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## Techniques for assessing skills and knowledge in a business strategy classroom

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**Abstract:** The purpose of this paper is two-fold. The first is to present the structure of an undergraduate course entitled “Business Policy and Strategic Management” taught at the DeGroot School of Business, McMaster University. The second is to answer four research questions that are of interest to instructors developing and delivering similar courses. After analysing the performance of 1551 students in a fourth-year course, several insights are offered, including the suggested use of Multiple-Choice Tests (MCTs) as the most accurate measure of student achievement.

**Keywords:** curriculum design; education; class participation; student evaluation.

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## **1 Introduction**

Strategic management and business policy courses are a vital part of the curriculum in all undergraduate business programs in North America. In fact, AACSB International recommends that accredited programs offer a capstone course on this topic. Knowledge of key concepts, tools, and principles, as well as the possession of strong analytical skills, prepares business graduates for entry into the contemporary workforce. Instructors currently developing and delivering strategy courses have a variety of pedagogical resources available, including numerous books, case studies, videos, and simulation games. Instructors across various disciplines, including strategic management, continue to share their insights and experiences with course development, through journals devoted to curriculum design, such as the *Curriculum Journal*, *Journal of Curriculum Design*, and *Journal of Management Education*. Consistent with an approach that takes continuous improvement and shared resources as central concepts, we present the dual objectives of this project. The first is to briefly describe the structure of a course entitled “Business Policy and Strategic Management” taught at the undergraduate level at the DeGroote School of Business, McMaster University, in the belief that some instructors may find aspects of this course design applicable to their programs. The second objective is to present the results of an empirical investigation of the relative accuracy of techniques used for student assessment. Based on literature reviewed, four research questions are proposed and answered by analysing student performance data using quantitative data analysis techniques.

### *1.1 Course objective and learning outcomes*

4PA3 Business Policy and Strategic Management is a fourth-year required course for Commerce and Engineering and Management undergraduate students in the DeGroote School of Business, McMaster University. The course has been offered since its inception in 1952 and is considered the capstone of the program designed to unify the student's learning experience.

Historically, the capstone strategy course has been a mainstay of business education since the early 1920s during the dawn of management education led by Harvard and Wharton. Course content in the early decades consisted primarily of oral presentations by practicing business managers, formal cases of critical management incidents, and role playing (Wolfe, 1975).

By the 1980s, the field of strategic management and its corresponding capstone course had matured enough to become a staple course in most schools registered with the AACSB International. In addition to the traditional course content that had evolved throughout the century, new methods started to emerge including management games and the inclusion of international management and non-profit organisation content (Eldredge and Galloway, 1983). Ultimately, the purpose of the course was to integrate other previous courses (e.g., finance, marketing, human resources, accounting), build on acquired knowledge, and act as a stepping-stone to the real world of business. The underlying focus of the course was to enhance students' capacity to do the job of a general manager responsible for strategic performance.

The 4PA3 course at McMaster is taught primarily through the case-method but also includes readings, lectures, videos, workshops and a simulation game. What students learn in this course, however, has utility not just for the person at the top of the enterprise. Increasingly, general management responsibility is shared and every member of the management team needs to appreciate how his or her actions contribute to the overall success of the enterprise. The cases and concepts of the course take the total business as the unit of the analysis and the general manager of the business as the key decision-maker. The materials used in the course encompass a wide range of industries, businesses, and issues in order to provide the greatest depth and breadth of experience. In terms of *learning outcomes*, upon completion of this course, students should be able to complete the following key tasks:

- play the role of the main decision-maker(s) while taking all stakeholders into account
- assess operational health and business performance while forecasting the organisation's prospects as it is currently being run
- calculate all necessary industry metrics, marketing information, financial ratios and trends to defend recommendations
- define the capabilities essential for the successful development of a business and determining action
- formulate a strategic plan while considering the organisation's capabilities and environmental context
- identify the important opportunities and challenges facing a business and setting out a course of action for dealing with them
- implement changes, as necessary, in order to position the business for the future
- detail an action plan that is operationally specific.

