

*Lecture #1*

***ARCHITECTURAL DESIGN AND DESIGN COMPUTATION***

*Professor Larry Sass*

Topics

- [1] ARCHITECTURAL DESIGN
  - [2] CREATIVE DESIGN
  - [3] COMPUTERS IN THE FIELD OF ARCHITECTURE
  - [4] CAD
  - [5] DESIGNING A CABIN
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**[1] Architectural Design*****What is architectural design?***

- Architectural design in this course is the exploration of the characteristics of space and form.
- Evaluation of design proposals is a creative process in search of increasing design quality
- Design quality determined by the appearance and function of building form, space and detail.

***What is design?***

- Design is a process of looking and working with materials either through visualization or rapid prototyping.
- Great design is a problem setting exercise, meaning design results are not based on right or wrong answers to a problem. Design evaluation is based on the quality of ideas.
- All designers has their own process to design a building, there are legal aspects of the process that have to be adhere to. Some architects such as Frank Gehry like to work with models. Some architects such as Norman Foster work with computer images and some architects such as Jerahmia Eck work on paper with hand made models.

***What is the architectural design process?***

- The studio design process is a search for answers and new questions on social, formal and practical design problems. Innovative solutions and unique ideas is the key. The process is broken into schematic design and final design
  - The legal architectural design process is broken into five stages:
    - Schematic or Conceptual Design
    - Design Development
    - Construction Documentation
    - Bidding
    - Construction Administration
  - Most professionals work on all five stages of the process
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- o Some professional architects only produce designs (design development)
- o Some professional architects only produce construction documents

## [2] Creative Design

Creative Design is a generative process that results in many candidate ideas for reflection. All creative professions such as painting, music, sculpture or dance is a process where ideas are presented and new ideas are generated from an evaluation of previously created ideas. This process of production and evaluation can lead to innovated results or new forms, spatial shapes or details. Quality is also linked to the creative process. The quality of a candidate idea increases with each representation. There are two people key to the process of creativity and design process. Don Schon and Thomas Ward.

*Thomas Ward, et al,*

- Creative processes call for the manufacture of ideas or objects for reflection and evaluation. The creative process is best presented by Ward, T B (1999) where he claims that creativity is a process of generating candidate ideas for evaluation. This claim is supported by generative fields such as shape grammars and genetic algorithms, where line drawings or computer models are built from rule based computer code. The goal of these computer programs and generative methods is to create many candidate designs from which a design will select the best design fit.
- Ward expands on his goal to present creative cognitive processes by providing examples of creative thinking in the form of drawings conceived by novice and experts. They have taken a non traditional approach to the study of creative cognition by analyzing the relationship between creative and non creative thinking. Conclusions of the paper demonstrate that creative thinking involves various subsets of generative and explorative processes.
- Creative equation is one of exploration (a), generation of artifacts (b) resulting in a candidate idea (c).

*Don Schon*

- Don Schon refers to design as a process of creating artifacts where the designer is creating objects or drawings upon which reflection can occur. This reflection method leads the designer to the next representation.
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**[3] Computers in the field of architecture**

There are three areas of computing in the field of architecture

- Computer Graphics and Representation
  - CAD
  - Solid Modeling
  - Curved Surface Modeling
  - Parametric Modeling
  
- Raster Based Programs
  - Photoshop
  - Paint Programs
  
- Computer Rendering
  - Animation
  - Virtual Reality
  - VRML
  - Gaming
  
- Generative Design Systems
  - Genetic Algorithms
  - Shape Grammars
  
- Digital Fabrication
  - Rapid Prototyping
  - CAD CAM

**[4] CAD (Computer Aided Design)**

Computer Aided Design is a trade term developed in the early 60's at MIT.

- a. Vector based drawing and modeling
- b. Models and their relationship to materials

**[5] Designing and Construction of a Cabin in the Woods**

The course project is to design and fabricate a beach cabin on the shores of Provincetown Massachusetts. The cabin is a single room environment for an older couple, one is a writer the other a painter.

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## Overview of the Project

	<b>Goal</b>	<b>Study</b>	<b>Computer Application</b>
1.	Environment	Program & Site	AutoCAD
2.	Shape	Building Form	AutoCAD
3.	Design	Window, Walls, etc	AutoCAD
4.	Shadow	Shape and Form	3D Studio
5.	Day Light	Window Size	3D Studio
6.	Materials	Finished Materials	3D Studio/Photoshop
7.	Program	People and Furniture	Poser/3D Printing
8.	Foundation	Build connection to Land	AutoCAD/3D Printing
9.	Construction	Wood Based Construction	AutoCAD/Laser Cutting
10.	Graphics	Presentation	AutoCAD/Digital Photography

**REFERENCES**

Schon, D A: 1983, *The Reflective Practitioner: How Professional Think in Action*, Basic Books.

Sternberg, R J: *Handbook of Creativity*, Cambridge University Press 1999  
PP. 189 - 212

**Glossary**

CAD Computer Aided Design  
CG Computer Graphics

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