

## Chapter 8

# User Interface Design Pedagogy: A Constructionist Approach

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### ABSTRACT

*A major limitation in traditional class lectures that uses textbooks, handouts, transparencies and assignments is that students often are unable to “experience” user interface design. This limitation can be overcome by using the constructionist approach that allow students to experience user interface design by allowing them to “do” or “construct” so that they can understand and remember. This paper describes an Internet-based interactive case scenario that was developed, based on the constructionist approach, to teach students user interface design concepts in conjunction with the Questionnaire for User Interaction Satisfaction (QUIS). A proof of concept evaluation was conducted and the results indicate that this approach is effective in user interface design pedagogy.*

### INTRODUCTION

The term user interface has been defined “as those aspects of the system that the user comes in contact with” (Moran, 1981, p.4). Systems were said to be “friendly” when users were able to seamlessly use or operate the complex systems through its well designed user interface. The term “user friendly” was coined to refer to a system that a user can easily interact through its interfaces. The field of user interfaces began to develop as systems developers and researchers spent more time and effort to enhance user interfaces to make

them more “user friendly.” In the mid-1980s, the developing field of user interface design began to include other factors such as organizational issues, work practices, design, implementation and evaluation amongst others. As more factors were added, it became apparent that a more comprehensive term was needed to describe this field that was emerging. A broader term “human-computer interaction” (HCI) was then adopted to describe this new field. Today, HCI is taught as a course (or as part of a course) in the computer science and information systems curriculum of most universities. User interface designers try to

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satisfy the human requirements of a system by applying knowledge from many areas: cognitive psychology, input and output devices, guidelines and standards, dialogue types, and (because design knowledge is inadequate) prototyping methods. It is multidisciplinary (Preece et al., 1994).

The explosive growth of the Internet has resulted in a paradigm shift that has affected all aspects of our lives. The ease of use and accessibility to the Internet - any time and anywhere has helped propagate its growth. This paper describes an effort to harness the strengths of hypertext markup language (HTML) and utilize it to develop an interactive virtual menu systems based on a case scenario for user interface design using the constructionist approach (Papert, 1980a). The approach taken to teach students user interface design is to allow them to have a hands-on experience through the interactive virtual menu system. The interactive virtual menu system is the first prototype built. The constructionist approach uses constructive tasks to impart knowledge. The objective is to motivate learning through activity. In this way, learning is made more effective. The great Chinese sage Confucius once said "I hear and I forget. I see and I understand. I do and I remember."

## **LITERATURE REVIEW**

Constructionism is a major principle in contemporary education theory and a strategy for learning. There are two facets to constructionism - that learning takes place as a result of actively constructing new knowledge and that learning is effective when "constructing" or "doing" activities that are personally meaningful. It is widely accepted in educational circles that an important part of the learning process consists of "hands-on" construction. Constructionism has been supported by the success of children educational activities based on building blocks (Resnick, 1991). It is a well-established methodology for learning

(Papert, 1991; Resnick, 1991). The constructionist approach uses constructive tasks to impart knowledge. Its goal is to develop creativity and motivate learning through activity. Constructionism asserts that knowledge is not simply transmitted from the teacher to students, but is actively constructed in the mind of the learner through various hands-on activities. In addition, it suggests that learners make their ideas by constructing their own knowledge structures. It has been shown that learning is more effective when it is activity-based rather than passively received (Brown, et al, 1989). The active "constructing" or "doing" tasks leads to discovery.

The concept of discovery learning is not new. Discovery learning can be described as experimentation with some extrinsic intervention -- clues, coaching, a framework to help learners get to a reasonable conclusion. It has appeared many times in educational philosophy, Dewey stated "there is an intimate and necessary relation between the processes of actual experience and education" (Dewey, 1938). It is also supported by learning theorists/psychologists such as Piaget, Bruner, and Papert, "Insofar as possible, a method of instruction should have the objective of leading the child to discover for himself." (Bruner, 1967). But it has never received overwhelming acceptance even though it has enjoyed a few positive swings of the educational-trend pendulum in American education (Jacobs, 1992).

The learner draws on his own experience and prior knowledge to discover the knowledge to be learned. This is embodied in a personal, internal, constructionist environment. Bruner stated that "Emphasis on discovery in learning has precisely the effect on the learner of leading him to be a constructionist, to organize what he is encountering in a manner not only designed to discover regularity and relatedness, but also to avoid the kind of information drift that fails to keep account of the uses to which information might have to be put." (Bruner, 1967)

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