### 1.2 Course materials

The following *required course materials and readings* are utilised in the course:

- *Strategic Analysis and Action* by Mary M. Crossan, Joseph N. Fry, and J. Peter Killing, Prentice-Hall, 2004. Previous editions of this textbook were adopted in the past
- Custom Courseware that contains eight cases
- The Capstone business simulation team member guide and access to the simulation website.

The following *optional course materials* are offered that are also available in the bookstore:

- *The Strategy Process* by Henry Mintzberg, John Voyer, and James Brian Quinn, Prentice Hall, 1994
- *Harvard Business Review on Advances in Strategy* by Robert Kaplan, Kathy Eisenhardt, Don Sull, Peter Tufano, Orit Gadiesh, James Gilbert, Mohanbir Sawhney, and Michael Porter, 2002
- *Strategy Safari: A Guided Tour through the Wilds of Strategic Management* by Henry Mintzberg, Joseph Lampel, and Bruce Ahlstrand, Free Press, 2005.

### 1.3 Delivery method

Learning in the 4PA3 course results primarily from in-class discussion of comprehensive business cases as well as pre-class analysis. The balance of the learning comes from the lectures on strategic concepts, from related readings, and from researching for presentations, cases, assignments, and simulation decisions. 4PA3 is delivered through a variety of pedagogical techniques, such as lectures, readings, assignments, presentations and a simulation game, with a major emphasis on a case-based approach. During the course, students are expected to utilise their knowledge from other disciplines including finance, accounting, human resources, and marketing. The objective of case studies is to allow students to develop and apply their understanding of various business policy decisions encountered in a variety of organisational settings. Each case is accompanied by a number of questions. Students are responsible for reading, analysing and solving a case before a class, and participating in class discussions. For example, during the 2006 winter term, the following cases were utilised in the course:

- 1 *Visioning at Xerox Canada* by Nick Bontis under the supervision of Mary M. Crossan
- 2 *Canadian Airlines Corp.* by Nick Bontis under the supervision of J. Nick Fry and Rod E. White
- 3 *Designer Classics Carpet Manufacturing Ltd.* By Rod E. White
- 4 *Harlequin Enterprises Ltd.* by J. Peter Killing
- 5 *Rehabilitation Research Centre* by Nick Bontis

- 6 *Hyperion Aurora Trust* by Nick Bontis under the supervision of Stephen R. Foerster
- 7 *Fifth Column* by Christopher K. Bart
- 8 *Weytjen's First Assignment* by Barbra Pierce under the supervision of Mary M. Crossan.

Lectures are another important part of the course. An instructor usually provides an overview of related book chapters and explains the key concepts such as tools and business models in detail using a uniform case analysis tool-kit (e.g., the Diamond-E framework). Real-world examples are the core component of the lectures. Instructors teaching different sections of this course are free to offer any relevant examples of their choice; those are usually derived from their own business/consulting practice or based on recent events in the business world. For the Capstone business simulation (see [www.CapSim.com](http://www.CapSim.com) for further information), teaching assistants deliver a one-hour lecture that covers the key underlying concepts, offer tips on success, and explain the technical aspects of the game. A more detailed description of the simulation will follow.

#### 1.4 Assessment

All work is evaluated on an individual basis except in the case where group work is expected. For group work, team members share the same grade. The final grade is calculated as follows:

<i>Component</i>	<i>Weight (%)</i>
Assignment 1 (individual)	5
Multiple-choice test (individual)	15
Case exam (individual)	15
Capstone business simulation (group)	20
Assignment 2 (individual)	5
Oral presentation (individual)	5
Peer assessment (individual)	5
Participation (individual)	25
Major Field Test (individual) <sup>1</sup>	5
<i>Total</i>	<i>100</i>

<sup>1</sup>The Major Field Test is administered in each 4PA3 class as part of the AACSB International accreditation requirement for quality control and learning outcomes. Each student writes the test and receives 5% towards his or her course grade regardless of the test score. Therefore, this component does not have any impact on the final class grades and was excluded from further discussion and data analysis (component correlations were utilised for data analysis, therefore, adding or subtracting 5% from each student's final grade did not affect the outcome).

