

## **A DIGITAL DESIGN COACH FOR YOUNG DESIGNERS**

ROHAN O. BAILEY  
*Victoria University of Wellington*  
*New Zealand*

**Abstract.** It is the intention of this paper is to construct for the reader a suitable foundation on which to determine a digital design coach. It seeks to define this possibility by examining two ideas. The first is visual thinking, as used by designers in the process of design. The second idea, that of providing students with expert partners for the learning of design is supported by evidence from a variation on protocol analysis (developed by the author) and a related design studio conducted in New Zealand and Jamaica. Using these concepts in relation to recent advances in the development of digital tools the paper proposes what a digital coach may look like.

### **1. Introduction**

The computer has been a significant part of design education for some time. With educators finding new and innovative ways in teaching digitally mediated design, students of architecture have been able to easily manipulate this new media to convey their ideas in a visually convincing manner. Despite these new pedagogical approaches to the media, the computer has not played a more direct role in informing the young designer of much of what must be considered during the design process.

Good design decisions are based on the ability of designers to take advantage of sketching to aid their powers of visualisation. In an effort to involve the computer more in design education, this paper specifically seeks to validate the educational advantages of a digital design coach for young designers using the sketch as an interface for this tool.

### **2. Sketching and Design Education**

The hand sketch is one of the most important tools that the Architect uses in the design process. Rather than simply being a method to record ideas, the designer uses the sketch as a means to reason with. Researchers have likened the act of sketching to conversations (Schön and Wiggins, 1992) and have given value to the idea of back-talk (Goldschmidt, 1999) in which the drawing

itself acts as a catalyst to propel the design process forward. It can be suggested that the designer in actuality explores the drawing for clues as to the way forward. In this way, the sketch fundamentally directs and aids the architect's decision making.

Sound and imaginative decisions are based on the designer's ability to take advantage of sketching. In other words, the more experienced the designer is, the easier it is for the sketch to inform and clue him or her in on the vital aspects of the problem.

One of the chief purposes of design school is the learning of design ability. This not only involves creation but also largely involves the recognising of problems and the contexts within which they exist. Teaching is typically done through a project based studio approach, and unless the project is technically oriented, the student is usually expected to self learn from reference books the technical and social paradigms that have implications for the users of buildings. Although this information is readily available, a beginning designer sometimes has no idea such an issue exists or even where to look. More often than not, in the opinion of the student, these are the very issues that seem to "get in the way" of the solution.

### 3. Heads and Hands

Based on the presupposition that sketching can be seen as the meeting of the "hand" and "head" to achieve a design solution, a unique protocol analysis experiment (termed Double H) that put human subjects in both these roles was developed by the author. One person was the "head"; this person did the designing by telling the *hand* what to do. The other person was the "hand"; this person had the responsibility of sketching images to assist the *head* in grasping the problem and progressing towards a satisfactory design outcome.

When it became clear that this technique could also be used as a teaching tool, the experiment was expanded for design studio with the aim of illustrating to students the generative role of drawing in designing.

The two-week project was introduced into a second year architectural design course at Victoria University of Wellington, where each student acted as either *head* or *hand* in the design of small building.

The exercise was repeated later at the Caribbean School of Architecture in Kingston, Jamaica. One difference between the two studios was the fact that students from year 3 (equivalent to the studio in Wellington) were paired with students from year 6.

In these experiences, the medium for communication between *head* and *hand* was the sketch. At all times, when the *head* came up with design ideas, the *hand* attempted to interpret and represent explicitly the issues embedded in the decisions the *head* was taking. It soon became obvious upon analysis that

the level of expertise in the *hand* contributed to a relatively smoother process for the *head*. This is illustrated in the following protocol extract where a practitioner (expert), in the role of “hand”, attempts to “clue” the student (novice) in on the implications of various design decisions about a stair:

*Expert: Do you want me to leave that much for your landing? (indicates distance on drawing)*

*Novice: Yep, Yep. We could go that way*

*Expert: Or we could wind up further. (Makes circular motions)*

*Novice: Wind up further, yeah*

*Expert: And then just come back a little way this side, which means people, could walk... (starts to draw outline of stair)*

*Novice: I think... yeah we will go like that. Keep the walkway though because I want to be able to get around the other side.*

It can be extrapolated from the anecdotal evidence presented that the expert as hand in the arrangement acted as a ‘clue machine’. It can also be seen that the clues offered by the hand made it easier for the head to comprehend the problem.

