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RESEARCH ARTICLE

DESIGN THINKING

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Manuscript Info	*Abstract*
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	Design and design thinking have been identified as making valuable contributions to business and management, and the number of higher education programs that teach design thinking to business students, managers, and executives are growing. However multiple definitions of design thinking and the range of perspectives have created some confusion about potential pathways. This paper examines notions of design and design thinking and uses these definitions to identify themes in higher educational programs. We present the findings from an initial exploratory investigation of design and design thinking in higher education business programs and define four distinct educational approaches around human centred innovation, integrative thinking, design management and design as strategy. Potential directions for management education programs are presented.

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Introduction:-

The importance of design thinking for management has been argued in the last decade (Boland & Collopy, 2004; Brown, 2008, 2009; Brown & Martin, 2015; Dunne & Martin, 2006; Martin, 2009; Starkey & Tempest, 2009). Interest in applying design thinking to management education is strongly influenced by Dunne and Martin (2006), Martin (2007a), and more recently by Glen, Sucio and Baughn (2014). This approach requires change from traditional work patterns to something closer to a "design shop" where the focus is on the flow of work life, style of work, mode of thinking, source of status and dominant attitude (Dunne & Martin, 2006). Glen et al. (2014) argued that design methods align with adaptive reasoning in real-world settings.

Many large successful international firms such as General Electric, Proctor & Gamble, Sony, and Philips, use a design perspective as a problem-solving apparatus across the company. While the importance of design in business has been well established, the contributions of design were best known and valued in innovation including new product and new service development (Utterback et al., 2006). More recently, design thinking has moved from product and process design to becoming a key element in company strategy (Camillus, 2008; Fleetwood, 2005; Verganti, 2006, 2008).

The research question we are addressing is: what are the characteristics and understandings of design and design thinking in higher education business programs. The paper responds to suggestions regarding the importance of design and its potential contributions to management education This paper extends existing literature on business and management education in a number of ways.

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Literature of Review:-

Design involves purposeful behaviour that is targeted toward certain goals and the creation of solutions. The goal of design may be to solve a problem that affects one or many people. In the design field, design is not seen as the prerogative of a select few. On the contrary, "we all can, and do, design and that we can learn to design better" (Lawson, 2006, p. vii). Within the academic discipline of design, the notion of design thinking has been of central importance for more than thirty years. Schön (1983) in education and Lawson (2006) in architecture, in their respective ways described and reflected upon how designers think. Lawson (2006), for example, claimed that the design process includes formulating, moving, representing, evaluating, and reflecting. Design thinking can be described as "a discipline that uses the designer's sensibility and methods to match people's needs with what is technologically feasible and what a viable business strategy can convert into customer value and market opportunity" (Brown, 2009, p. 86). Design thinking is generally referred to as "applying a designer's sensibility and methods to problem-solving, no matter what the problem is … a methodology for problem solving and enablement" (Lockwood, 2010, p. xi). More recently, design thinking has moved from product and process design to a key factor in company strategy (Bucolo & Matthews, 2010; Carlopio 2009). To a large extent, the notion of design and design thinking in the business literature has been largely popularised by stories and case studies of work carried out by design firms such as IDEO that have been working in new product development for decades (Brown, 2008, 2009; Hargadon & Sutton, 1997). In these cases, design thinking is widely understood as a human-cantered approach to innovation that includes inspiration, ideation, and implementation that appears equally cyclical and iterative understanding people as inspiration, prototyping, building to think, using stories, and having an inspired and inspiring culture (Brown, 2008).

Nature of Design Thinking

In many fields, knowledge is generated and accumulated through action (i.e., doing something and evaluating the results). That is, knowledge is used to produce work, and work is evaluated to produce knowledge. Creative people tend to work in two different ways: either as finders or as makers (Owen, 2007). Finders demonstrate their creativity through discovery. They are driven to understand and to find explana-tions for phenomena not well understood. Makers are equally creative, but they are driven to synthesize what they know in new constructions, arrangements, patterns, compositions, and concepts. Given the fundamental process differences between how finders and makers think and work, other factors might similarly reveal differ-ences among professional fields and therefore help to define the nature of design thinking. One such factor is the content with which a field works.

A conceptual map can be drawn to represent both content and process factors (Figure 1). Two axes define the map. Separating the map into left and right halves is an analytic/synthetic axis that classifies fields by process (i.e., the way they work). Fields on the left side of the axis are more concerned with finding or dis-covering; fields on the right are concerned with making and inventing. A symbolic/real axis divides the map into halves vertically. Fields in the upper half of the map are more concerned with the abstract, symbolic world, as well as the institutions, policies, and language tools that enable people to manipulate information, com-municate, and live together. Fields in the lower half are concerned with the real world and the artifacts and systems necessary for managing the physical environment (Owen, 2007).

Four quadrants result from this division. The first is analytic/symbolic, which includes fields like science that are heavily analytic in their use of process and their content is more symbolic than real in that subject matter is usually abstracted in its analyses. The second quadrant is synthetic/symbolic, which includes fields that are concerned extensively with the symbolic content and synthetic processes. For instance, law falls in this quadrant because it is concerned with the symbolic con-tent of policies and social relationships, and most of its disciplines are concerned with the creation of laws. The third quadrant is analytic/real, which on the content scale involves reality and on the process scale is strongly analytic. Medicine, for example, falls into this quadrant because it is highly concerned with real problems of human health and diagnostic processes are its primary focus. The fourth is syn-thetic/real, which involves fields, such as design, that include synthesis processes and real content (Owen, 2007).

