The Relationship between Design Concept and Sketches of Architectural Design Novices

Shih-Yung Liu* and Yi-ching Liu** and Hsiu-Tyan Chuang***

** Chung Yuan Christian University, Doctor of Design Program*
deshouse@ms46.hinet.net
*** Chung Yuan Christian University, Doctor of Design Program*
Tungnan University, Department of Construction Technology
liu0129@mail.tnu.edu.tw
**** National Taiwan Normal University, Department of Industrial Education*
hsiutyan@ntnu.edu.tw

Abstract: Most architects use concrete forms to help them develop ideas. Such process is commonly found in conceptual sketching and abstract graphics. The sketches developed by the designers not only record the designers' concepts but also help the formation of the concepts. This study investigates how the novice students of architectural design (first-year students) come up with something new from the process of sketching and then design and construct the models of the sketches. In addition, the research tries to explore the relationship between design concept and sketching of architectural design novices by analyzing the time consumed, amounts of sketches, model making time period and the results of their sketches. These data are eventually integrated with teachers' observations to finalize outcomes from this project.

Key words: architectural design, design concept, sketch

1. Introduction

While developing their ideas, designers commonly use a number of forms of graphic representation mainly are conceptual sketches and abstract diagrams. To most architects, sketching is inseparable from conceptual design, moreover, sketches are the tools they learn to use to progress their designs. Additionally, sketching is a learned process during design education where architects learn to think with drawings, develop their ideas and solve complex problems with them. (Schon, 1983; Akin, 1986; Lawson, 1990) They practice sketching skills till they become professionals. Initially, an architectural plan might comprise meaningless symbols to a novice designer, until s/he takes on the intended meaning through learning the conventions associated with them. Then sketches become aids for the progression of a design solution and play an essential part in knowledge acquisition and representation. The ability to read or produce sketches appears to be the only way to develop architectural expertise.

What would it be if a designer develops ideas and designs solutions without using sketching? when an architect does not have access to sketching? Unable to sketch probably prevents designing. Therefore, this project hopes to find out novice designers' perceptions between design concept and sketches, by assessing how architecture

freshmen students realize and sense conceptual sketching process of distinct stuffs then move onto designing and making.

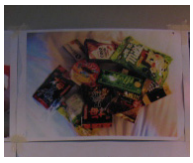
2. Research theories and references

Drawing is a means to an end- a tool to help solve problems, create new ideas and assist communications. (Hank and Belliston, 1992) Moreover, drawing is a required skill for every designer. Designers must be able to express their concepts by drawing, description or modeling. Drawing is the easiest and most direct mean among all and widely used and most used to highlight the work itself. (Yu, Han, and Li, 2004) Akin (1978) believes that sketches cover design solutions and seem to be essential for recognizing conflicts and possibilities. One of the most influential views is that sketching is a dialogue between the designer and what the drawings suggest. (Goldschmidt, 1991; Schon and Wigginsru, 1992) Goel (1995) defines sketches as equally essential for revising and refining ideas, generating concepts and facilitating problem solving.

With today's rapid growing computer technology, virtual 3D models created by latest software are taking over precise free-hand drawings in the old days. Design sketches remain irreplaceable during design thinking and communicating process, regardless conveniences brought by computer and technology. Goldschmidt (1992) even considers design sketch the most valuable and creative part throughout design behaviors.

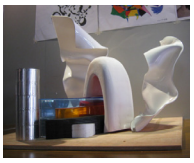
3. Research method

51 freshmen students at the Architecture Department in Ming Chuan University are divided into 4 groups with no different conditions. This research tries to record sketching and making model time periods which are recorded by each student using the standard form we've provided, sketching amount and grades of design assignments from each student, using them as variables to discuss and analyze in order to understand relation between concept designing and sketch drawing from novice designers. Students are given instructions as the followings below to transform and simplify a meaningless 2D picture into a 3D model: (1) Students should take vertical view pictures (one or more) as the fundamental 2D picture after piling up any objects. (Picture. 1) (2) Then they should make the final 2D pictures (one or more) with concrete design concepts after making plenty of sketches, based on the fundamental 2D picture with or without any design concepts. (Picture. 2) (3) Repeat step 2, only this time students should finalize their work with a conceptual 3D design picture. (Picture. 3) (4) Make models with their 3D pictures. (Picture. 4)


Picture.1


Picture. 2


Picture. 3


Picture. 4

In order to cope with the research experiment, also to avoid influences from teachers and teaching policies; the four steps are assigned to four different teachers and student groups alternately. Therefore, each group can experience four teaching styles at different steps. Joint grading method is applied to each step, in other words, four teachers give their grades respectively to each student group, so the final grade is the average grade from four teachers.

4. Research results and analysis

4.1 Sampling Distribution and Descriptive Analysis

Effective samples in this research are 51 freshmen students at Architecture Department in Ming Chuan University, including 30 males (58.8%) and 21 females. (41.2%) Table 2 shows descriptive analysis of all variables.