## 5. Research into Design Aids that use Sketching

Digital tools for architectural practice and the education of architects have reached the point today where “pen based interaction will allow architects to use the pencil again” (Gross, Do and Johnson, 2000). Demonstration applications have been built that recognise sketches and provide analytical tools to the user (Do, 1998) and prototypes now explore the direct generation of three-dimensional form from freehand drawing input (Gross, Do and Johnson, 2000).

We can now consider using drawing in the digital realm as a direct means of thinking rather than as a means to automatically generate forms and shapes for consideration. Teaching design to students by providing them with an “expert” digital partner is an innovative way of doing this.

## 6. A Digital Design Coach

The digital coach (Figure 1) uses the sketch as the method of learning and interface. In it the designer makes a mark or series of marks on the screen or drawing tablet. The tool interprets that mark and presents the designer a list/mapping of issues influenced by that mark or series of marks. The designer responds verbally, ‘clicks’ on the issue or continues to draw hereby defining the context; the “map” changes accordingly.

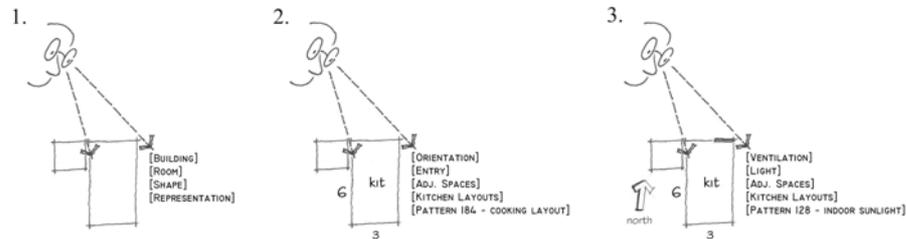


Figure 1: A digital coach

By breaking the problem down and presenting it as smaller “problem states” we are giving the student an appreciation of the issues involved in the design situation.

## 7. Discussion

The most important premise in teaching design is to let the student understand that design is a conscious activity (Uluoglu, 2000). Being more conscious during the process makes for a more skilled designer. The key to achieving this is not the provision of a tool that tests, analyses and provides answers but one that makes the issues known by constructing a map of clues, facilitating a deeper understanding of the problem. The sketch, for the student, becomes a conscious tool that supports and informs exploration. In turn it allows the student to make more intelligent, well-informed and confident decisions.

Thus, the computer is no longer perceived as alternate media to physical models and pen based systems but rather as a tool to be used in the learning of design ability which is the primary purpose of design education.

## References

- Do, E.Y.-L.: 1998, *The Right Tool at the Right Time - Investigation of freehand drawing as an interface to knowledge based design tools*, Ph.D. Thesis, Georgia Institute of Technology.
- Goldschmidt, G.: 1999, *The Backtalk of Self-Generated Sketches*, <http://www.arch.su.edu.au/kcdc/books/VR99/gold.html>, Accessed: 10 Jan 2001
- Gross, M.D., Do, E.Y.-L. and Johnson, B.R.: 2000, Beyond the low-hanging fruit: Information technology in architectural design past, present and future, in W. Mitchell and J. Fernandez (eds), *ACSA Technology Conference*, MIT Press, Cambridge MA.
- Schön, D.A. and Wiggins, G.: 1992, Kinds of seeing and their functions in designing, *Design Studies*, **13**(2), 135–156.
- Uluoglu, B.: 2000, Design knowledge communicated in studio critiques, *Design Studies*, **21**(1), 33–58.