major in industrial design:

- Perform the research on manufacturing practice; build a manufacturing practice factory for the industrial design specialty at school. After learning some basic theoretical lessons, let students learn all kinds of practical skills at factory. So that the students' ability of practice can be improved and professional skills can be strengthened, in this way, it could really link theory with practice, which is also the needs of development and perfection of the subject itself (Ma, 2008). On the other hand, through manufacturing practice, the students' sense of organization and discipline will be enhanced; the spirit to bear hardships, hard work, cooperation and teamwork can be fostered. In this way, the comprehensive quality of the students can be improved.

- Perform the research on manufacturing practice, build a relationship with the enterprise and create a practice basement outside school. So that students can walk out of school and contact with the society, which not only can make the students have a better understanding about their own specialty and level of development of the relevant industries, but also can help them establish a correct outlook on life and values. Meanwhile, students can learn a lot of actual design process, access to new instruments, equipment, new methodologies and new processes which can't be learned on textbooks. It can effectively make up the insufficiency of class-teaching and lay a solid foundation for the study of the follow-up courses.

CONCLUSION

As a new subject, industrial design, from the beginning to now, is always a constantly changing, constantly developing process. And the industrial design itself is also a creative activity and conducting the research on manufacturing practice is always an essential aspect of industrial design. This study puts forward the method and the implementation steps about the research on platform construction of manufacturing practice for industrial design specialty. Its purpose is to make students become the new type industrial design talents of good comprehensive quality which have the strong practice ability, the reasonable knowledge structure and the solid theoretical basis, so as to not only satisfy the demand of employing unit in the market, but also accord with basic rules and basic requirements of education teaching of undergraduate course.

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