Findings:

Many universities were found to have programs where students were exposed to design thinking in classroom situations and workshops around problem based issues. From the review of all data, four areas of categorisation emerged; (i) Human Centered Design; (ii) Integrative Thinking, (iii) Design Management, and (iv) Design as Strategy. These categories are described in some detail below. The first and most well-known is Human-Centered Design.

Human-centred design:
Human-Centred Design Human-centered design is defined as focusing on people or customers and their needs rather than on specific technology conditions. Innovation occurs at the intersection of business, technology and people and through this intersection radical, new experience innovation is produced. The user is the one to decide if a product or a service should exist or be established. This approach is strongly supported by design companies such as IDEO and the Stanford D-school, where design thinking is conceptualized as a specific way of evaluating and using design methods by non-designers. Nussbaum (2009) summarised these processes as: Observation, Brainstorming, Rapid Prototyping, Testing, and Implementation.

The non-linear iterative processes used in human-centered design usually begin with an initial definition of the problem, followed by exploration of the user and the design space, generating possibilities through brainstorming, building prototypes that are then tested, often a number of times, and the findings used to refine the problem resolution

Integrative Thinking:
The ability to constructively face the tensions of opposing models, and instead of choosing one at the expense of the other, generating a creative resolution of the tension in the form of a new model that contains elements of the both models, but is superior to each.

Integrative thinkers approach these four steps in a very specific way.

The first step considers more features of the problem as salient to its resolution; they consider multi-directional and non-linear causality between the salient features; they are able to keep the "big picture" in mind while they work on the individual parts of the problem; and they find creative resolutions to the tensions inherent in the problem's architecture (Martin, 2009).

Design as strategy:
Thisis relatively ill-defined and largely under construction. It employs the principles and processes of human-centered design and components of strategy such as Porter's activity maps (see Armistead & Clark, 1993) to present a whole of organization approach to design as a strategic as well as an operational process with the purpose of creating sustainable competitive advantage. In this category, design activity concerns the whole of the product system integrating the products, services, and communication strategies with which a company presents itself to the market and sets itself in society giving form to its strategy (Bucolo & Matthews, 2010; Camillus, 2008; Carlopio, 2009). Many of these programs are at the postgraduate MBA and executive education level and delivered as workshops through partnering arrangements with companies (Liedtka & Ogilvie, 2010).

Discussion:-
It is apparent from this overview of educational programs and courses that design thinking, usually based on principles of the human-centered approach to design, forms the core of all of the programs. Indeed, Liedtka and Ogilvie (2010) asked "What would be different if managers thought like designers, and their answer is: empathy, invention and iteration" (p. 6).

The general principles of these educational programs targeted at undergraduate and postgraduate levels are to bring together students from multiple disciplines to work together on common problems, developing multiple perspectives on problem or opportunity situations. Workplace projects working in groups on authentic tasks through consultation with industry partners around workplace problems are common features of these programs. Perhaps Formosa and Kroeter's (2002) disappointment in the lack of design and design approaches for managers arose from their focus on MBA programs rather than a broader view of management programs. On the other hand our overview did not find many MBA programs that included design thinking, so to some extent their concerns may be still current.

Australian universities show some early experimentation with design thinking, often within units on innovation where interest in design thinking may be of longstanding interest. Within Australian business schools there is some recognition and realisation that design thinking in business is a growing and necessary field and new initiatives have begun. Some business schools are using symposiums (Swinburne) while others are creating new units to accommodate MBA programs around design thinking (University of Technology, Sydney).

International programs delivered by partnering of courses, programs, and sometimes even universities, where universities and business schools from Toronto to Paris are taking up new collaborations with design schools. Some of the partnerships developed between Business Schools and Design Schools have been encouraged and nurtured by involvement with and membership of Cumulus, a global association of Art and Design Schools focused on art and design education and research. Cumulus is a forum for partnership and transfer of knowledge and best practices and currently consists of 176 members from 44 countries.

Dunne (2010) compared positive design and integrative thinking and contended that while there is a great deal of common ground between positive design and integrative thinking, the two approaches are different in character. He argued that although both approaches generate solutions to problems, "where integrative thinkers use assertive inquiry and causal modeling to understand the models of others, positive designers work by questioning and observing users, and using trial solutions to reframe the problem" (Dunne, 2010, p. 209).

Design thinking has been embedded in product design for many decades and more recently has been applied to system design. Design thinking and its application is not limited to large private-sector companies. Both small companies (Ward, Runcie, & Morris, 2009) and the public sector have been experimenting with these approaches to find new ways of developing solutions to complex problems. For example, public sector organizations are looking at new ways of increasing innovation and are experimenting with "Deep Dive" (IDEO, 1999) workshops. The growing popularity of design thinking is reflected in the growing number of articles (often unpublished) about the potential of design thinking and Deep Dive experiential workshops for developing new ways of thinking.

Conclusion:-
This research is an early attempt to provide a preliminary mapping of some of the higher education business programs that include design thinking in their offerings to business and management students. Some universities have long delivered in this space internally or through connections with specialist programs. This dynamic field appears to be in constant change as institutions develop internal capability bringing schools of design and business together or developing alliances within or across universities to experiment with programs. Furthermore, many of the existing courses and programs are adapting and changing to respond to increased demand from industry.

With few exceptions, management education has added design thinking and design methods into current programs through building alliances with design schools. The challenge for business schools is to incorporate such notions and methods into more integrated formulation and delivery and we suggest such initiatives are more likely to occur in the contested space of executive education programs.

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