

# The Crafts Design from Tradition to Innovation - A Preliminary Study on Beginners' Learning Behavior Model

Yi-Shin Liu\*, Dr. Li-Hsun Peng\*\*

\* *Doctoral Program, Graduate School of Design, National Yunlin University of Science & Technology;  
Dept. of Fashion Design, Hsuan Chuang University, liumag315@gmail.com*

\*\* *Department of Creative Design, National Yunlin University of Science & Technology, penglh@yuntech.edu.tw*

**Abstract:** The purpose of this study is to discuss the development process of students' learning behaviors when students primarily learn crafts design in "Metalsmithing" courses. The study applies The Perry Scheme by William PERRY (1970) proposed for the development of college students' knowledge epistemology. Two development stages of cognitive models, Dualism and Multiplicity, are applied as bases for curriculum design and utilize The K-J method to classify students' works. Theoretically, applies the Phenomenography to analyze students' assessments and evaluate their stage of cognition. Three conclusions are as follows:

(1) Lacking capabilities of advanced techniques and integrated application: most of the students rely on the teacher's instruction, less thinking about technical improvements and integrative implications. (2) A divide of technical capabilities and design thinking: studies shown that students are able to seek for a better solution by thinking cognitively; unfortunately, owing to a lack of honed techniques, the result of their work are often far from their desires or teacher's expectation. (3) Innovations with multiple guide and develop thinking skills: the qualities of craft innovation are not entirely based on techniques and quantitative accumulation. Therefore, learning techniques emphasizes on mentoring system for learning crafts traditionally, process to the innovation and development to enhance the learning process design and design cognition.

**Keywords:** *Perry Scheme, Cognition, Phenomenography, Craft, Metalsmithing*

## 1. Introduction

### 1.1 Motivation

"Craft" is accumulated by the culture and civilization. Inevitably, to inherit this wisdom, techniques would be a starting point to show whom qualified and capable to create and invent things. Traditional apprenticeship focus on technique heritage by constantly repeating and exercising to achieve master's standard. Nowadays, craft design teaching at universities emphasize on all of techniques, design and innovation, but that depends on the teacher's guidance. Academia rarely discusses the development process of learning cognitive and innovative model. By individual learning and teaching experience, acknowledging whom firstly experience developing artworks with the specified guidance for innovation and development, their cognitive and behavioral patterns is worthy to discuss. Focus on students who firstly experience with a course of Metalsmithing to explore their development of learning patterns.

## **1.2 Research Questions & Purpose**

Botnick & Raja suggest that “since the turn of the twentieth century, design has come to be defined as a professional activity decoupled from the manufacturing process. This separation has established the design profession in hierarchical opposition to craftsmanship” (2011:54). In the past, the traditional craft development regards as the correctness, accuracy and inheriting high-end skills, but fewer developments involves innovative thoughts. Yet, within the context of the integration of craft and design, the traditional craft development becomes not only a need to master professional skills but a must to develop thinking and disciplines to solve design problems. Thus, in class, a perennial challenge for design educators is to teach discipline-specific context required while advancing the development of thinking and problem solving skills (Carmel-Gilfilen & Portillo, 2012:238). Technical development must inevitably make steady progress incrementally; however, how instructors avoid from the traditional technical-oriented learning cognitive to activate students’ techniques to address on questions of design and structure. Hence, the students’ cognitive development in this learning process-oriented is what this study is going to aim at.

The purpose of this study is to understand the process of beginners’ cognitive development and learning model. Applied “Perry Scheme” by Willian PERRY, university students knowledge epistemology proposed development framework to explore the development of student process in design learning. The first two stages of development in the Perry Scheme are Dualism and Multiplicity that are the basis for curriculum design. By utilizing KJ method to classify students’ works, the research analyzed visual image by Phenomenography as well as assessment of the cognitive stage in order to integrate beginners’ cognitive model and the improvement of craft design teaching process.