*Assignment 1* is done individually. Students are required to submit a Porter 5-Forces Analysis of a case. Students are graded on their ability to write a concise, accurate and in-depth analysis of the case facts and their implications. Overall, they are encouraged to carefully analyse rather than restate the case facts, clearly indicate whether each force

is 'low', 'medium' or 'high', and make a conclusion on the overall attractiveness of the industry.

*Multiple-choice test* is similar to a traditional examination approach during which students are presented with a number of questions that have five possible answers. The exam covers the material from the textbook, lectures, and discussions. No cases are covered because each instructor may facilitate case discussion in a slightly different way and offer solutions that may deviate among course sections. The exam is open-book and all non-electronic sources of information are allowed. To prepare for the test, students are also offered practice questions from previous years.

*Case exam* is administered towards the end of the course. Students receive a comprehensive management case with a set of questions and are responsible for developing their own solutions. This test is similar to case exams that are traditionally done in other strategy courses.

*Capstone business simulation®*: CapSim is a simulation-based game that provides a hands-on environment where students can learn to manage and coordinate business functions from marketing to research and development. CapSim participants are divided into competing teams where each team acts as an executive committee responsible for running a \$100 M electronic sensor company. Students use a combination of decision support software and website support to make decisions about the strategy and direction of their company. The simulation is an exciting way to explore the complexities and challenges of running a business. Most real-world, strategic decisions are made after consultation with key executives and colleagues in an atmosphere of committee deliberations and discussion. CapSim is founded on teamwork since it plays a crucial role in the coordination and execution of strategy. Students are permitted to create their own teams. Teams tend to consist of 5–6 students and are confirmed by the TA based on overall class size (we expect to have 10 or 12 teams per class, 2 industries per section, 5 or 6 teams per industry).

Teams make decisions about various aspects of a simulated company for a given period of eight years that take place over several weeks. Teams meet regularly outside of class time to analyse the strategic position of their company and to discuss issues, problems, financials, etc. The results for each company are returned every week. Each firm's objectives are achieved systematically and successfully by considering and applying concepts previously developed in lectures, readings, and case discussions. Each team's performance is evaluated using a variety of performance criteria as follows: 12% – cumulative profit, 12% – market share, 12% – Return on Sales (ROS), 12% – asset turnover, 12% – Return on Assets (ROA), 12% – Return on Equity (ROE), 12% – ending stock price, and 16% – ending market capitalisation. All years are weighted equally. Teams compete against teams in their industry and across all 4PA3 groups. Each team is required to submit a set of the firm's decisions for each round of the simulation. Based on the results the team achieves, the team is given a relative standing among those in their industry. Any team that goes bankrupt receives a grade of zero. At the end of the simulation, each group member shares a mark worth 20% of his or her final grade.

*Assignment 2* is related to the CapSim simulation game. Each student individually prepares a concise report on the status of his or her company at the start of the simulation.

This report should concentrate on the issues pertaining to the analysis of the industry, company, products, profit potential, and other factors that may affect the future financial position. The following points should be covered:

- 1 How will technology reshape customer expectations in future?
- 2 How will demand increase, and how will that affect your investment in capacity?
- 3 How much money can you make? Determine profit potential in a best-case scenario.
- 4 How do customers perceive you and your competitors today? Is there room for improvement?

Students use a CapSim guide to do situational analysis. We always emphasise the fact that doing well on this assignment develops a true understanding of the nature of the simulation and the environment in which the simulation is taking place that is crucial to success.

