

## ESTABLISHMENT OF CHINESE ENGINEERING-TYPE MODERN DESIGN HIGHER EDUCATION SYSTEM

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### ABSTRACT

*The rise of modern design was closely followed by the birth of modern design education. Although primitively rooted in traditional art education system, modern design education, along with social industrialisation and fast development of modern design, experienced a successive division to meet emerging social needs. Under this situation, a kind of modern design education with “engineering science” characteristics emerged in history and formed a new type of design education. This article, based on a primary differentiation of “art type” and “engineering type” within modern design education, illustrates firstly the main characteristics and problems of “art-type” modern design education. It also analyses establishing principles and comparative advantages of “engineering-type” modern design education as a model and demonstrates its brief target to create “science of design”. Consequently, a successful establishment of Chinese engineering type modern design higher education, with its key benefits, will better satisfy diversified social needs of modern China under the background of industrial civilisation trend.*

**Keywords:** Modern Design, Chinese Modern Design Education, Art-Type, Engineering-Type, Design Science

### INTRODUCTION

Modern design, known as architecture, product, graphics, and textile, is highly valued in terms of modern social economy, management, and culture. Modern design education, hence, has been experiencing dramatical rise and fast development in modern industrialised countries (Wang, 2002).

Basically, “design” means a sort of “planning or preparation” aiming at a definite target or an arranged purposive activity (Papanek, 2013). Although it has been exhibited in severely diversified manifestations, essence of design is rooted in this idea. “Modern design”, therefore, implies a specified design form which bases on technological system of modern civilisation and serves for modern society, whose characteristics has been highlighted as “industrialism” and “democracy” by those researchers who took academic interests in modern design history (Wang, 2002). Comparatively speaking, “art” is usually regarded as an activity with subjective creativity (Gombrich, 1998), which is by no means an objective problem’s solution. Any painting or sculpture, as an artistic work, though made by means of sophisticated skills and technics, is hardly an answer for a practical question. Instead, design is working for such an achievement. Design work is always created to deal with practical problem, despite such a task could have been weakened because of any possible incompetence or misunderstanding from designer. Hence, modern design is no other than performance(s) targeting to provide practical solution for those problems in modern society, possessing historical characters of modern technological system and modern civilisation. This article, based on differentiation of historical progress of modern design education, is

presented to comparatively analyse Chinese modern design education modes in terms of “engineering-type” and interpret its education principles, advantages, and aim.

## **SOCIAL ORIGIN AND DIFFERENTIATION**

In retrospect, “design” had been defined as an approach or element of “artistic creation” activities in the Renaissance, which briefly referred to “sketch” or “graphics drawing” (Yin, 2013). According to this origin, the term “design” has been associated with, even regarded as a component of “art” since its birth. This is reason why the concepts of “design” and “art” are closely connected nowadays. For the same reason, early modern design education was emerging under the guidance of traditional art education mode. During the period of late 19th century, some design education activities were carried out within “art education institutes” in England and the United States (Wang, 2002).

With the rise of modern design and the fast development of industrialised society and industrial civilisation in Europe and the United States, however, “design” has been interpreted with new meaning. In late 19th or early 20th century, a series of design movements were launched, which are now known as “Chicago school” in America, “Deutscher Werkbund” in Germany, “De Stijl” in the Netherlands, and “Constructivism” in Russia (Pevsner, 2004; Raizman, 2007; Woodham, 2012). As the result of these movements and ideological contributions, “design” has been renamed as a method or operational process to fulfill rational functions and to reach targets under the support of modern industrial technologies, which formed a basic idea of “modern design”. “Design”, hence, completed a historical turning which had it transformed from “a subjective approach of artistic creation” to “an objective method of functional realisation”. Consequently, traditional art education mode could no longer meet emerging needs efficiently under this changed background. On this issue, Wang, a Chinese modern design historian, has commented: although such kind of expanding way of teaching method based on art education institutes did work in the field of graphic design, “arbitrariness”, “extreme individualism”, “non-standardisation”, and “anti-teamwork” in free art would altogether become serious obstacles for those engineering coloured task, e.g., industrial design (Wang, 2002). “Engineering” characterised new design education mode thus appeared and “Bauhaus”, an ideologically Deutscher Werkbund based design education institute founded in 1919, became its earliest representative. It was the first time in history that a school advocated design education should be founded upon “science and normalisation” (Frampton, 2004), which was then practised again in Ulm Academy of Design (founded in 1950s) with more maturity (Wang, 2002). That was a landmark of historical differentiation in the progress of modern design education. The history of Bauhaus and Ulm Academy of Design and the historic differentiation of modern design education have already declared a new “engineering-type” modern design education, which opposed to “art-type” modern design education systematically.

