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Solving wicked problems: Searching for the critical cognitive trait

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1. Introduction

The business environment of today presents problems which are "wicked" in nature. As characterised by Rittel and Weber (1973), wicked problems are ill-defined, have multiple stakeholders, have no clear and unambiguous solution or an exhaustive list of potential solutions, and each problem is essentially unique and has no stopping rule, i.e. one usually ends up by saying "that's good enough". Bennett (1998) holds that subjective decision making processes are required when the task environment is ill defined and is characterised by complex patterns of information.

Wicked problem solving is of critical importance to business schools. The increasing complexity of business environments and the structures and functions of firms have raised the question whether business schools are appropriately preparing their students to cope with such complexity (Bennis & O'Toole, 2005; Glen, Suciu, & Baughn, 2014; Mingers, 2000; Pfeffer & Fong, 2002; Simon, 1967; Waddock & Lozano, 2013). According to Bennis and O'Toole (2005), business schools have adopted a model of academic excellence based on abstract financial and economic analysis, statistical multiple regressions, and laboratory psychology, with a low focus on actual business drivers and little relevance to business practitioners. Cunliffe (2002) points out that business education has often been criticized at a normative level as advocating the systematic application of theory and techniques to every situation, while practitioners deal with ill defined, emotive, unique and complex issues, i.e., wicked problems.

According to Wilkins (2013), the mental models we possess and through which we filter events and experiences surrounding us influence our ability to solve wicked problems. Such cognitive frames, if not adjusted with respect to the context as wicked problems demand, may prove to be dysfunctional, and therefore, wicked problems represent not just organization level operational challenges, but also cognitive challenges for the individual.

There exists a need for appropriate assessment of the problem solving capabilities of individuals (Gijbelsa, van de Watering, & Dochyc, 2005), and cognitive variables, rather than behavioral variables, may provide greater value to such assessment. Also, the literature on wicked problems does not attempt to extract and characterise the cognitive character of wicked problems (Farrell & Hooker, 2013). The first objective of this study is to identify the key cognitive trait required for solving wicked problems, which may act as a measure of progress by the student in a program for imparting to business students the skills necessary for wicked problem solving.

Furthermore, the efficacy of the case based method of teaching in imparting such skills to the student is reviewed. Business schools have widely adopted the case method of teaching and it has occupied a prominent position in business management pedagogy over the past hundred years. However, the case method of teaching has received the criticism that classroom discussions cannot compensate for experiential learning in the real world, and that management cases convey a distorted sense of reality which may jeopardise learning and problem solving abilities. Also, there is a lack of conclusive evidence about the efficacy of the case method of teaching (Mesny, 2013; Rousseau & McCarthy, 2007). A second objective of this study is to ascertain whether a case based pedagogy helps develop the critical cognitive trait required for solving wicked problems.

The third objective of the study is to highlight the structural components of a pedagogy which combines the case based approach with experiential learning. Cognitive and practice based approaches can benefit and strengthen each other (Marshall, 2008), and

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Glaser (1984) finds a connection between problem solving abilities of individuals and their knowledge of concepts and principles relevant to the problem situations. Leavitt (1989) posits that effective problem solving requires mental rigor and hard analysis of the environment, inter-personal skills to get things done through and with other people, and effective pathfinding which involves vision, values, and commitment. While it is widely held that effective path-finding is best taught through real life experiences, and crisis situations, business schools have the capability to teach a little of it through constructively designed programs.

Such pedagogy may be designed based on the learning and teaching strategy presented by Fabricatore and López (2014). Designed to help students to deal with the influence of complex systems in their lives and develop 'complexivist mindsets' to cope with complexity, the course initially guides natural self-organization processes by allowing the students to form work groups, providing them with tasks aimed at solving wicked problems, and a continuous iterative cycle of assessment of intermediate results and revisions of plans and activities. Complexity in the course with respect to the individual student emerges from the necessity of working in a heterogeneous group to achieve shared knowledge and learning, the complexities inherent in the wicked problem the student is asked to solve within a group setting, and the complexities emerging from unanticipated consequences of actions and periodical performance reviews.

