



Higher Education Research and Development Society of Australasia, Inc

Higher education in a changing world

Research and development in higher education

Proceedings of the

28th HERDSA Annual Conference

3-6 July 2005

Sydney, Australia

Clark-Murphy, D. (2005) How much should we divide and rebuild the indivisible and complex business environment?, in *Higher education in a changing world, Proceedings of the 28th HERDSA Annual Conference, Sydney, 3-6 July 2005: pp 110.*

Published 2005 by the
Higher Education Research and Development Society of Australasia, Inc
PO Box 27, Milperra, NSW 2214, Australia
www.herdsa.org.au

ISSN: 0155 6223
ISBN: 0 908557 62 0

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How much should we divide and rebuild the indivisible and complex business environment?

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Abstract: *Real executives frequently make management decisions within highly complex working environments that may simultaneously affect many functions and disciplines within the organisation. However, management education in universities has frequently involved segregating areas of business in order to concentrate on narrow subject areas for intense analysis. Whilst a valuable and effective means of studying subjects in detail, management education and qualifications that are based upon concentrated attention to single subjects in isolation, denies the true nature of managing real businesses. Also, some managers make good decisions in complex environments, others do not.*

One solution is to provide management students with appropriately realistic and complex organisational simulations where they can experiment with alternative decision strategies, reflect upon the outcomes, and learn from the consequences of their decisions. In order to develop simulated organisations for use in management education, this study investigated relationships between managers' individual information processing and their decision-making performance within environments of varying complexity. The research design included examination of these relationships for subject managers using a series of well-established computerised instruments.

A sample of Public Sector managers made decisions within different levels of complexity to simulate the range of challenging situations at work. Their decision-making performance and individual information processing capability was analysed to discover any relationships. Results provided some evidence that decision-making performance of Public Sector managers was significantly different, at similar levels of environmental complexity, from previous samples of private sector managers.

The results of this study highlighted a need for simulations to be programmed to accommodate differences in managerial context amongst private, government and NGO sectors. The lack of subjects' feedback and its subsequent qualitative analysis was identified as being a limitation of this study. A need for further research was identified to establish performance benchmarks and design parameters to simulate a series of alternative and multiple organisational cultures.

Keywords: *business education - management-psychology - curriculum design*

Introduction

Management education in universities has frequently involved segregating areas of business in order to concentrate on narrow subject areas for intense analysis and understanding. This appears intuitively comfortable for education in specific professional areas such as accounting, finance, and law, but the principle of focussing on silos of subject education has its problems. Whilst a valuable and effective means of studying subjects in detail, management education and qualifications that are based upon concentrated attention to single subjects in isolation, denies the true nature of managing real businesses. Real executives work within highly complex environments that frequently require them to make management decisions that may simultaneously affect many functions and disciplines within the organisation. These may include marketing, finance, human resources, occupational health and safety, accounting, change, team development, legal and ethical compliance, client relationships, risk, contractual obligations, and organisational culture and politics. Executive education curricula design that is less complex in structure than reality then denies executives the opportunity to learn, practice, and to be assessed for integrated skills in a manner and to standards that are transferable to their workplaces.

Some managers make good decisions in complex environments, others do not, so the capacity of managers to make decisions may be impeded by increasingly complex working environments (Savas, 1990; Keating, 1988; Karpin, 1995). Thus one solution is to provide appropriately realistic and complex organisational simulations in which management students can make decisions, experiment with alternatives, reflect upon the outcomes, and learn about the more holistic and comprehensive consequences of their decisions. Development of appropriate simulations then requires the establishment of appropriate contexts with levels of complexity and elements of realism in which management students may make decisions.

However the literature contains some dichotomies in this regard. Review of the literature reveals some weaknesses in earlier studies (Streufert and Satish, 2000; Roberto, 2002) that focus on developing prescriptions about what managers do, rather than attempting to understand their decision-making processes. Results from studies within real organisational contexts have generally not been replicated in alternative situations (Clark-Murphy, 1998, 1999, 2002, 2003). Press reports suggest that outsourcing imperatives, the loss of in-house expertise, and demands for contract management have created increasing complexity for managers (Breusch, 2000). If some managers make good decisions in complex environments and others do not, understanding relationships between decision-making performance and levels of environmental complexity becomes an imperative for management education.