*Presentations* are done after the completion of CapSim. Each team prepares a presentation detailing, round by round, the successes and failures of their company. This presentation should concisely explain what the team planned to accomplish in the round compared to what actually happened. It should also explain how the team adjusted its plans in light of competitive and other unforeseen activities. The focus of this presentation is an honest and critical assessment of how well the team's business plan worked. The presentation should end with a brief discussion of the important successes and failures which occurred during the team's tenure as managers of their company. Each member of the group must present and receives an individual grade. The format of all presentations is formal with appropriate business attire and presentation techniques. Students are evaluated on the thoroughness of presentation content, creativity and communication skills. Teams are encouraged to be as creative as possible when making these presentations and may use any format they wish as long as each team member has equal presentation time.

*Peer assessment* of CapSim team members is done after the game. Each student is required to rank his or her team members on the criteria related to their contribution to the success of the company on the scale from 0 to 5. Assessment is done anonymously online at the CapSim website and each student may see the results of his or her ranking in aggregate form only. This peer assessment grade is added to the student's final grade.

*Participation* is a key component of the course. Students are encouraged to participate in all class discussions, especially, in case studies and lectures. Students are expected to complete the readings and prepare for case discussions before each class. The case-based method requires students to be cooperative in sharing their views in classroom. Debate and challenge are important activities that help in the learning process. With respect to good participations in case discussions, students are encouraged to:

- get the discussion off to a productive start by highlighting the key characters in the case and main decisions that still need to be made
- shape the discussion through the meaningful introduction of the key theoretical concepts, current events, financials or alternative analysis

- triangulate case discussions with the current events or readings and by matching or referring to previous points made during the class
- link or contrast the main highlights of a particular case with previous cases
- change or reverse the direction of the discussion when appropriate and support the alternative hypotheses or opposing views
- summarise and bridge the comments of others without undue repetition.

In addition to the readings, students are advised to devote at least two hours of intensive preparation for each case discussion. Each student is assigned an individual participation grade for each class by an attending TA. Students are required to have name cards, and the TA also has a photograph of the class. TAs are specifically trained at the beginning of term to evaluate participation. Physical presence does not count for participation; contributions are evaluated from physically but not mentally present (zero grade) to good chip shots, to quite substantial comments, to case-cracking contributions with empirical evidence. A participation mark is assigned for each student after every single class.

## **2 Theoretical background and research questions**

### *2.1 Rationale for the project*

The idea to conduct this empirical investigation was inspired by several instructors and teaching assistants involved in the delivery of this course. During course review meetings, some of them wondered whether the current assessment method was an optimal one, or whether the current assessment methods could be replaced with one that completely captures the entire picture. We did not know for sure whether students performed consistently good or bad in all evaluation components, and whether there was a difference between group and individual performance. Below are a few quotes:

“Even after being a TA for 4PA3 for several semesters, I still fail to realise whether there is any relationship between participation, a multiple-choice test and a case exam. Do those who talk a lot in class perform constantly better? Do those who never participate do so because they are afraid of public speaking or just unprepared? I looked for the relationship but failed to identify one. One of my major surprises was when a student with a zero participation grade received a perfect grade on the case exam.”

“As a TA, one of the most contentious aspects of the 4PA3 course is the introduction of a 25% participation grade component. Many students are unfamiliar with this relatively heavy weighting on participation and it is a concern for many. Further to this, there is the concern that the participation grade might overshadow the other components in the minds of TAs and create a halo affect further affecting other components.”

Initially, this line of research was driven by the practical needs of a specific business school program. However, we soon realised that there were various theoretical underpinnings that could be tested and empirically evaluated.



*First*, we believe that academic research should be practical; currently, there is a growing body of literature that explicitly states that business academic research should not only contribute to theory but also address the needs of practitioners (Baskerville and Myers, 2004; Benbasat and Zmud, 1999; Bennis and O'Toole, 2005; Booker et al., 2008). In this case, we believe that instructors and teaching assistants who deliver this or similar strategy courses may potentially employ the findings of this project to better understand the effectiveness of these assessment methods, to improve their curriculum, or learn how to advise their students. *Second*, there are many theoretical foundations that may be utilised to develop research questions. As such, similar issues have been already previously investigated in various disciplines, mostly in education. The following subsection presents the literature review that was employed to propose four research questions.

