

ASSESSMENT CRITERIA WITHIN CHINA'S INDUSTRIAL DESIGN EDUCATION

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ABSTRACT

This paper discusses how industrial design lecturers in Chinese HE institutions evaluate and understand creativity in students' design works in related design courses. First, through literature analysis, this study explores and sorts out how lecturers understand "creativity" in different cultural backgrounds. Secondly, the curriculum and syllabus of 5 institutions of higher learning in China¹ were collected, and 64 selected industrial design lecturers from these five HE institutions were interviewed to evaluate design works which were completed by design students in the courses during the four-year long programmes. The purpose of this study is to further understand how lecturers evaluate students' design works and to explore their reasons. Through the analysis of the data collected from this interview, the results indicate that most lecturers have difficulties with providing concrete instances of what they mean by creativity, and subsequently they were unable to articulate criteria they used to assess students' creativity.

Keywords: Creativity cultivating, teaching and learning process

1 INTRODUCTION

1.1 Research background

In the face of the global attention to talent competition and talent training, cultivation of innovative and creative workforce has become one of the goals for Chinese Higher Education (HE) institutions². Lin and Xin [1] pointed out that as lecturers plan, organise and implement teaching and learning activities, such as assessment and mode of class delivery, the lectures play a vital role in cultivating and developing the future creative workforce. Xu [2] suggested that there is a correlation between how lecturers and students approach creativity. As assessment practices, including assessment criteria, privilege and promote certain knowledge and skills over others, the assessment practice shape students' learning and their professional practice development [3]. Xie pointed out that the solution process of artistic design method is a creative process, a cognitive process and a social process, so designers cannot be without creativity [4]. Although, there is an increased emphasis on creativity in the field of design education research in China, no research has been undertaken yet to explore whether current pedagogical practices, including assessment, are facilitating development of creative approaches. We report results from the Academic Design Assessment Practices (ADAP) research exploring lecturers' assessment practices and whether the assessment criteria support students to develop knowledge facilitating creative approaches.

1.2 Research objectives and methods

To understand which aspects of students' knowledge were aimed to be developed, we reviewed learning objectives of all core courses in five leading Chinese industrial design programmes. Then, to understand which knowledge the assessment criteria promoted we interviewed lecturers (n=64) who delivered and assessed core courses in these reviewed programmes. Prior to the interview each of the lecturers was asked to select a top graded student design project from their courses. The high graded student's projects

¹The five institutions are: Central Academy of Fine Arts, Nanjing University of the Arts, Jiangnan University, Shandong University of Art and Design, Nanjing Forestry University.

²Include reference to the 21st Century Education Revitalization Action Plan

were used during the interviews as discussion pieces and to help the lectures to articulate criteria which they used to determine the assessment grade. During the interview schedule we used the following key questions: 1. Please briefly describe the teaching process of this course; 2. Why do you think this is an excellent student design work and in what aspects?; 3. How do you understand creativity?; 4. How do you understand the expression of creativity in student design works?

2 UNDERSTANDING OF CREATIVITY

Fu [5] argued that creativity can be understood differently by different cultures. Nevertheless, China's research on creativity is based on the results of western creativity research. Under the background of Chinese culture, Liu [6] purposed that the connotation of creation mainly embodies the novelty, uniqueness and appropriateness of creating achievements. Gan [7] suggested that creation refers to the activity process in which the subject synthesizes all aspects of information, forms a certain goal, then controls or regulates the object, and produces new achievements of social value for the first time in the process of world history and in the world. Similarly, Lin [8] proposed that: "creativity is the use of all known information to produce the intellectual qualities of a product that is novel, unique, of social or personal value for a certain purpose." Li [9] suggested that people also tend to create the process of activity when defining creativity and define it as one or a series of specific processes for analysing or solving problems.

