

Design and Design Thinking in Business and Management Higher Education

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Abstract

Design and design thinking have been identified as making valuable contributions to business and management, and the numbers 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.

Keywords

design thinking, management education, business schools, higher education

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).

Two drivers that have largely stimulated interest in design and design thinking at a company level are, the growing recognition of the potential impact of design and its contribution to successful

business practice and the popularity of the notion of design thinking at the business level. Recent research indicates that companies who use design in their business, perform better economically in the marketplace (Borja de Mozota 2006; Dell’Era Marchesi, & Verganti, 2010; Moultrie & Livesey, 2009; Nussbaum, 2006).

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 (Boland & Collopy, 2004; Starkey & Tempest, 2009). We also respond to an earlier call for design literacy in managers in MBA programs. Formosa and Kroeter (2002) surveyed 19 of the top US MBA programs and found not a single program addressed or incorporated design into its curricula in any significant way and even in programs that focused on marketing and branding, curricular attention to the principles or theories of design was at best cursory. This paper extends existing literature on business and management education in a number of ways. First, we discuss notions of design and design thinking identifying some different approaches. Second, we investigate some of the higher education programs that include design thinking for students in business and management education. Third, we categorise the programs and approaches based on the information available. Finally we suggest potential directions for management education and development.

Theoretical Frameworks

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 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-centered 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).

Design thinking for problem solving

Designers seek outcomes that are desirable for users, viable for the client, and feasible within technical and design constraints. Design thinking is applied to problem solving situations, around the concept of wicked problems, drawing on Rittel’s initial description of social planning problems as indeterminate (Churchman, 1967; Rittel & Webber, 1973). Further, Buchanan (1992) created a

new conversation around wicked problems in design, arguing that designers deal with problems that are ill-defined, so that the creative re-definition of the problem is part of the professional skill. Recently, even some strategy problems have been labelled as wicked problems, for example, if the problem involves many stakeholders with conflicting priorities, if it changes even as solutions are attempted, and if there is no way to evaluate if the remedies will work (Camillus, 2008).

Lawson (2006) contended that design problems might be the most important type of problems to investigate because so many professionals are paid for designing products and systems. Within the conception of design understanding, it is well understood that there is more than one right way. A design attitude, as distinct from a decision attitude, means designing or bringing about alternatives. Here the concern is with finding the best possible given skills, time and resources. It is taken for granted that design will require the invention of new possibilities. In contrast to a design attitude is a decision attitude, where the manager as idea generator encourages new possibilities. Similarly, “a design attitude views each project as an opportunity for invention that includes, a questioning of basic assumptions and a resolve to leave the world a better place than we found it” (Boland & Collopy, 2004, p. 9).

Glen et al.’s (2014) comparison of processes of rational-analytical thinking and design thinking approaches highlights the benefits of design thinking in terms of problem formulation, methods, solution processes, rationale, and outcomes. The generative nature of design thinking in developing new solutions is not limited to business settings, and there is a wealth of literature regarding the application of design thinking to social innovation. For example, Brown and Wyatt (2010) discussed how design thinking could lead to hundreds of ideas and, ultimately, real world solutions that create better outcomes for organisations and the people they serve.

Design thinking applied to business strategy and business transformation is sometimes described as integrative thinking (Cooper, Junginger, & Lockwood 2010; Martin, 2009). This approach to design thinking centers on innovation and business transformation, the discovery of unmet needs and opportunities, and the creation of new visions and alternative scenarios. A core element of design thinking is its ability to capture new knowledge, whereby practitioners might differ in their technique and tools (Bucolo & Matthews, 2010). It will, however, be the combination of applying design tools with a strong understanding or organisational innovation that identifies the strategic value of design thinking. A summary of approaches to design thinking is presented in Table 1.

Table 1. *A selection of design thinking approaches.*

Approach	Author	Details	Examples
Design thinking includes: empathy, integrative thinking, optimism, and collaboration to transform the way a company develops products, processes and strategy	Brown (2008)	Design thinking 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.	Design thinking can transform the way a company develops products, processes and strategy
Design thinking uses the abductive thinking of designers, to	Martin (2009)	Evidence showing that creative thinking in a business is required	Case studies of popular corporation’s process and journey

actively look for new data points, challenges accepted explanations, and infer possible new worlds

for success. Examples of companies such as Apple, IBM focusing on what occurred before and after design thinking was adopted.

but lacks in clear instructional directions to modify business

Design thinking integrates human, business and technology factors in the problem identification-solving and design process.