## 2.2 Literature review and research questions

In 1869, Sir Francis Galton, heavily influenced by his cousin, Charles Darwin, published his book *Hereditary Genius*, in which he advanced the thesis that variation in human ability was due to superior qualities passed down to offspring through heredity. Galton's work appeared at a time when the American population was exploding due to large influxes of immigrants, generally thought to be of low intellectual ability (Pulliam and Van Patten, 1999), and American society was piecing together an education system for the masses (Gatto, 2006). In an attempt to create an efficient and rational system that would deliver standardised education, and to identify those offspring blessed with Galton's hereditary superior qualities, standardised testing was born (Caruano, 1999). In the early 1920s, in an effort to identify potential officer candidates, the American military developed the Multiple-Choice Test (MCT) as a measure of intelligence and intellectual achievement (Caruano, 1999). From the moment of its birth, the MCT has been the subject of embittered criticism and derision (Wigdor and Garner, 1982).

Despite the generally antagonistic stance many students and educators take towards the MCT, it has persisted as a measure of achievement in academic settings. There is little question that the MCT is an efficient and cost-effective assessment tool (Roediger III and Marsh, 2005), but does the MCT actually measure a student's performance?

Criticism of the MCT falls into three broad categories:

- 1 it is vulnerable to random effects from guessing (Burton and Miller, 1999; Downing, 2003; Posey, 1932)
- 2 it discriminates against certain socio-economic and cultural groups (De Vita, 2002; MacDonald and Paunonen, 2002)
- 3 it measures declarative knowledge rather than depth of learning (Popham, 1990).

Burton (2005) addresses 12 of the most common myths and misapprehensions concerning the extent to which the MCT is subject to random effects, and asserts that a test containing a sufficient number of questions relative to the concepts examined may counter any of these potential effects. Williams (2006) argues that a variation in the type of question, as well as careful construction of questions displays considerable depth of understanding. In particular, the Assertion-Reason Question (ARQ) is an indicator of

deeper learning. There is a valuable lesson to be learned from the criticism that the MCT favours students who do not struggle with language comprehension. In an international business school with significant numbers of English as a Second Language students, it is important to remove time constraints to permit additional time for comprehension (Paxton, 2000).

If modern pedagogical techniques frown on the MCT as a method of assessment, what then are the alternatives proposed? In his pivotal paper “A True Test: The Case for Authentic Assessment”, Wiggins argues that

“authentic assessments require students to be effective performers with acquired knowledge. Traditional tests tend to reveal only whether the student can recognise, recall or ‘plug in’ what was learned out of context.” (Wiggins, 1990, p.2)

These types of authentic assessments would include case studies, simulations, opportunities to interact and collaborate with peers and active participation, including “engaging oral analysis” of a topic.

The 4PA3 Business Policy and Strategic Management course at the DeGroote School of Business, McMaster University, assesses students using both the Wiggins notion of authentic assessment, and a traditional MCT. The assessment measures, explored in greater detail in the previous section, include a case study, a MCT, a simulation of a real world problem requiring demonstrated problem solving skills, and multiple opportunities to interact, collaborate and participate in learning activities.

In this research paper, we test whether the authentic assignments are better predictors of the student’s overall performance than the more traditional MCT. In other words, would students perform better, overall, if one of the two methods was dropped.

We base our initial inquiry on the notion, advanced by Bandura (1986) that an individual’s sense of personal efficacy stems from his or her ability to predict how a given situation might unfold, or control the conditions under which the situation is to occur. Academic self-efficacy has been explored by numerous scholars, and it is important for a number of reasons directly related to assessment methods. Self-efficacy is referred to overall classroom performance (Bandura, 1986; Bontis et al., 2008; Schunk, 1984), and to the depth of involvement students feel in a particular subject (Betz and Schifano, 2000). Self-efficacy beliefs have been associated with reduced stress for learners (Griffin and Griffin, 1998; Newby-Fraser and Schliebush, 1997) and increased motivation to acquire skills and knowledge (Pajares and Graham, 1999). A further research goal is to determine how and to what extent efficacy beliefs affect performance on a specific assessment.