## **2. Literature View**

### **2.1 Craft and Craft Learning**

Owing to physical shape of substance, human spirit and civilization revolution, the importance of craft was born in response to the needs of life, the most ancient human heritage and the specific cultural assets. It contains characteristics of cultural, aesthetic, unique, and economic. In industrialized societies, many researches and equipment have been developed. Technology and materials themselves far beyond any restrictions can be mass-produced, and replace manual processes. Liu proposed “in contemporary art, especially craft, tradition, modernity and contemporary are the fuzzy concepts corresponding to origin, development and transformation which will lose the ground” (2009:3); traditional craft, however, did not disappear due to industrialization and technological development, but due to the attention to this asset as a new realm, and this phenomenon also affects the process of learning and development model.

The learning progress, in essence, has a clear level tendency, especially in metal craft. On technical aspects of the inevitability of sequential learning and insufficient, techniques are unable to provide follow-up design and production needs. The principle requirements on learner guidance should go along with the familiarity of its techniques, but the level orientated learning in the connotation of courses of “combination of skills learning and artistic creation” cannot completely explain the situation (Lee, 2006:41). Students follow teacher’s guidance step-by-step and practice repeatedly will soon go into next level. After the intervention of elements of artistry and innovation involves, student learning cognitive become complicated. It is not only important issue but also a

profound impact on the level of innovation of the outcome that how to deduce the possibility of applications and to shape of technical specifications for teaching and learning.

## **2.2 William Perry's Scheme of Intellectual and Ethical Development**

"Perry Scheme" a framework for development of knowledge of students' cognitive theory proposed in 1970 by William G. PERRY, initially in non-structured interviews of students at Harvard University. The detection of college students' coherent development pattern also reflects students' understanding of the perception about the world. Perry Scheme divided into three main stages that are dualism, multiplicity and contextual relativism where the relativity period of this theory can be divided into contextual relativism and commitment relativism. Each position resents a qualitatively different model of thinking, or structure for perceiving the nature of knowledge (Brooks, 1998:4). This structure on the students learning cognitive does not go hand in hand. Sometimes due to different curriculum or subjects, it can be in the different stages of cognitive at the same time.

Perry proposed various standards of stages to identify different indicators and different process. This model is also used in the various disciplines of the tertiary institutions and the further development and validation (Baxter-Magolda, 1995; Moore, 1994); meanwhile, there are more than one thousand interdisciplinary researches have been influenced by the findings ([www.PerryNetwork.org](http://www.PerryNetwork.org)). Nevertheless, in the current research climate, a certain part of Perry Scheme should be strengthened. Hofer and Pintrich (1997) mentioned "there are a number of limitations to Perry's (1970) work: most notably, a gender bias and difficulties in measuring cognitive change", especially in the gender issues which brought scholars: Belenky, Clinchy, Goldberger and Tarule in 1986 published the book "Women's ways of knowing: The development of self, voice and mind", raised a viewpoint about women's knowledge. Perry's groundbreaking research about epistemology and learning cognitive for the college students' cognitive development is still a focus in academic field currently.

## **3. Research methods and theories**

### **3.1 Theory of Perry Scheme**

In *Forms of Intellectual and Ethical Development in the College Years*, Perry states students questioning about how knowledge forms and where the sources are as for their own cognitive understanding and how to change over time. Knowledge epistemic divided into three types - Dualism, Multiplicity and Relativism, wherein each period is divided into two or more stages, a total of nine stages (Perry, 1970). In which nine stages, learners within all process is only "right" or "wrong", "good" or "bad", and grow to realize knowledge with multiple conflicts. Thus, they are able to decode based on the original sources, evidence and logical reasoning, and acting, in accordance, determined by personal opinion, ideology, interests and values.

The Perry Scheme's position 1 and Position 2 represent students believe that all things lead to answers and can be solved. Therefore, they rely heavily on instructor to provide them with the necessary information in order to solve a problem (Carmel-Gilfilen & Portillo, 2012:239).

Position 1: Duality, students believe teachers or books for providing correct answers.

Position 2: Thoughts, students believe the absolute boundaries of right or wrong, but they agree teachers are not the only sources, or if teachers give more complex situations for seeking answers, professions or authority that they thought may provide the correct answer.