2.1 Creativity behaviour

Mackinnon [10] defined the behaviour of creativity from the perspective of personality, process, situation and product. Gardner [11] suggested that individual, other persons, and work interactions constitute creative behaviour. Robbins [12] pointed out that the causes of creative behaviour include creative potential and creative environment, and there is a certain functional relationship between them, through the identification of problems, information collection, creative generation to creative evaluation is the whole process of creative behaviour. Basadur [13] argued that creativity is the process that produces results: creativity involves continually identifying, solving problems and implementing new solutions. This response must be new and appropriate for the task and problem-solving. Feedback, such as assessment, is an incentive strategy in the behaviour system through intrinsic motivation, emotional state and understanding of standards and mastery of strategic skills influence creative behaviour [14]. The generation of creative behaviour runs through the process of identifying problems and using knowledge to solve problems, and knowledge plays an important role in the generation of creative behaviour.

3 IDENTIFICATION OF ASSESSMENT CRITERIA OF INDUSTRIAL DESIGN

3.1 Knowledge structure for industrial design teaching in Chinese HE institutions

In 2019 more than 600 institutions [15] in China offered a major in industrial design. Although, China has become a country of advanced art and design, and the scale of education is unprecedented, according to Peng [16] the design graduates are not meeting the basic quality of China's manufacturing companies' needs, in view of the above findings we reviewed learning objectives, related teaching syllabus and contents of the curriculum of the top five industrial design HE institutions in China, listed in Table 1. Even though, the knowledge structure of industrial design teaching across the Chinese HE institutions is adapted by each of the HE institutions, the top ranked industrial design HE institutions programme structures are used by rest of industrial design programmes as benchmark. Therefore, we have included highly ranked industrial design programmes in China in this study. For example, Nanjing University of the Arts and Jiangnan University were both ranked at top in the soft Chinese discipline of "Design Science" [17]. Central Academy of Fine Arts, Nanjing University of the Arts and Jiangnan University all belong to Class A++³ in the fourth round of subject evaluation of the Ministry of Education.

Table 1. Publicly listed programme objectives of five selected industrial design degrees

³Since 2019, China's design discipline rankings have been graded using A++, A+, A, B+, B, ...E. The ranking consists of total 5 Classes and 11 Levels.

Nanjing University of the Arts
Talent Training Objectives: <i>"Thought" construction - curriculum foundation, enrich students' ideological understanding. The cultivation of "behaviour", the cultivation of students' ability to think and solve problems independently, the cultivation of "habit", the stimulation of students' personal interest and passion "designer" character formation-the lofty requirement of curriculum goal setting up design for human "third wisdom".</i>
Core Curriculum: <i>Product development design, Drawing and modelling, Product engineering design, Ergonomics application design, Mechanical structure, Problem-based learning etc.</i>
Central Academy of Fine Arts
Talent Training Objectives: <i>Cultivate high-level creative talents with a sense of responsibility and international vision, be able to actively respond to social changes and integrate innovation, adhere to academic supremacy, educational ideals and talent training as the core of discipline development, and focus on developing students' creativity and resilience.</i>
Core Curriculum: <i>Undisclosed information</i>
Jiangnan University
Talent Training Objectives: <i>It has a solid theoretical basis for industrial design and the ability to find, define, analyse and solve problems in an integrated manner. It has a broad international vision, strong sense of social responsibility and innovative design thinking. It is capable of engaging in industrial product innovation design, business model design, interaction and experience design and service design for enterprises and institutions, professional design institutions and scientific research units under the changing economic and industrial patterns.</i>
Core Curriculum: <i>Technical basis and design expression, Principles and methods of interactive design, User research and experience strategy etc.</i>
Shandong University of Art and Design
Talent Training Objectives: <i>Cultivate innovative and applied product design talents, and actively respond to the national "design innovative talents as a guide" call.</i>
Core Curriculum: <i>Design sketch, Design drawing, Display design</i>
Nanjing Forestry University
Talent Training Objectives: <i>Cultivate senior industrial design and engineering talents with solid basic design knowledge, advanced design concepts, rigorous logic analysis ability, skilled design performance ability, Chinese cultural background and international vision, capable of product development and design and related fields of design, research and teaching.</i>
Core Curriculum: <i>Design drawing, Design sketch, modelling principle, Mechanical design foundation, Computer aided industrial design, Product system design etc.</i>