Table 2. Sampling Distribution and Descriptive Analysis

Variables	No. of person	Minimum	Maximum	Average	SD
Assignment Grade	51	60.00	88.00	72.75	8.22
Sketching time period(hr)	51	6.00	50.00	15.63	8.19
Sketching amount (page)	51	7.00	71.00	27.00	11.46
Model making time period	51	4.00	60.00	18.31	13.01

4.2 differences test

Applying differences test to analyze the three variables-sketching time period, sketching amount and model making time period- to see if they would affect assignment grade. Results from Pair T test show that assignment grade and sketching time period, assignment grade and sketching amount, assignment grade and model making time period are all significant. On the other hand, bi-variable correlation analysis suggests just the opposites. It means that the three variables like sketching time period, sketching amount and model making time period are not significant to assignment grade.

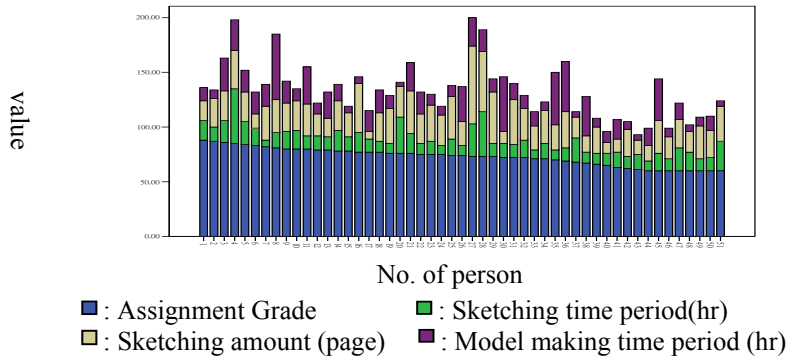
Table 3 Pair T test and Bi-variable correlation analysis

Pair sample	Pair T test				Bi-variable correlation analysis	
	amount	average±SD	t	significance (two-tailed) [a]	Pearson correlation	significance (two-tailed)[b]
grade – time	51	57.12±10.54	38.712	.000	.176	.217
grade - sketch	51	45.75±13.12	24.896	.000	.142	.319
grade- model	51	54.43±14.08	27.608	.000	.181	.203

[a.] t test significance (two-tailed) p value < .05 means difference is significant.
[b.] p value = 0.1(two-tailed) stands for significant.

4.3 Data from teachers' interviews

Through basic design course in the Architecture Department, four professional architecture teachers join this research. The four steps are assigned to four different teachers and student groups alternately. Therefore, each group can experience four teaching styles at different steps. It is an eight-week long project with 8 hours of each week, teachers give instructions to each group respectively and keep tracks of students' learning progress and teaching logs regarding the research. Records are as followed: (1) Freshmen students are new to sketching skills so they don't usually clearly express their ideal design concepts. (2) Most students spend too much time just to outline their design concepts on sketching; hence, the time-amount ratio is not a direct ratio. (Picture 5) (3) It is clear that sketching time period is at direct proportion with sketching amount and assignment grades. (Picture 5) 4. Model making time period is at direct ratio with sketching time period. (Picture 5) (5) It is possible that students who spend more time on making models are those who have less experience on 3D picture transform into actual materials and components. (6) Students spend a lot of time to sketch and modify their design concepts during2D to 3D sketching step.



Picture 5. Relation chart of sketching time period, sketching amounts, model making time period and assignment grade

5. Conclusions

While design students learn how to sketch they are also learning how to develop ideas, such as starting with one design proposal and developing it into another one. Thus, students learn how to progress their ideas through sketching. These are the conclusions that the research had found out: (1) To novice designers, sketching is a dialogue, so that they keep tracks of all their design concepts. (2) Sketching helps for 'seeing the design as parts and seeing it as a whole'. This point goes along well with the Gestaltist's view which states: 'the whole emerges from and cannot exist without parts but depends on the relationships between the parts'. Sketching is really essential because the parts themselves cannot emerge properly neither can be held without sketching. (3) Re-representation is the key to solve a design problem was a common view. Designers can come up with new design concepts while keep on making sketches. (4) Sketching captures the moment and stores it.

6. References

[1] Akin, O. (1986). *Psychology of architectural design*, Pion Ltd, London.

[2] Akin, O. (1978). *How do architects design?* in J. C. Latombe (ed) Artificial intelligence and pattern recognition in computer aided design North Holland, Amsterdam, pp. 65-119.

[3] Goel, V. (1995). *Sketches of thought MIT Press*, Cambridge, MA

[4] Goldschmidt, G. (1991). The dialectics of sketching. *Creativity Research Journal,* Vol 4 (2), pp. 123-143.

[5] Goldschmid, G. (1992). Serial sketching: visual problem solving in design. Cybernetics and System: *An International Journal,* 23, pp.191-219.

[6] Hanks & Belliston. (1992). *DRAW ! A visual approach to thinking*, learning and communicating.

[7] Lawson, B. (1990). *How designers think?* (2nd edn) Butterworth Architecture, London.

[8] Schon, D. A. (1983). *The reflective practitioner: how professionals think in action Basic Books*, New York.

[9] Schon, D. A & Wiggins, G. (1992). Kinds of seeing and their functions in designing, *Design Studies,* Vol. 13 (2), pp. 135-156.

[10] Yu, Y., Han, T., & Li, Y. (2004). *Product Design Model Presentation*, Shanghai: Shanghai People's Fine Arts Publishing House.