The research questions in this study are as follows: Is there a core cognitive ability required to solve wicked problems? How effective is the case method in developing this cognitive ability? What are the structural components of a pedagogy which involves experiential learning in a real problem solving situation?

The major contribution of the study is to fill a gap in extant literature by identifying the cognitive ability of integrative complexity as playing a central role with respect to solving wicked problems. This ability may progressively be developed in students through a structured program of study and practice, and may be subjected to periodic measurement to estimate progress in development. The study validates the efficacy of case based teaching in helping to develop this ability among students.

2. Wicked problems

Problems are wicked in nature not because they are hard to solve but because they are subject to contradictory variables, the issues are complex and tangled, and each problem is unique with little or no precedents (Camillus, 2008; McMillan & Overall, 2016).

Wicked problems are never solved (Camillus, 2008; Rittel & Weber, 1973; Wilkins, 2013), and such problems need a holistic approach since issues and problems are interrelated and dynamic in nature (Hornett & Lee, 2017; Waddock, Meszoely, Waddell, & Dentoni, 2015) and have active engagement of multiple stakeholders who may have conflicting views and objectives (Duffy, 2017, pp. 14–16; Edmondson, 2016; Ketter, Peters, Collins, & Gupta, 2016; McMillan & Overall, 2016).

However, Daviter (2017) offers alternative strategies for dealing with wicked problems, depending on the nature of the problem. Holistic strategies strive for a comprehensive solution addressing all aspects of the problem, and perhaps this is the most difficult to achieve. Taming strategies try to reduce the problem to more manageable and controllable proportions, such as dealing with the multifaceted issue of poverty in an underdeveloped economy by initiating a centralized food for work scheme and thereby bypassing political, social, educational, economic and cultural issues which are interconnected. Coping strategies aim to take advantage of the fragmented and disjointed nature of wicked problems by offering piecemeal solutions for selected fragments, allow for analytical and administrative tasks to be divided. Carrying forward the above example of poverty, coping strategies may result in funds being distributed to regional authorities in the economy, with each local entity given the mandate to formulate and implement its local policy addressing poverty alleviation.

Farrell and Hooker (2013) claim that the solution to wicked problems lies in recognising that a core cognitive process lies at its heart. Wicked problems demonstrate three characteristics – finitude, complexity, and normativity. Finitude refers to the limitations of our cognitive abilities, experience, and knowledge which constrain us from solving wicked problems. Complexity relates to interrelationships and feedback loops within a system which raises the latter's complexity and unpredictability. Normativity explains the roles of human values and norms which influence issues, create conflicts, and make acceptable solutions difficult to reach (Farrell & Hooker, 2013).

3. The cognitive process

The focus on wicked problems strengthened with the emerging belief that a linear approach to solving design problems did not work in certain situations where problem formulation and analysis were difficult mainly due contradictory and conflicting information, and the presence of many stakeholders with differing issues and expectations.

Wicked problems require non-linear thinking rather than linear thinking (Buchanan, 1992), where cause and effect relationships are difficult to determine (Waddock et al., 2015). Linear thinking is effective where the problem is determinate in nature, with the conditions, constraints and issues clearly spelt out. However, indeterminate problems, without definitive conditions and constraints require a non-linear approach (Buchanan, 1992). Such an approach requires the investigator to have a holistic view of the problem situation and a testable hypothesis with respect to actionable solutions. Since the problem situation does not come to the investigator in a pre-defined condition, defining the problem is as important as finding a solution.

This relates to the process of abductive reasoning where acceptable solutions are arrived at through forming an exploratory hypothesis leading to subsequent inquiry, and in the process the problem and a proposed solution are defined simultaneously (Khisty, 2000; Liedtka, 2006).

Liedtka (2006) explains the difference between the three types of reasoning – inductive, deductive, and abductive. Inductive reasoning involves drawing inferences from data – for example we conclude from a set of data points that when price rises, demand