In summary, the stated programme objectives for the undergraduate programmes in industrial design in the five HE institutions aimed for students to develop the ability to independently identify, analyse and solve problems on the premise of having a solid theoretical foundation in their field. The programme objectives also emphasized the importance of innovation which is consistent with the Chinese national strategy aims. However, none of the courses in the core curriculum included "creativity" in their title. Whereas the course titles placed emphasis on the technical aspects of design e.g. sketching, colour and construction of three-dimensional composition. Although, the programme objectives emphasised development of creative talent (e.g. design thinking, innovative thinking), this does not seem to be translated into the core courses which it seems still maintain a more traditional descriptor of technical training.

3.2 Research results and analysis

Not surprisingly, the data indicates that the evaluation criteria used by lecturers expanded as the programme progressed. Interestingly, the lecturers from the different universities referred to similar evaluation indicators for student design works within the same programme level, which reflects homogeneous approach among the reviewed programmes. Overall, the first year focused on developing students' basic abilities such as: cultivating students' modelling ability, colour perception ability, the expression form of design work, and it required students to complete the design work independently. In the second year, the students' creative ideas, the function of the design work, the understanding of the material and the evaluation criteria of the process level of the design work were added. Based on the third and fourth years of the programme, the evaluation criteria of the customer's needs in the design work was added. Overall, the creativity has been included in the criteria of evaluating students' in undergraduate design work, which is basically consistent with the requirement of cultivating innovative talents in undergraduate teaching goal and talent training programme. The key words for the evaluation of different design works in different programme years across all the courses are listed in Table 2.

With the deepening of professional study in different academic years, lecturers pay more and more attention to "Structure" as one of the evaluation criteria, although the last semester it has declined, but in the overall there is a rising trend. The key word "Form" has appeared in all four academic years, and the overall trend is on the rise.

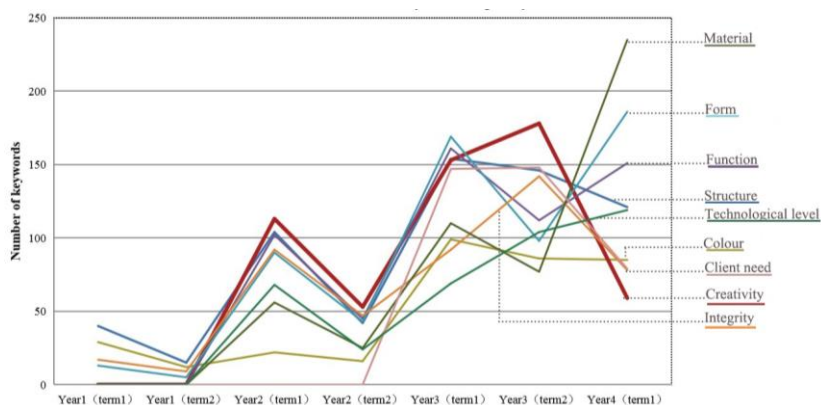
The assessment criteria key word "Function" was not mentioned by lecturers teaching in the first year the first-year programme level, but increased rapidly in the second year, it maintained a steady trend for the subsequent programme levels. The assessment criteria key word "Creativity" was also not mentioned by lecturers teaching the first-year programme level; however, it grows rapidly in the second and the third year, and then it declined in the fourth year.

Table 2. Summary of keywords evaluation- related in interview records

Programme	Assessment Criteria (Keywords)
First year	Structure, color, form, integrity
Second year	Structure, colour, creativity, function, form, integrity, material, technological level
Third year	Structure, colour, creativity, function, form, integrity, material, client need, technological level
Fourth year	Structure, colour, creativity, function, form, integrity, material, client need, technological level

The frequency of the keywords is compared longitudinally, and the change of each assessment keywords in seven semesters can be seen through the line diagram as shown in Table 3.