## **“ART-TYPE”: PROPERTIES AND PROBLEMS**

Prior to detailed interpretation on characteristics, requirements, and possible comparative advantages of “engineering-type” modern design education in China, properties and corresponding problems of “art-type” modern design education within Chinese universities and art academies is to be discussed in first, according to theoretical studies of Chinese modern design education (Wu, 2011; Xiang, 2015; Yang, 2009; Yuan, 2014; Zhang, 2008) and the author’s practical teaching experience.

## **Basic Orientation**

Rooted in traditional mode, “art-type” modern design education usually has “visual representation” a core mission of teaching programme which reflected by those so called “core curriculum” and its specified teaching contents, while the general task of modern design as “practical solution for problem” is marginalised, if not being completely ignored. Under the comprehensive influence of traditional mode and teaching methods, “art-type” modern design education give rise to an obvious consequence which allows students look upon “design activity” as “visual form’s creation and representation” subconsciously. The function “to provide practical solution” of modern design, however, is extremely underestimated and modern design’s way of thinking characterised by “questioning awareness” is in absence. It is consequently illustrated that “art-type” modern design education is “visual representation” oriented, instead of “question and solution” oriented.

## **Psychological Influence**

With “visual representation” orientation as core mission in “art-type” modern design education system, a psychological effect of teaching activity has been emerged dramatically. Under the same influence of traditional mode and teaching methods, students always receive psychological hints to heavily depend on subjective force, e.g., intuition, inspiration, or unconsciousness, whereas theoretical learning and rational thinking’s nurturing has been neglected or despised intentionally by them. Despite the invaluable significance of intuition, inspiration, and unconsciousness on “design aesthetics” or “design innovation”, “design” is a performance with rationalised intellectual pursuit (Hu, 2008). Modern design towards “question and solution” should rely on sufficient accumulations on theoretical knowledge, rational recognition, and reasonable analytic ability as intellectual background. “Art-type” modern design education is inclining to emphasise arbitrary outlet of intuition and unconsciousness in teaching process, instead of intensive training on rational way of thinking for practical design solution. Nevertheless, any efficient and reliable modern design work, e.g., “road planning within a residential community in terms of distance’s minimisation between gateway and each dwelling unit”, or “space design of desks within an office-room in terms of economic efficiency and comfortability” (Jones, 1992), will be hardly accomplished only with arbitrary artistic or aesthetic creation. Correspondingly, it is illustrated that “art-type” modern design education does not concentrate on rationalised intellectual pursuit, but on psychological edification of subjective aesthetic creativity.

## **Teaching Practice, Management, and Policy Making**

Educational idea and position of teaching staff have been disclosed from the core mission and psychological edification of “art-type” modern design education aforesaid. “Visual representation” or psychological hints with “intuition and unconsciousness” exactly resulted from “art-type” teaching staff and their practice. This is an issue of “one question with double terminals”. there are two aspects to manipulate such an interactive practice under “art-type” education background.

First, for the sake of same historical origin, currently most teachers who are responsible for modern design teaching practice themselves were “art-type” modern design education’s product, whose background knowledge with cognitive bias have been revealed by their teaching practice to considerable extent. In this situation, many teachers do not make sense of difference between “design” and “art” education task clearly, if not obscure them deliberately.

Second, not only teachers in practising frontier but also those staff at teaching management and policy making level conserve severely similar idea or position since they were the same educational production. They, as administrative officer or policy maker, advocate and motivate the mentioned “art-type” teaching practice from the perspective of teaching management and policy making at macro-level, with only those identified teaching activities available. Although teaching innovation have been supported under “art-type” education mode, any attempt or experiment’s practical performance and effect, once overstepped their limitation in mind, will be not insured with suitable ideological conditions at managing and policy making level, let alone leading to an all-new education mode.