In order to develop simulated organisations for use in management education, this study investigated relationships between managers' individual information processing and their decision-making performance within environments of varying complexity. Rationale for this approach derives from the forty years of literature about interactive theories relating cognitive processing to decision-making performance. The research design included examination of information processing capacity so that simulations could be developed that were compatible, and provided the appropriate level of challenge for managers according to Locke & Shaw (1981). Information processing capability was measured using "Circumgrids" (Chambers & Grice, 1986), a computerised co-ordinate grid. For comparison, critical thinking ability was also measured from Watson and Glaser's Critical Thinking Appraisal (1984). Decision-making performance was measured within replicated experimental conditions of Wood and Bailey's (1985) computer-simulated organisation of manipulable environmental complexity. Analysis of these relationships provides increased understanding of managers and the effects of environmental complexity on their decision-making performance (Jin et al, 1995).

From the results of this study, a series of postgraduate management education instruments, Complex executive Simulations were developed to avoid the dislocation of management education caused by the specialisation of subject areas. Programs designed around these simulation models take a flexible approach to many leadership and management issues, and use realistic, work-related content that is based on real organisational systems and culture. Programs are developed around physical, technological, and intellectual environments, accompanied by as much or as little diversity and complexity as required. By incorporating an organisation's real systems, contractual documentation, legislative parameters, policies, guidelines, and working protocols, the simulations are designed to provide sophisticated and subtle learning programs that reflect realistic executive situations. Thus they are directly related to improving performance and effectiveness.

Method

In this study, a novel combination of established instruments was selected for their specific validity and their well-established reliability. Valid and reliable benchmarks were required before the development of appropriate simulations could commence. Individual information processing was measured as integrative complexity using David Hinkle's (1965) co-ordinate grid analysis within an updated (1999) version of the computerised program, "Circumgrids" (Chambers & Grice, 1986). Watson-Glaser's Critical Thinking Appraisal (Watson & Glaser, 1984) was used as a control measure for integrative complexity. Decision-making performance, was measured within a recently (1999) updated edition of Wood and Bailey's (1985) computer-simulated organisation of manipulable environmental complexity.

A convenience sample of 203 government managers included a balance of gender, diverse ethnicity, age and experience from a range of different agencies in order, as far as possible, to be representative of government managers at large. Anonymity was a contractual pre-condition of this experiment and was preserved by using only subjects' coded identities for telephone enquiries, assistance, or individual feedback. This lack of qualitative feedback was identified as being an inevitable limitation of this study.

1. The first stage of the experiment was completion of the 30-minute Watson-Glaser Critical Thinking Appraisal (WGCTA) (Watson and Glaser, 1984) as a control measure for information processing capacity. This instrument has been used extensively in the private sector for two decades, and is the only one identified in the literature to include benchmarked measures for a range of different managerial levels and contexts.
2. The second was to register and respond to interaction amongst six constructs in "Circumgrids" (Chambers & Grice, 1986) computer program to measure information processing for comparison with earlier studies. "Circumgrids" is a software package sponsored by the British Government, primarily to assist clinical psychology practitioners.
3. The third was to register twelve decisions (four at three different and increasing levels of environmental complexity) within an organisational simulation (Wood & Bailey, 1985) to measure their decision-making against a well established 100% benchmark, and results from earlier studies. The simulation addresses both quantitative and qualitative aspects of decision-making including the opportunity to evaluate and refine situational options like choice of employees, motivation tools, feedback to employees, and goals to set individual employees. The experimental design reduces the effects of presenting problem situations in different ways by standardising the information environment and its mode of presentation (Wood & Bailey, 1985). This instrument is the only one in which measures of decision-making performance are continually relayed back to the subject during the experiment, to assist in learning decision strategies. Also, this software can be programmed to automatically increase in environmental complexity during the experiment and to record subjects' decision performance.

Results

Test	Mean	S.D.	min	max	n
Critical thinking ability (WGCTA)	34.4	1.7	30	37	203
Information Processing (Circumgrids)	8.8	2.1	3	14	203
Decision making performance across all levels of environmental complexity	80.5%	5.0	56	112	203
Decision making performance in low environmental complexity	84%	8.6	59	100	203
Decision making performance in medium environmental complexity	86%	7.6	65	112	203
Decision making performance in high environmental complexity	72%	7.9	56	87	203

Table 1. Scores from WGCTA, Circumgrids, and Decision-Making Simulation

From Table 1, subject managers' scores on the Watson-Glaser Critical Thinking Appraisal $\bar{x} = 34.41$, (SD = 1.72, n = 203) were not significantly different from established norms for managers at $\bar{x} = 34$, SD = 4.2 (Watson and Glaser, 1984) ($t=3.43$, $p > .05$, 2-tailed). As critical thinking and integrative complexity have been tested and highly correlated by Watson and Glaser (1984), this provides some control for benchmarks of critical thinking across studies.