Table 3. Assessment criteria Keyword frequency table



The assessment criteria key word "Material" also was not mention for the first year. The trends for the second and third years were relatively stable, with the highest number appearing in the fourth year. The keyword "Integrity" has been found in all four academic years, with the highest number in the second and third years, and it felt in the fourth year.

The assessment criteria key word "Technological level" did not appear in the first year. But overall, it was on the rise. The assessment criteria keyword "Client need" did not appear in the first as well as in second year, but it shown a sharp rise in the third and fall in the fourth.

Although, "Colour" overall frequency count is the lowest when compared to other 5 assessment criteria it is included in every programme year level. it to be the least mentioned. for the puts it as proportion of the four academic years than others, but, especially in the third.

The frequency of evaluation indicators in the seven semesters of the four programme years from high to low is: structure, form, function, creativity, material, integrity, technological level, client need, colour (Table 3). The frequency of creative appear mostly in the second year, the main purpose of the analysis of Table 3 is to observe the change of the frequency of the key words mentioned by the lecturer in the evaluation of the student design work in the undergraduate four academic years.

Subdivided into each year, the key words in different year frequency ranking, we can see that lecturers in different year to the student training focus is different. As shown in Table 4 (1-4).

In the first year, lecturers focus on the ability of students to structure, colour, form, and integrity (Table 4-1). During the second academic year, there was an examination of the students' creative ideas, the function of the design product, the material of the design product and the level of the process, in which the frequency of the key words appears from high to low: creativity, function, structure, integrity, form, technological level, material, colour (Table 4-2). In the second academic year, lecturers focus is on the facilitating students' creative thinking.

The frequency of assessment keywords in the third academic year from high to low is: client need, creativity, structure, function, form, integrity, technological level, material, colour (Table 4-3). Since the design courses in the third academic year tend to have more design practice projects, most of the course design works are undertaken in cooperation with an enterprise. Therefore, in the third year, lecturers are more focused on the ability of students to generate creative ideas based on meeting the needs of their clients.

Table 4-1

Table 4-2

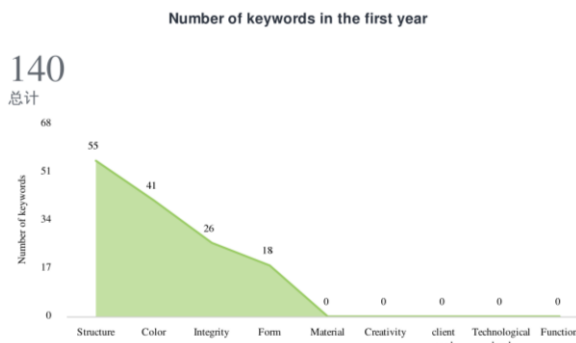


Table 4-3
Number of keywords in the Year 3

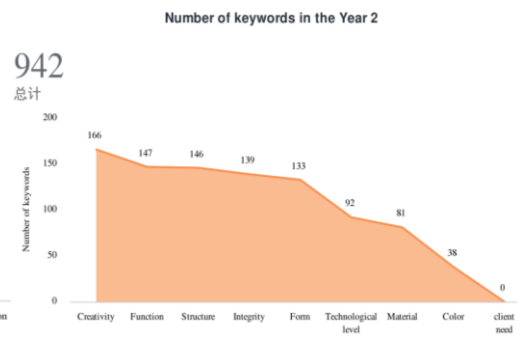
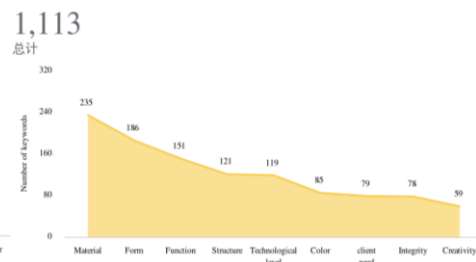
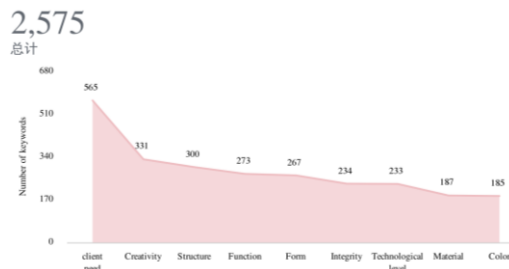