The ability to predict how a situation might unfold, in this case, how an assessment is to be taken and calibrated, requires that the learner be familiar with the assessment method. As the MCT has been a feature of modern education from its inception, it is reasonable to believe that every 4PA3 student is familiar with this assessment method, and therefore feels confident about predicting the format of the test, the administration method, and the grade calculation procedure. We would therefore expect the greatest sense of efficacy to arise from the MCT as a result of this familiarity and consequent predictability.

The ability to control the conditions under which an evaluation is to take place is likely to be compromised by situations in which the grade is affected by other members of a group, or where on the spot oral analysis is required. In other words, the very reason

Wiggins argues for his “authentic assessments”, that “they require students to be effective performers with acquired knowledge” (p.2), may be the reason why students might tend not to perform well on these kinds of assessments; namely, that efficacy beliefs decline in situations that students do not feel they can control. As such, other assessment procedures, such as heavy weight of an in-class participation component, a simulation game, and a case exam are less frequently utilised by DeGroot instructors and are less evident in the undergraduate curriculum. Therefore, it seems reasonable to suggest that students are less familiar with those assessment methods and would develop a lesser degree of efficacy towards those components.

If the MCT presents the greatest opportunity for students to both predict and control the outcome of the assessment, then the MCT ought to be the best predictor of performance overall. The MCT is an important test measure, then, to build self-efficacy beliefs and in the process deepen involvement and motivation, reduce stress and generate better overall performance. In the context of a business school, the MCT has an additional significance, in that a large number of professional and post-graduate qualifications involve extensive and complex MCT assessments. Many students, wishing to continue their careers and acquire additional credentials, would benefit from increased familiarity and confidence in their ability to perform well on MCT.

“Results! Why, man, I have gotten a lot of results. I know several thousand things that won’t work.”

Thomas A. Edison, US Inventor (1847–1931)

Simulations, case studies and challenging oral analysis are valuable tools in any learning environment, but may not provide an adequate instrument for assessing whether concepts have been retained or understood. An empirical study of a simulation used to introduce graduate business students to the principles of intellectual capital management demonstrates that such simulations accelerate the learning process and have a valuable role to play in generating receptivity to new ideas and methodologies (Bontis and Girardi, 2000). However, there is no necessary relationship between how a student performs in a simulation, and how well concepts were understood and retained. Grades based on performance in these types of exercises may not accurately reflect learning. An MCT following each exercise might be a better indicator of how well essential concepts were grasped.

The purpose of assessment is twofold: to provide students with an objective measure of their knowledge and skills, and to provide instructors with an indicator of their effectiveness (Wiggins, 1990). The practical implications for students are manifold, as assessments partially determine access to funding, opportunities for further study and careers (Jones and Jackson, 1990). It is thus vital that instructors assess students as fairly and objectively as possible. This paper is fundamentally concerned with the accuracy and fairness of assessments based on a variety of assignments, including MCT, case study analysis, simulation, participation and presentation. Based on the previous discussion, we ask the following:

*Research Question 1: How are the independent assessment components of the course correlated? In other words, if students perform better or worse in a particular assessment component, in what specific components are they also likely to perform better or worse?*

That students may experience anxiety when required to participate in a public speaking forum would come as no surprise to most business professors. While the degree of anxiety may vary, evaluating students on the basis of public speaking exercises can be problematic and needs to be approached with some caution (Hartman and LeMay, 2004). With this in mind, we ask:

*Research Question 2: How well does the assessment based on participation reflect overall course performance?*

