



Design Thinking: Can Creativity Be Taught?

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Abstract

This paper contributes to the current interest in design thinking as superior to cognitive and analytical thinking for solution generation, suggesting ways that this epistemological shift can be introduced in education, specifically as the Design Charrette. This paper explores the adaptation of a traditional studio technique in architecture – the Design Charrette – to teaching. The Design Charrette is an intense, collaborative session in which a group of designers drafts a solution to a design problem in a time critical environment. The Design Charrette offers learning opportunities in a very condensed period that are difficult to achieve in the classroom by other means and has enormous potential to enrich teaching in many disciplines.

Introduction

In recent years, the limitations of instrumental rationality have become increasingly apparent and theorists have proposed new modes of thinking as a way of better integrating ethical reasoning. Many of the current problems facing the world at the global and local level are highly complex, requiring consideration of moral and ethical perspectives as well as instrumental reasoning about efficiency. Environmental issues, economic and social development challenges, addressing violence and political conflicts all involve multiple perspectives and stakeholders and defy simple solutions. Complex problems which require multiple perspectives to solve have also been characterized as “wicked” [1]. This paper explores the nature of design thinking as multi-epistemic process and its implications for teaching and learning.

Design Thinking

Carlos Teixeira [2] is among the proponents of “design-based learning” as an approach to solving complex problems which are generally beyond the capacity of cognitive and analytical problem solving in order to generate solutions. Design thinking is fundamentally multi-epistemic, using multiple ways of knowing (thinking, feeling, sensing and intuiting) and producing creative problem solving [2]. While some propose a dichotomy between analytic thinking or problem solving and design thinking, analytic thinking is actually part of design thinking. Design is concerned with how things ought to be [3] and is not restricted to the design professions (like architecture, graphic, industrial or interior design). By contrast, sciences conduct descriptive analysis; they take the world as given explaining how it functions by revealing underlying causal mechanisms [4].

Designers tend to explore problems through solution conjectures rather than analyzing the problem and subsequently generating alternative solutions [5][6]. Designers often shape both the problem framing [7][8] and possible solutions. Designers often work in a playful fashion, physically engaging with representations in the form of drawings, models and prototypes [5][9]. They frequently introduce new goals and constraints throughout the design process [10]. Designers tend to deliberately utilize the tension between what is desired and what is possible, often starting with the desired and working their way back to what is doable. Fundamentally, Design Thinking requires an epistemological shift from substance to process thinking. Table 1 illustrates how design thinking addresses the dimensions of wicked problems outlined by Horst and Rittel.



Table 1: Using design thinking to address wicked problem conditions

Wicked Problem Conditions[1]*	Design Thinking
1. There is no definitive formulation of a wicked problem	There can be no definitive solution; only a negotiated resolution
2. Wicked problems have no stopping rule	Resolution is limited by pragmatics of budget, resources, or external conditions where the goal is acceptable improvement
3. Solutions to wicked problems are not true-or-false, but good-or-bad	Value cannot be determined by an individual, single perspective or individual framework and must be a negotiated resolution from the range of perspectives
4. There is no immediate and no ultimate test of a solution to a wicked problem	Resolutions must be evaluated by problem owners integrated in a staged design process
5. Every solution to a wicked problem is a "one-shot operation"; because there is no opportunity to learn by trial-and-error, every attempt counts significantly	Resolutions must be emergent, responding to and cycling through input and evaluation stages
6. Wicked problems do not have an enumerable (or an exhaustively describable) set of potential solutions, nor is there a well-described set of permissible operations that may be incorporated into the plan	Resolutions must necessarily be creative
7. Every wicked problem is essentially unique	Resolution of a wicked problem is necessarily a unique and acceptable fit to the problem
8. Every wicked problem can be considered to be a symptom of another problem	The framing of a wicked problem must include as many diverse perspectives as possible
9. The existence of a discrepancy representing a wicked problem can be explained in numerous ways. The choice of explanation determines the nature of the problem's resolution	Diverse, multiple perspectives are required in framing the problem and evaluating the resolution
10. The planner has no right to be wrong	Designing is political and the input and validation must come from the range of those impacted by the design, including heretofore silent voices

Education for Design Thinking

Experimentation with design processes in conventional classrooms, for example, the design charrette, enables us to understand the boundary conditions for creative education in the current context. Current design practice may be a good place to begin to first understand what exactly could be transformed and how one should go about transforming practice in a range of disciplines from management [11] through information systems[12][13] through health care administration [14].

Action learning, emerged at least in part from the notion of action research, pioneered by Kurt Lewin [15], who sought ways to foster collaborative learning among experts and clients by employing an iterative procedure with a sequence of planning–acting–observing–reflecting. Donald Schön [16] examined how professionals really go about problem solving and concluded that “reflection-in-action” was an iterative, collaborative process, combining both art and science. He maintained that the fundamental concepts of designing could only be through the experience of designing. He maintained that “reflection in action” was the basis of any design process. “Knowing in action” is tacit and spontaneous, professional knowledge that cannot be learned from a book, nor described with much success. It is a dynamic knowledge, whereas facts, rules, procedures and theories are static.