Meinel & Leifer (2011)

Design thinking comprises human-centred methodology combining expertise from design, social sciences, engineering and business. It blends an end-user focus with multi-disciplinary collaboration and interactive improvements to produce intuitive products, systems and services.

Exploration of the design thinking process, by describing the development and application of design thinking

We now turn to the research question regarding the characteristics and understandings of design and design thinking in higher education business programs for management education and development.

Methodology

Using Internet search engines, business literature and research reports, research was conducted into educational programs, courses and units and course content across a selection of universities to investigate how design and design thinking is being taught to students in business around the world. Some information was available online in different forms. For example, often a unit synopsis was available online to describe briefly what and how learning objectives were assessed but rarely the scope of the program and its week by week learning activities was posted online in a few minor cases. Many searches required a direct contact with the university to discover the details of content and activities of the program. By investigating the content of curriculum and focusing on international business schools or interdisciplinary units including business, the following results were attained.

Two types of searches were conducted over a period of four weeks to obtain information about design and business and management education. The searches of international and Australian universities examined programs and courses around innovation and entrepreneurship as well as general management and education programs. Contact was also made with professionals in the field to check the nature and accuracy of our findings. The programs identified will be discussed in terms of their common characteristics and an illustrative summary of some of these courses is presented in Tables 2-5.

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-Centered 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 conceptualised 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 key tenets of design thinking used in these programs are:

- to develop a deep understanding of the customer based on: fieldwork research; an empathic approach getting out in the real world with consumers, open collaboration even co-design; observational research ethnographic methods watching, listening, discussing and seeking to understand. *Start from a 'seeking to understand' point of view.*
- to involve the users early on to seek user evaluation of a concept. Collaboration with the users and through forming multidisciplinary teams is radical rather than incremental and seeks added value.
- to accelerate learning through visualisation with hands-on experimentation creating quick prototypes, to fail quickly and frequently, so learning can occur.
- to use prototypes such as sketches, mock-ups, stories, role-playing or storyboards to make the intangible tangible and to visualise ideas.
- to understand the importance of concurrent business analysis integrated through the process rather than added later or used to limit creative ideations.

The non-linear iterative processes used in human-centered design usually begin with an initial defining 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, as described in Table 2 and a specific instance, Stanford University D-School, illustrated in Figure 1.

Table 2. *Human-centered innovation approach to design thinking in higher education*

University	Course or Unit	Program	Description
Stanford University in partnership with Aalto University, University of St Gallen; Hasso-Plattner Institute	ME310 Design Innovation	UG	Multi university project based 1 year long; Global student team of 6-8 Teaching innovative methods and processes. Brought together CEO's, Postgraduates and Undergraduates.

Stanford University D-School (UK)	ME310 Design Innovation	Post Grad & Executive Courses	IDEO connection as they are all graduates of Stanford
Hasso-Plattner Institute School of Design Thinking	ME310 Design Innovation	PG	Modelled from Stanford course
Aalto University	International Design and Business Management program	PG	Industry projects - partnering with Stanford University
University of St Gallen	ME310 Design Innovation	Post Grad Executive Education	Human-centred approach. Industry Partners

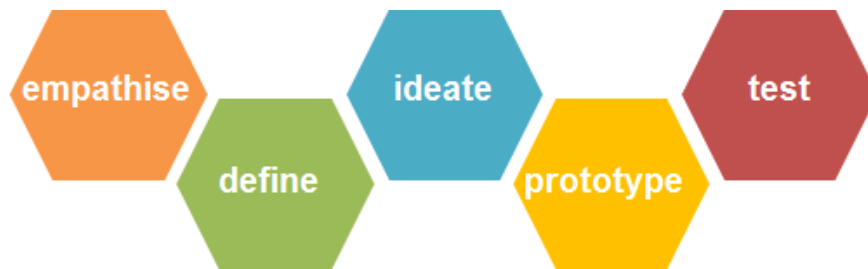


Figure 1. Design thinking Stanford D-School.

Integrative Thinking

The second category of courses includes the notion of Integrative Thinking defined as:

... 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.

(Martin, 2007b, p. 15)

Martin (2009) described decision-making as involving four steps:

1. The first one is *salience*: what do we choose to pay attention to, and what not? In this initial step, we decide which features are relevant to our decision.
2. The second step is *causality*: how do we make sense of what we see? What sort of relations do we believe exist between the various pieces of the puzzle?
3. The third step is *architecture*, during which an overall mental model is constructed, based

upon our choices from the first two steps.

4. The final step is *resolution*: what will our decision be, based on our reasoning?

These steps are summarised in Figure 2.