### **Systematic divergence**

Followed by the corresponding problems, the illustrated properties inevitably gave rise to a systematic divergence of “art-type” modern design education. It means, on the one hand, “art-type” education mode possesses in large part “subjectivity” and “arbitrariness” in teaching practice since many educational requirements of “art styled” are not measurable and with no objective targets, on the other hand, “subjectivity” and “arbitrariness” coloured modern design education is to be exercised at the expense of “objectivity” and “scientific nature”, which has typically manifested “indifference” for scientific design process and methods. It is never strange that scientific design process and methods in modern design activity, e.g., “investigation”, “experiment”, “analysis”, and “estimation”, are usually relegated to second position (even to complete disregard) in teaching practice of art education institutes. Although such factors have showed extreme importance for modern design or are the key qualification for a successful modern design task (Dai, 2016; Liu, 2007), the innate properties of “art-type” modern design education, for lack of well-matched rational idea and knowledge background’s sake, failed to support any scientific procedure in modern design.

## **“ENGINEERING-TYPE”: PRINCIPLES, ADVANTAGES, AND AIM**

### **Establishment Principles**

Based on the interpretation aforesaid, unless experienced complete but severely difficult reform, instead of superficially detailed change, a real “engineering-type” modern design education system would be hardly established and rooted in art education institutes. Therefore, how it can be made? For author’s opinion, two possible ways of establishment are to be presented.

Approach 1: to found independent “design academy”, or to found independent “design school” within an existed university.

Approach 2: to form “design profession”, “design faculty”, or “design branch institute” in (engineering science backed) mechanical engineering school or architecture school within an existed university.

The first approach is characterised by these highlights, which allow a new setting of educational policy making, management, and teaching practice’s operational mechanism and staff’s recruitment mechanism on the basis of “engineering-type” modern design education’s principal requirements in independent design academy or design school, so as to be differentiated strictly with traditional “art-type” education mode in advance and to reach new target, while the second is featured by those characteristics, which are inclining to satisfy the needs of modern design education with scientific tendency and with its operational mechanism or teaching methods in engineering science backed mechanical engineering school or architecture school, in order to develop its dominant position in “rationality” and

“objectivity” to higher extent and then to reach new target (Zhang, 2015), although lack of superiority in visual representation or psychological edification of aesthetic intuition.

Nevertheless, no matter which way were adopted to establish “engineering-type” mode, it should adhere to the following principles.

Principle 1: “questioning awareness leading” as a guidance of teaching task. It aims to have students who are nurtured under “engineering-type” education mode acquire ability to learn modern design methods which are going to resolve practical problems effectively, instead of constrained to create visual form randomly or blindly.

Principle 2: concentrating on students’ rational way of thinking training. It aims to support intellectual pursuit of “resolving practical problems with modern design methods” in terms of theory and idea.

Principle 3: setting up teaching staff who are competent to realise “engineering-type” education mode. It aims to answer for teaching task and target of “engineering-type” modern design education, in terms of “teaching practice” and “educational management construction and operation” at micro-level and “educational policy making” at macro-level.

Principle 4: strengthening “objectivity” and “scientific nature” systematically. It aims to supply a “scientific and normalised” foundation in modern design teaching process, in order to let design solution, as intellectual pursuit, receive agreement with more practical and reliable basis, and to avoid receiving agreement only with arbitrary artistic creation upon “witchcraft-like” psychological influence.

### **Comparative Advantages**

Potential disadvantage of “engineering-type” modern design education should be taken into consideration, before any discussion on its comparative advantages. With full consideration on latent weakness, comparative advantages will be emerged to a certain degree. As to potential disadvantage, it is viewed as possible “mirror image” reversal of “art-type” modern design education, which means, for concentration on science nature’s sake, “visual form presentation” or “aesthetic judgment and unconscious creativity” would appear to be weak, particularly in teaching process of “design faculty” and “design branch institute” within engineering science backed mechanical engineering school or architecture school. Hence, a relevant training course is going to be integrated into systematic teaching programme, in order to avoid possible weakness and its followed consequence.