The information processing scores of managers was $\bar{x} = 8.84$, (SD 2.1, n=203) compared with $\bar{x} = 11.79$, (SD = 2.13, n=34) by 34 private sector subjects in a comparable study by Chambers and Grice (1986) ($t = 19.7$, $df1, 202$, $p < .001$, 2-tailed). This significant difference of information processing capability between managers and the subjects of earlier studies provides some measure of concern about managers dealing with complex issues.

The decision-making performance of the subject managers overall was $\bar{x} = 80.5\%$, ($\sigma = 4.98$, n = 203), significantly less than Wood and Bailey's (1985) well established 100% decision-making standard within the computer simulated organisation ($t = -55.7$, $df1/202$, $p < .001$, 2-tailed). Repeated measures t-tests also indicated that the decision-making performance of all subjects within each of the three levels of the environmental complexity conditions of the simulation was significantly lower than Wood and Bailey's (1985) decision-making standard.

Results from a large sample (N=203) showed that scores of information processing predicted decision-making performance generally and within situations of low complexity but not within situations of medium or higher complexity. The combined effects of information processing and critical thinking ability on decision-making performance differed little from the predictive effects of information processing alone.

Discussion

The main questions about whether the information processing capacity and decision-making of managers positively correlate, are generally answered by this study. Although managers scored at similar levels in the critical thinking ability test, their scores for information processing and decision-making within standardised experimental instruments showed that they processed information and made decisions differently, especially in situations of increasing complexity. The tests were novel for all subjects in all

experiments, as a control, and the results show that generally, managers who displayed lower information processing capability also displayed lower decision-making effectiveness within environments of increasing complexity.

This result suggests that management educators should provide appropriately complex yet challenging (Locke, 1984; Lock & Latham, 1990) scenarios in which students can make decisions within complex environments that include issues of marketing, financial management, accounting, human resources, operations, etc. Each simulation should provide a clear set of objectives within a realistic and competitive work environment in which managers can act and review their actions without risk to themselves or their organisations. The designs should also incorporate a flexible array of changeable features that allow diverse and subtle alternative scenarios on which to base specialised and realistic problems. A visual focus provides for unambiguous appraisal and consideration of problems without the individual executive having to interpret verbal details as evidenced in some “case study” approaches to postgraduate education. This provides for greater use of valuable executive time by allowing auditory, verbal and kinaesthetic learning modes.

By incorporating an organisation’s systems, contractual documentation, legislative parameters, policies, guidelines, working protocols and culture, the simulations are designed to provide sophisticated and subtle learning programs that reflect realistic executive situations directly related to improving performance and effectiveness at work. Programs are developed and focused around physical, technological, and intellectual environments, accompanied by as much or as little diversity and complexity as required. Each design includes comprehensive learning modes within an adult learning cycle to deliver maximum benefit to participants for minimal resource expenditure.

An extension of the facility of simulation is the opportunity to devise realistic future scenarios. This provides executives with educational opportunities to address hypothetical cultural and structural diversity in business. These programs may then be designed to prepare executives for anticipated or speculated demands within a new area of business endeavour, or to simulate and address current problems of an industrial, physical, financial or political nature within their own organisations. By providing this non-threatening yet competitive environment, executives can develop intellectual armouries and practical negotiating and decision making skills to simultaneously enhance the future prospects of themselves and their organisations.

A further benefit of this design principle is that executives, who may normally be relatively isolated from each other due to departmental structure or geography, are able to address problems and future scenarios as a team. This facility then allows an executive team to be maintained, on their return to work, through improved interpersonal and commercial communications at a level unavailable to them previously.

To date, simulations have been developed and used effectively to address significant issues within the realms of international business acumen, international marketing projects, cross-cultural competitive tendering and contract management, industrial relations and human resources planning, project management risk assessment and contingency planning. All applications to date have been adopted by commercial or government organisations, though there is surely an argument for educational institutions to adopt similar instruments for management education if their learning outcomes are to be transferable to real workplaces. Further, educational researchers may be able to develop research conditions less constrained by demands for anonymity, identified as being a limitation of this study. This study, earlier PhD theses, and continuous development and refinement of instruments, are part of a long-term project to serve the needs of managers and their stakeholders. Further studies are needed towards establishing appropriate decision-making performance norms for the structural and cultural contexts in which managers must make decisions.

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