Position 3 and Position 4: Multiplicity, students believe that authorities may know the answers in some areas, but where ambiguity exists, any option must be considered acceptable (Brooks, 1998:6). They think information is absolute right and intend to understand problems from a variety of angles. They will figure what teachers want and seek for teachers' recognition; sometimes the task is difficult to assess but they attempt to interpret. All answers seem to be effective. Mainly in these two stages, students' task is to learn how to look for the solution and respect everyone has their own answers or opinions, not all the answers are unique.

Position 5 and Position 6: after students recognize all teachers' master field, they should turn into self-learning and start asking questions. Some students can recognize all knowledge corresponding to situational areas. Appropriate or inappropriate, right or wrong and good or bad should determine with the relevant context so that students can comprehend everyone effectively. Based on this learning process of solving problems and providing evidence, they begin logical reasoning as a cognitive foundational decision-making.

Position 7, Position 8 and Position 9, students can truly understand the truth relatively. The significant means depend on the situation which is not only individuals in the academic world, but also penetrate into their life in every aspect. Students learn knowledge as a foundation in addition to seek their own answers; in addition, they can create their own values, worldview and the code of conduct.

### **3.2 KJ Method**

KJ method originated in the 1960-1970's, by Japanese human culture scientist, Kawakata Jiro. The main feature of this method is to classify the basis of integrated innovation. KJ method can minimize numerous literature, information, etc. in significance or separated sentences recorded solidly in the card by individuals as well as group discussions. Different from statistical concepts, KJ method is not quantified research; other than that, it uses a written language to facilitate problem solving, and induction of which is a good way to know the facts in diverse information.

KJ method can categorize and classify data or information for systematical function. Recently, design study began to utilize this method to process and analyze "non-text" information such as shape, visual design, image etc. (Cheng, 2007:86). This study employs KJ method as a research method to process and to classify those visual images, furthermore, to analyze them by Phenomenography in order to construe students' works.

### **3.3 Phenomenography**

Phenomenography is one of qualitative researches regarding human's cognitive experience including feeling, understanding, begun in the early 1970s in Sweden. Marton and Booth (1997) claim "that a fundamental difference between Phenomenography and Phenomenology is perspective to examine what his/her reaction when encountering conflicts or problems" (McGuinness, 2007:153). In contrast of Phenomenology, Phenomenography revered for specific reaction specifically generated image or visual phenomenon as the main analyzed object. Mainly, the description and analysis is the human experience and understanding. The purpose is to understand different perception of the same phenomenon.

The purpose of Phenomenography is to solve the problem in thinking and learning (Marton, 1986). In this study, the students' works are as the results of learning cognition. These illustrations are the "outcome" of learning instruction and personal transformation after teacher's guidance and instructions, by the viewpoint of Phenomenography, the illustration analysis in the follow-up chapter.

## 4. Discussion and Analysis

### 4.1 The Research Limitation

The participants of this study are college students who select the course of “Jewelry / Metals I” at the School of Design. Basic techniques such as sawing, sanding, filing, surface embellishment and soldering are taught in this class. The variables are the theme project for design and innovation. Eighteen weeks, two hours a week and the researchers unify classes, strategies, and course content. In addition to this course as free elective, students whose attendances only specified at School of Design, excluding age, gender and prior character. The total participants are 22: 3 males, 19 females, including one for seniors, and the remaining 21 for sophomores. All students have never learned any metal craft techniques. Contingently, the corollary to gender cognitive or prior character influenced prior learning enthusiasm is still open to question; therefore, this study only focuses on learning experience cognitive process on craft.