“Visual form presentation” or “aesthetic judgment and unconscious creativity” training course within modern design education, however, is essentially different from those edification within traditional art education. Possessing such charismatic creative power itself strongly suggests “purpose” in artistic creation activity, say, “art for art’s sake”, while this power only a practical means in design creation activity, as have been clarified, “design” should not have this sort of aim. Now that “artistic presentation and creation” is evaluated only in terms of “means” for modern design activity, its potential disadvantage could be evaded for a means, which is adopted to reach target, is going to be obtained by effective training. Therefore, with efficient training course which integrated into educational aim strategically, the students who are nurtured under “engineering-type” modern design education could acquire basic capability in “visual form presentation” or “aesthetic judgment and unconscious creativity” and have them an effective means to achieve the defined goal.

Once potential disadvantage has been avoided, “engineering-type” modern design education, as a systematic mode, will exhibit its comparative advantages in following way.

Advantage 1: to obtain necessary ability of “rational way of thinking” based on systematic training of scientific design process and methods. It lets students competent to discover design problem in designing course and to make rational analysis and accurate judgement on design problem.

Advantage 2: to obtain necessary ability of “problem resolving” based on acquired rational way of thinking. Design activity will be presented and estimated objectively as effective solution for specified practical problem.

Advantage 3: to obtain necessary ability of “cooperation”, “systematic organisational coordination”, and “self-management” in team work. Far away from extremely individualised artistic creation activity without any cooperation, team work is vital to “engineering-type” accomplishment. Hence, the students under “engineering-type” modern design education will take advantage of “team spirit” as innate dominance of “engineering-type” work, in order to response to more complicated design task and to ensure target to be reached under the condition of systematic organisational coordination and management.

Advantage 4: to obtain necessary ability of establishing rationalised design idea under modern design theoretical training. It has students recognise “intellectual pursuit” essence of modern design and avoid possible “anti-intellectual” tendency of “art-type” modern design education under extremely subjective individuality applause.

**Aim of Education**

If “art-type” modern design education aims to create “design art” or a kind of artistic presentation form with “design” (as an approach) to meet cultural need of Chinese modern society (as classical art corresponded with artistic need of ancient society), “engineering-type” modern design education, instead, is to found “design science”, in which “artistic creativity” is merely integrated into scientific design activity as a means, so as to solve practical problems in Chinese modern society. Compared with “engineering science” as methods to cope with relationship between “objects”, “design science” is targeting to relationship between “human” and “object” (Wang, 2002). In order to reach this aim, it requires (a) Scientific design theories which dramatically similar to “engineering science”, in which theoretical basis is fundamental for any performance and engineering task can hardly be achieved without theoretical knowledge, whereas artistic activity could only rely upon individualised subjective intuition or subconscious creativity; (b) Normalised design process and methods, rationalised design estimations, and interdisciplinary perspective covering natural and engineering science, social science, and humanities study, eventually to confirm science nature and openness of “engineering-type” modern design education. Nonetheless, for the relationship between “art-type” education mode and “engineering-type” education mode, the author never implies that the latter is a replacement of the former. Rather, under industrial civilisation with extremely diversified social needs in modern China, a fully differentiated modern design education mode will better satisfy such various needs in any case (Zhu, 2013). Accordingly, a brief comparison between “art-type” and “engineering-type” modern design education is made as following.

**Table 1. A comparison between “art-type” and “engineering-type” mode**

	<i>Art-type</i>	<i>Engineering-type</i>
Orientation	visual representation	question and solution
Psychological Training	subjective creativity	intellectual pursuit
Teaching Method	artistic performance	scientific operation
Aim	art of design	science of design

## **CONCLUSIONS**

Modern design education is a historical product of social development under industrial civilisation background in China. Strongly diversified design needs of modern industrialised society lead to dramatic divergence of modern design education mode and “engineering-type” modern design education becomes an inevitable outcome from diversified design needs within the same social context. Essential differences do exist between “art-type” and “engineering-type” modern design education, which mainly manifest in establishment principles, education aim, and accordingly in unique teaching methods and comparative advantages of “engineering-type” education mode. Consequently, “engineering-type” modern design education is aiming to construct “design science” in order to better satisfy specified social needs, which are otherwise failed to be answered by “art-type” modern design education, as the former does not manage to meet those needs which have already been answered by the latter.

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