Table 4-4
Number of keywords in the Year 4



The number of keywords in the fourth year from high to low is: material, form, function, technological level, structure, colour, integrity, client need, creativity (Table 4-4). In the fourth year, lecturers aim is was for students to demonstrate comprehensive knowledge application in their projects. The students have been also required to demonstrate their understanding of functions and forms of different materials in their design work.

3.3 Assessment of creativity

We have identified 9 key assessment criteria that lecturers acknowledged during the interviews they deemed to be important in evaluating students' work. However, criteria which can be used to evaluate creativity approached such as "problem finding" and "problem solving" have not been considered by the lecturers during the interviews. We suggest that as the lecturers focus is on assessing the final student design project outcomes they fail to pay attention to students' creative behaviours such as whether they can find valuable topics, whether they can make decisions about unexpected situations, and whether they can effectively communicate with the internal and external collaborators.

From the research data (Table 3), we can observe that lecturers mentioned "creativity" frequently during the interview, and it ranked fourth (second only to structure, form and function), but in the course of the interview with 64 lecturers, we found that lecturers were unable to articulate to a large extent what creativity is, what creative design work is, and were unable to explain the reason why the student project was consider as creative. For example, 60% of lecturers who evaluated excellent student design works in their course often describe it as: "This project is creative"; "It's innovative"; " It's unique, thoughtful and creative." Lecturers, when asked what creativity is, more often interpreted it in terms of concepts such as "innovation, creativity," which are still very abstract, perhaps the most practical explanation being "unique" with little reference to the often-presented explanation such as "social value" or "applicability" or "leadership" in creativity research. Therefore, when lecturers explain the reasons for designing projects that they think are creative, they cannot clearly express what is creativity and innovation.

In addition, although in the relevant literature on creativity, we believe that creativity is closely related to professional knowledge and cultural background, it seems that lecturers are not aware of such issues. Lecturers focus on the application of students' knowledge in fields of structure ability, product versatility and colour application, and do not believe that the use of domain knowledge is directly related to creativity or the promotion of creativity. And 40% of lecturers did not include creativity into the evaluation process, and more emphasis was placed on design work colour perception, structure ability, use function, and integrity.

The above findings also reflect the lack of a guiding assessment criteria evaluation system and standards in the field of industrial design in China. The Industrial Design lecturers often rely more on their intuition

and experience when evaluating students' homework, which does not show that the evaluation results are ineffective, but rather that long-term dependence on such a way, or not aware of the problem. We suggest that these approaches are not conducive to lecturers teaching students design methods more effectively and is not conducive to guiding students to critical self-evaluation.

4 CONCLUSIONS

Based on the requirement of the national policy of China to train innovative talents in HE institutions, this study discussed the evaluation assessment criteria used by lecturers of industrial design in evaluating students' design submissions. The results indicate that training objectives of HE institutions kept with the national policy, by aiming to cultivate innovative talents with solid professional foundation. However, in the teaching process, lecturers were not able to fully implement the training objectives and the contents required by the syllabus. To a large extent, lecturers are more inclined to use their own personal preferences for design works when evaluating students' design works and focus on examining students' ability to apply general technical knowledge in design works.

The lack of lecturers' ability to articulate assessment criteria related to creativity makes it difficult for students to achieve the learning goals required by HE institutions in the teaching process, and the students' internal innovation ability will be difficult to be improved during the teaching process. Exploring how lecturers understand the problem of students' creativity in design work, analysing the problem from the perspective of teaching subjects provides a direction for future sustainability research, at the same time, it can also arouse more design educators to pay closer attention to their academic practises to realize the stated teaching objective of cultivating innovative and creative talents.

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