### 4.2 Design of Research

This study applies the first two stages of Perry Scheme - Dualism and Multiplicity - as the basis for curriculum design, with two of the four cognitive stage planning and content, class-oriented techniques teaching. The instructions and students are required to complete the task, then analyze by the cognitive behavioral patterns of Perry Scheme. 18 weeks of teaching and research, according to four stages are listed in the following table course covering techniques, demonstration, discuss and explain design or model, works published with comments, detailed in Table 1:

Table 1. Curriculum Design versus Perry Scheme cognitive stage

Position of Perry Scheme	Summary of Position	Teacher's Instruction	Student's Task
Position 1 : Basic Duality	Believe in teachers and textbooks. Believe all things with answers.	Give explicit techniques. Set clear formantes of assignments, but prompt within limitation in shape.	Complete and practice basic geometric shape, curve sawing and texture.
Position 2 : Full Dualism	Give complex scenario guidance for seeking the answer. The teachers are not the only creditable sources.	Apply Position 1 to produce and design. Set a clear formate but to different design approach and scenario.	Shall integrate the technique of Position 1. Use suitable methods and structures to complete a pair of pendant works.
Position 3 : Early Multiplicity	Remain the most knowledge as absolute. From a variety of angles to recognize the problem and seek for recognition.	Give explicit techniques. Set a clear formate of assignments that customize the structure and design of positioning.	Use a sheet of metal to design and produce a dimensional ring. Interphalangeal sculpture designed as the direction, without considering comfort as wearing.
Position 4: Late Multiplicity	Identity one's answers or opinions. The answer is not the only.	Give explicit techniques. Set clear formate and inform the subject of the work.	Use the structure of Jump ring and welding technique to design and produce a necklace, themed as “Spring”.

### 4.3 Dualism of Cognitive and Behavioral patterns in Technique Learning

Teaching and demonstrating craft techniques, in a case of beginners, teachers must inevitably demonstrate and explain step-by-step, on the one hand, for correcting a perception of the basic operation and to lay the foundations

of future learning, on the other hand, for operating efficiency and safety considerations. According to this study's findings, the more students consider technical skills, the larger cognitive and behavioral patterns of dualism appear. They clearly and carefully follow the steps, especially in Position 1 and 2. By their works can be seen that dualistic students failed to recognize the inherent psychological thinking that the task requires. Instead, they described designing as a process involving very little exploration, review or modification. This approach involves a more limited way of thinking (Carmel-Gilfilen & Portillo, 2012:252). Depending on different assignment, students thought it as technical exercises. Even if teachers guide and instruct their design should be completed under certain limitations or by design method, and scenario. Most of students do not have too much breakthrough in forms or application of techniques but only correct techniques taught by teachers in accordance with the faithful specifications, rarely through techniques integrated with changes or in-depth consideration, while the output of the works from design aspect (Figure. 1, Figure. 2).

Tools are simple and multi-functional. Knowledge transfer is direct, from generation to generation. But most importantly, the process of shaping materials into objects, of meeting functional needs, and of fulfilling simultaneous longings for beauty and creativity...not only as an artifact or a commercial object but equally as stimulus to innovation (Botnick & Raja, 2011:43). In the process of learning, tool is simple not necessarily a single function but mutual integration is important. How can students pursue the integration of production, function, aesthetics and innovation under the material restriction and limitations? Under the difficulty of reaching elementary techniques, beginners learn how innovation is in the techniques learning in the period of dualism should be a breakthrough.

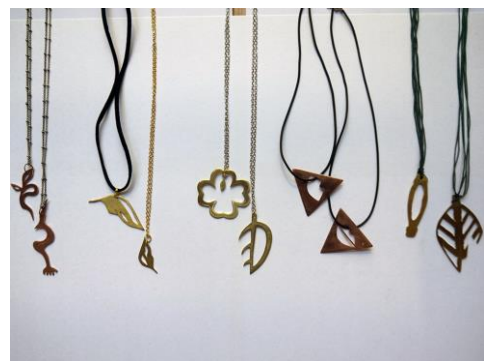


Figure.1 Position 1: Basic geometric shape practice samples. Figure.2 Position 2: A pair of pendant works.

#### 4.4 Evolution of design thinking

It seems few students work appears the point of Position 1 and Position 2 which students still believe to complete the task by following teachers' instruction is a safe range. In Position 3, because of the similarity of the contents and the class practice which students use paper with a variety of methods forming paper into other dimensional modeling practice. The result of this practice makes students only need to pay attention to the details such as the difference thickness between metal and paper. When directing assignment teachers give a general statement such as "Interphalangeal sculpture" and explicitly given "without considering comfort as wearing"; by this way, teachers does not affect too much on students' cognitive and feelings; instead, students at this stage, combined with the application of the techniques, and the different aspects of the design solution from different perspectives.

