Design Thinking

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Abstract Design thinking refers to a formal method for solving problems and providing solutions. It is one of the promising ways of transforming organizations. Researchers working in several disciplines continue to study the ways designers think. This paper provides a short introduction to design thinking and emphasizes the need of design thinking in undergraduate decision-making courses.

Keywords Design thinking, designers, innovation, 21st century skills, design practice

Introduction

Design thinking may be regarded as using a systematic thinking process to solve problems and come up with innovative solutions. It is not a new concept. It has a long history in engineering and architecture. Design is widely regarded as the distinguishing aspect of engineering.

The phrase "design thinking" was introduced by Rowe in 1987. The first Design Thinking Research Symposium took place in 1992 [1]. Design thinking is the methodology that designers follow when they design. This thinking is not restricted to designers. Everyone who wants to change existing situations designs. Ways of thinking like a designer include observing, interviewing, associational thinking and creating prototypes. Engineering, education, business, medicine, humanities, and architecture are concerned with design.

Understanding Design Thinking

Design thinking is not one single way of thinking. It is integrative and multidimensional. It is a combination of different ways of thinking. There are several models for design thinking. One version of the design thinking process involves six stages [2]:

Observe (expanding): This first step of the design thinking process entails understanding the problem. One must be familiar with what is already out in the world in order to avoid duplication. Design starts with a foggy idea about how the product should look or work.

Synthesis (consolidating): All information must be interpreted and condensed to meaningful insights.

Ideate: This involves generating a lot of ideas for the solution of the problem using brainstorming and other techniques. Designers should come up with as many ideas as possible.

Prototype (consolidating): This involves experimenting and prototyping the best ideas generated during ideation. It may also involve creating two- or three-dimensional representations of the ideas generated. It may be expensive and complex at this stage.

Testing: Through testing, designers can learn what works and what does not work.

Iteration: This entails going back to the prototypes and modifying them as needed. This may involve adding, deleting, modifying or replacing some parts. This is like starting the design process all over and may take time.

With these seven steps, problems can be formulated, the right questions can be posed, ideas can be generated, and the best solutions can be selected. Several organizations that are non-design fields, such as education and business, have sought to understand how designers think and strategies used in design process.

Design Thinking In Engineering

The industry needs engineers who are not only technical proficient but also have critical thinking, communication, and life-long learning skills. It is generally believed that the aim of engineering education is to produce engineers who can design effective solutions to meet needs. That is, design is regarded as the central activity of engineering [3]. But what does "design" mean to engineers? Ford and Coulston [4] quote ABET's definition: "Engineering design is the process of devising a system, component, or process to meet desired needs. It is a decision-making process (often iterative), in which the basic sciences, mathematics, and engineering sciences are applied to convert resources optimally to meet a stated objective. Among the fundamental elements of the design process are the establishment of objectives and criteria, synthesis, construction, and testing." Design thinking and innovation are important in engineering education. It challenges long-held beliefs and helps the designers break out of the familiar patterns of traditional engineering. ABET has encouraged early exposure of engineering students to design thinking in order to close the gap between engineering education and workplace.

Design Thinking in Education

Schools are always looking for ways to improve student learning and equip them for twenty-first century demands. Design thinking is one promising approach. It has been used in schools and colleges in a variety of ways. It enriches the curriculum, expands student perspectives, and benefits teachers. It empowers teachers to facilitate and enable students acquire 21st century skills [2]. It has been observed that students learn by doing and teachers enhance student creativity by using design thinking as a way of teaching. Students engage in hands-on projects that help them to use imagination to define problems and create solutions. Design thinking enhances innovation and the critical thinking skills employers look for.

Design Thinking In Business

Just as all humans are basically business people, humans are also designers. Business education prepares students to be competitive in today's highly technological and complex business environment. Business schools and colleges are adding design thinking courses to their curricula to prepare the next generation of leaders and managers. It is needless to say that business' expectations of design thinking are different from engineering expectations. Design thinking is used in business to characterize innovative, human-centered enterprises. It is crucial for a resource-challenged and innovation-driven economy. When design thinking is applied to innovation, the success rate for innovation greatly improves. Another approach to design thinking is offering dual degrees such as MBA and Masters in Design. Offering short courses on Design Thinking provides a sought-after mixture of multidisciplinary skills [5]. Successful design-led companies include Apple, IBM, Coca-Cola, Whirlpool, IDEO and Sense Worldwide.

Conclusion

Design thinking is basically an innovation process that emphasizes creative activities, asking questions, observation, interdisciplinary collaboration, visualization of ideas, and prototyping [6]. It has become a hot topic and a common corporate process across the globe. It has been perceived as an approach for dealing with problems which can be applied across disciplines. It focuses on how designers do their designing. Its purpose is to improve the quality of life.

Design thinking skills are essential for future workplaces. Innovation can take place through the practice of design thinking [7]. Unfortunately, design thinking is still poorly defined for most designers. Just what design thinking is meant to be is not clear. Some industry observers are beginning to question its basic assumptions. For this reason, business has not fully embraced design thinking as a new paradigm shift [8].

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