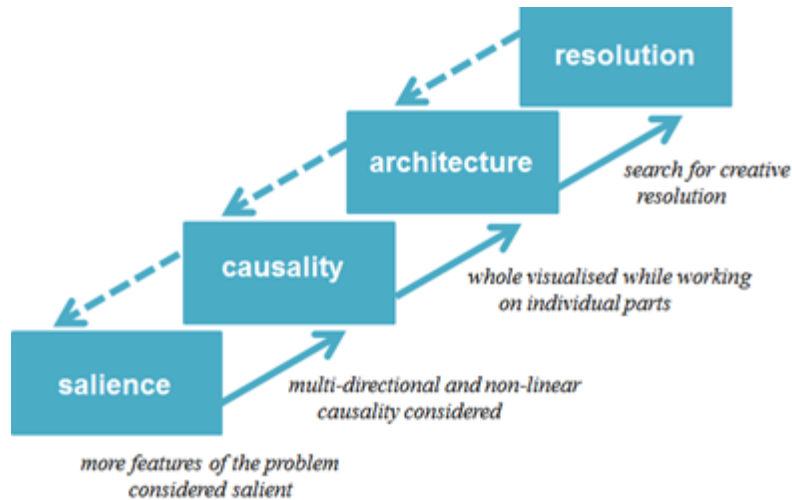


Figure 2. *Integrative thinking – combining design thinking and decision-making (adapted from Martin, 2009)*

Integrative thinkers approach these four steps in a very specific way. As shown in Table 3 and Figure 2, 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).

Table 3. *Integrative thinking approach to design thinking in higher education*

University	Course or Unit	Program	Description
University of Toronto, Rotman School of Management	Foundations of Integrative thinking; Business Design Business Innovation Lab	MBA, Executive Education Workshops	Designworks offers students and industry the opportunity to solve complex challenges and unlock business ideas. Strategy and Business design focus.

This designer's approach to solving problems, or the integrative way of thinking and problem-solving, can be applied to all components of business. Great design is characterised by a deep understanding of the user and their context, which informs creative resolution of tensions, collaborative prototyping and continuous modification and enhancement of ideas and solutions (see Martin, 2005). The Rotman School of Management with the Dean Roger Martin and Heather

Fraser, Director of the Business Design Initiative, offers a program that merges the practices of business and design at the Strategy Innovation lab, DesignWorks™.

Design Management

The third category of programs can be described as Design Management (Borja de Mozota, 2006), where research on design-oriented European small and medium enterprises (SMEs) became the basis of a model for design as differentiator, integrator, and transformer and good business (summarised from Borja de Mozota, 2006).

- Design can be a *differentiator*, where design is a source of competitive advantage on the market through brand equity, customer loyalty, price premium, or customer orientation.
- Design can also be an *integrator*, where design is a resource that improves new product development and innovation processes (time to market, building consensus in teams using visualisation skills) that favours modular and platform architecture of product lines, user-oriented innovation models, and fuzzy-front-end project management.
- Design can be a *transformer*, where design is a resource for creating new business opportunities or (in the case of advanced design) as an expertise to better interpret the company and the marketplace.
- Finally design can be focussed on *good business*, where design is a source of increased sales and better margins, more brand value, greater market share, better return on investment (ROI), and as a resource for society at large (inclusive design, sustainable design).

Further to this and, as shown in Figure 3 and Table 4, design management can be understood in a number of different ways.



Figure 3. Design management (Modified from Borja de Mozota, 2006, p. 47).

Table 4. Design management approach in higher education

University	Course or Unit	Program	Description
Politecnico Di Milano	Design Thinking	Masters of Strategic Design	Incorporates the value design has to offer business
Lancaster Institute for the Contemporary Arts	Design Thinking and Research Methods	Master of Sustainability, Innovation and Design	Develops design-literate professionals for creative roles in industry capable of contributing to innovative solutions for a sustainable future
California College of the Arts	Masters in Design Strategy	Post Graduates	Emphasizes many modes of learning and stresses communication (oral, written, and visual) and collaboration. Most student projects in the program are group-based and students learn to work with others from a variety of diverse backgrounds and across many time zones and locations. Students from many disciplines, including various forms of design, engineering, operations, marketing, management, organizing, and other of change-making forms in the world.
University of Gothenburg School of Design and Crafts: HDK with School of Business, Economics and Law at University of Gothenburg	Masters in Business and Design: a closely connected 2-year Masters program.	Post Graduates	The program is designed for students and professionals who have different educational backgrounds but a common interest in working strategically with design. The program focuses on a process in which people can contribute their different roles and experiences and will exercise the ability to understand what the others are saying and use one another's knowledge.
Pratt Institute; New York; focused on the special needs of design leaders managing design firms or managing design teams in creative industries.	Masters of Professional Studies in Design Studies	Post Graduates and Executive education	Two-year program created to bridge the disciplines of design and business management. Participants come from a variety of disciplines, including industrial design, interior design, graphic design, fashion design, communication and information design, interactive media design, and architecture. The curriculum is designed to develop strategic management skills in six study areas related to design management: operations management; financial management; marketing management.