In contrast of the dualists, multiplicity recognizes the importance of exploring different solutions. They described design as a cyclical process, where ideas are explored regularly (Carmel-Gilfilen & Portillo, 2012:253). In this process, by making the paper model stimulates student to explore the possibility of modeling and design. Teachers also give a further guidance repeatedly stimulates them thinking about the best combination of modeling techniques, and how to seek different combinations to solve design problems.

Comparing the students' final works from their paper model works (Figure. 3, Figure. 4), the result shows only a few student can duplicate the idea from their sample faithfully. Most of them still in the stage of developing design thinking rather than their technical skill. Their artwork cannot produce as expected results.



Figure. 3 Position 3: Ring design paper models.



Figure. 4 Position 3: Ring works.

#### 4.5 Techniques, Design thinking and innovation

Carmel-Gilfilen & Portillo claimed “too little pedagogic support leaves dualistic student discouraged; too much support hinders independent thinking and growth. When students remain entrenched in a more primitive form of thinking, they risk becoming paralyzed intellectually” (2012:252). Indeed, the in-depth connotation of courses of “combination of learning and artistic creative skills”, teachers’ challenge is how not only to avoid jeopardizing the traditional heritage but also give students innovative guidance and opportunities. Based on the connotation of Position 4 cognitive concept, beginners cannot make process to the expectation of the Fourth stage throughout the semester.



Figure. 5 Position 4: Students’ original prototypes versus final works.

For instance, when students design their first prototypes with the theme of spring, the prototypes cannot be departed from necklaces seen on streets that is beyond the objective of this stage which is all possibilities in shape. Nevertheless, students only modify according to teachers’ opinions do not clearly shown personal techniques and the unique viewpoint of idea integration (Figure. 5), and therefore student hardly make any progress or expand to the multiplicity. The craftsperson is in the possession of this on the spot knowledge and we call the mode of

design thinking born from such an experience “subtle technology” (Botnick & Raja, 2011:44). Regardless of technical or innovative development, knowledge of Craft sometimes formed by experiences not verbalized by words in details; thus, if learning cannot be multi-dimensional and specialized, student cannot cross the multiplicity period, thereby establishing a personal perspective.

## 5. Conclusion

Lawson discusses how design students obtain skills that assist them in meeting their creative potential, “Design education, then, is a delicate balance indeed between directing the student to acquire this knowledge and experience, and yet not mechanizing his or her thought processes to the point of preventing the emergence of original ideas” (Lawson, 2006:157). Combining craft techniques, design and innovation of which complexity and cognitive development is far beyond the traditional slavishly mentoring of indispensable techniques, thoughts, and innovative concept. Above research and analysis, the following are three conclusions:

1. The lack of integral capabilities and high-end techniques: the majority of students in technical cognitive patterns, in Perry Scheme definite as “dualism”, that is to say, most of them in the technical capacity to develop or to rely on demonstrating and operating, less thinking about advanced integral capabilities and high-end techniques;
2. The skill gap between technical capabilities and connotation of design: studies have shown that students in cognitive development of design and innovation to early multiplicity which can seek a better design program rather than totally rely on the cognitive stage of wrong criticism or preferences. However, the skill gap cannot keep up the pace of thinking to support solving all the problems in design process, and thus the results of their works are often unable to be expected.
3. Cultivating innovative guidance and multiple thinking abilities: in innovative design, good or bad is not entirely based on techniques. In addition to the basic demonstration, how to guide students reflect further on the development and integration of techniques become significant for students to create multiple thinking and learning by the traditional process and techniques to progress to the innovation capability heritage development, in order to enhance the learning process of cognition and development in design.

Craft is as a complex scientific subject solving design problems. We must take into account the limitations and the use of tools, but also think about the components of innovation and creativity. Throughout this study, it can be understood the design educators in formative foundational course, should separate students from technical basis framework to create comparable teaching guidelines.

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