Schön believed that this kind of tacit knowledge inherent in designing and could only be learnt in the unique environment of the studio. In the studio, there are ideally regular consultations between student and master designer (tutor). It is through demonstration of, and reflection upon their own knowing in



action that the master conveys this tacit knowledge to the student. Through speaking and demonstrating (e.g., drawing) in tandem, the teacher demonstrates how to explore and act [17][18].

Revans is credited with defining “action learning” based on his experience working at the Cavendish Laboratory with eight Nobel Prize-winning physicists who met together to discuss their experiments and to learn from each other. His iterative model, successively alternating experience and preparation reflection, is a useful paradigm for active learning. Since then, many others have refined and redefined the approach which is generally understood to refer to “a process of learning and reflection that happens with the support of a group or “set” of colleagues working with problems with the intention of getting things done” [19]. The process helps people to take an active and responsible stance towards learning and helps to overcome the tendency towards passivity in the learning process [20]. The key elements of an action learning process include:

- Focus on solving a multifaceted, real and often “messy” problem for which there is no single solution;
- Individuals meeting together in a group (known as a set);
- Each individual other than the facilitator brings to the set a real issue/problem or project that they wish to progress;
- The aim for each individual presenting their issue is to be able to take action on some aspect of the issue, to reflect upon and learn from the actions as the issue is progressed;
- Typically, the action learning set meets for three to four hours;
- The set will create explicit conditions, ‘ground rules’ on which to operate to ensure effective working;
- The process is iterative, based on reflection, questioning, conjecture and refutation [20][21][22][23][24].

Traditionally, teaching has tended to rely heavily on conventional pedagogical approaches – “chalk and talk”- although there is growing recognition of the importance of experiential and applied learning. Outcomes Based Action Learning (OBAL) which emphasizes guided instruction in theory and the application of theory via case studies, design competence labs/workshops and term projects has been promoted in information systems [25].

The Architectural Design Process: The Role of the Studio and the Charette

Architecture has long been used as a reference discipline for design thinking. Architectural design requires a balance between art and science. The buildings must stand – there are certain rules and requirements which must be understood and adhered too. At the same time, architecture values aesthetics. Schön discussed this creative tension in his analysis and suggested that while the architectural design studio is currently an anomaly in universities, it actually represents an opportunity, a model of “learning-by-doing” which could be adapted in other contexts [5].

In the Beaux Arts, the primary method of teaching architecture was learning by doing with a focus on the design problem. Students were divided into ateliers, and lead by a tutor. Traditions emerged that are still prevalent today— the use of the esquisse (the initial sketch solution to a problem that would be further developed), the teaching of design by practicing professionals, the use of the charrette (an intense, collaborative session in which a group of designers drafts a solution to a design problem), and the final evaluation of student work by a jury [17].

Today, the word charrette refers to any intense, collaborative session in which a group of designers drafts a solution to a design problem in a time critical environment. The Design Charrette offers learning opportunities in a very condensed period that are difficult to achieve in the classroom by other means. The Charrette:

- Generates engagement and an attitude of involvement;
- Develops an experience in and an appreciation of, the team approach;
- Broadens individual perspectives;
- Dramatically shifts the knowledge domain towards the applied;
- Dramatically increases individual confidence;
- Develops timeline awareness;
- Generates spontaneity, reacting to ‘intuition’ or ‘feelings’;
- Generates reflection/action/reflection as a cycle.



The Charrette is a way of learning-by-doing and integrating a range of knowledge and skills to solve a problem with a team in a limited time frame. It can be applied to a wide array of cross disciplinary problems offering unparalleled opportunities to apply theory to experiential learning. The steps in a Charrette include:

1. Teams chosen by the instructor
2. Overview of timeline is presented
3. Client introduced
4. Teams is assigned space (resources)
5. Team managers introduced (external professionals)
6. Client meets briefly with individual teams for direction
7. Client reviews alternatives (several directions are presented by each team)
8. Intense building stage (direction chosen, built)
9. Review by client (50 - 60% completion for comments, directions, and approvals)
10. Critical deadline: All work must stop at the critical deadline and everyone must understand that design is over
11. Presentation (each team presents design for review by client)
12. Wrap up: Open critical discussion with class, manager, client, and instructor is intended for the maximum degree of participation by the students. What is or is not the best solution is irrelevant: What is important is the discussion of the process and lessons learned.

Conclusions and Implications

Architecture has long been regarded as a reference discipline for information systems but it seems clear that it can serve to enrich a broad range disciplines. Teaching architecture relies heavily on action learning, an approach which offers a way of responding to increased demands for outcome based action learning in other fields. The Design Charrette, a cornerstone of architecture education, offers a practical and effective way of accelerating and enhancing learning.

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