Design as Strategy

The fourth category of programs can be described respectively as Design as Strategy or Strategy as Design (Figure 4 and Table 5). This category is 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 organisation 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 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 post graduate MBA and executive education level and delivered as workshops through partnering arrangements with companies (Liedtka & Ogilvie, 2010).

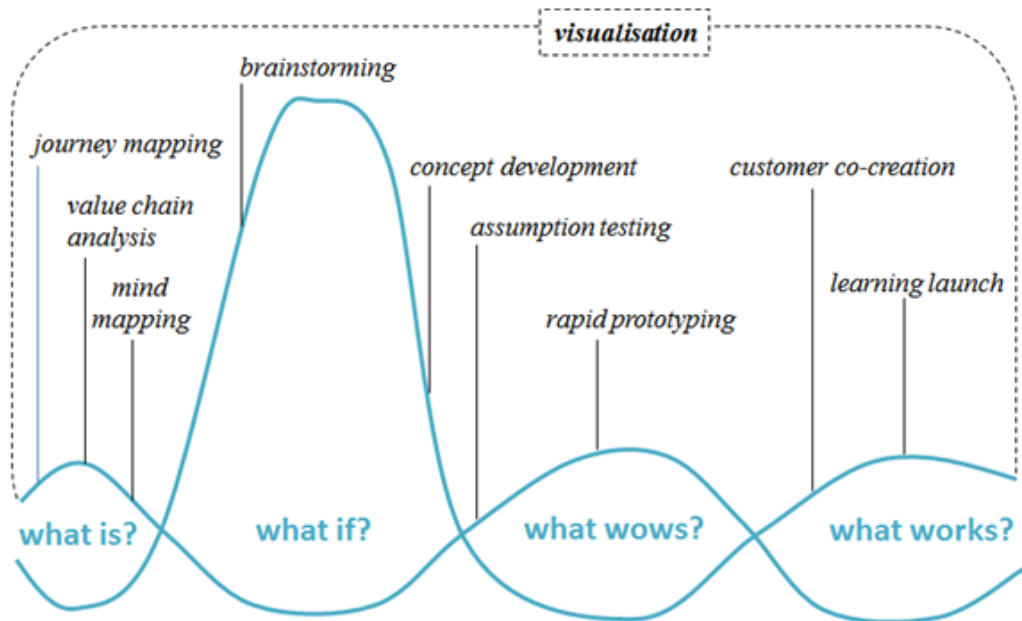


Figure 4. Design as strategy (Modified from Liedtka & Ogilvie, 2010)

Table 5. *Strategy as design in higher education*

University	Course or Unit	Program	Description
University of Technology Sydney	Strategy by Design	Executive Education Workshops	Create strategy innovations by using the models and tools successfully used by designers to solve business problems.

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 organisations 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.

The potential contributions of design and design thinking for management have been well argued in the last decade from management theorists (Boland & Collopy, 2004; Brown, 2008, 2009; Dunne & Martin, 2006; Martin, 2009; Starkey & Tempest, 2009) and design academics (Formosa & Kroeter, 2002). Design has contributed to successful business performance at strategic as well as operational levels.

Many programs are established to bring together students from a range of disciplines at the undergraduate and graduate levels, to work on common problems and learn design methodologies and apply them to workplace projects. Multiple approaches to designing educational curricula, from Formosa & Kroeter’s (2002) four-part proposal of required and elective MBA courses to deliver an understanding of what design is and ways to leverage this resource in corporate strategy and decision making, to the Stanford D School experience, at Stanford or at their associated institutions, or the Darden School’s application of design thinking to business school classes (Liedtka & Ogilvie, 2010).

The number of these programs is increasing and will doubtless take on new forms. We can expect the core approach of human-centered design plus the reframing of business issues into opportunities for new business or strategic renewal to increase. The popularity of this design driven approach in the marketplace may prove too fast for business schools and we may see initiatives in the Strategy as Design and Design as Strategy space taken up by experienced designer business leaders.

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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