We are then concerned with alternative assessment methods that provoke less anxiety. Assuming that assessments involving the least amount of anxiety, understood as a dimension of Bandura's concept of predictability and controllability in the construction of self-efficacy beliefs, would be the most fair and accurate indicator of skills and knowledge, we ask:

*Research Question 3: Which particular assessment component is most reflective of overall performance?*

We argued previously that self-efficacy beliefs may decline in situations that do not provide students with controllability, and thus performance in that specific assignment may also decline relative to performance in other assignments. Individual assignments offer greater controllability than assignments that require group collaboration. We therefore ask our final question:

*Research Question 4: How do individual vs. group assessment components reflect overall performance? In other words, can final performances be better predicted from individual or group assessments?*

### 3 Methodology and results

In order to answer the study's research questions, a quantitative analysis of grade components of those who completed the course was done. For the period of 2003–2006 inclusive, course results from individual years were merged into a uniform 1551 data points set. This was possible to do for the following reasons. First, all 4PA3 assessment components as well as the grade allocation scheme remained identical over those years. Second, the same course delivery approach was utilised; the course coordinator instructed professors to deliver course material in the same way, and the teaching assistant coordinators ensured the uniform application of grading policies in these years. Third, an ANOVA test demonstrated that the means of the final grades remained the same in those years,  $F(3, 1547) = 1.690$ , n.s. A Kolmogorov-Smirnov test was done to assess whether individual component grades follow a normal distribution. The results demonstrate that grades are non-normal (the highest  $p$ -value is 0.01). Therefore, non-parametric techniques for data analysis should be utilised.

To answer *Research Question 1*, a Spearman correlation matrix of course assessment components was calculated (see Table 1). It demonstrates a number of moderately or very low correlations. As such, the highest correlations above 0.2 were observed between participation and case exam, participation and multiple-choice exam, and participation and assignment 1. Seven correlations ranging from 0.10 to 0.15 were identified; in four situations, the case exam correlated with assignment 1, assignment 2, multiple-choice

exam, and peer assessment. In three cases, assignment 1 correlated with multiple-choice exam, peer assessment with participation, and multiple-choice with CapSim. Five very low (i.e., below 0.10) yet significant correlations were observed. However, it was believed that they do not represent interest in this study. Given the large sample size in this project, any correlation above 0.06 becomes statistically significant. At the same time, a correlation below 0.10 manifests less than 1% of the variance in another variable that cannot be of any value to researchers and practitioners. Therefore, these values are considered negligible.

To answer *Research Questions 2 and 3*, a correlation table between a grade obtained in each evaluation component and the final grade excluding that particular component was constructed (see Table 2). It is noted that it was impossible to run Multiple Linear Regressions because of the violation of an independency assumption. That is, each independent variable (i.e., grade for each evaluation component) was also included as part of the dependent variable (i.e., the final grade) that is not allowed in regression analysis.

**Table 1** Evaluation components correlation matrix. Values significant at the 0.01 level are in bold

<i>Component</i>	<i>Assign #1</i>	<i>MCT</i>	<i>CapSim</i>	<i>Assign #2</i>	<i>Present</i>	<i>PeerEval</i>	<i>Participat</i>
MCT	<b>0.125</b>						
CapSim	0.006	<b>0.133</b>					
Assign #2	0.036	0.056	0.022				
Presentation	0.010	0.036	0.001	0.160			
PeerEval	0.052	<b>0.071</b>	<b>0.070</b>	0.035	<b>0.071</b>		
Participation	<b>0.238</b>	<b>0.243</b>	<b>0.066</b>	<b>0.096</b>	0.051	<b>0.142</b>	
Case exam	<b>0.127</b>	<b>0.135</b>	-0.016	<b>0.147</b>	0.026	<b>0.136</b>	<b>0.245</b>

**Table 2** Evaluation component – final grade correlations. Values significant at the 0.01 level are in bold

<i>Assign #1</i>	<i>MCT</i>	<i>CapSim</i>	<i>Assign #2</i>	<i>Present</i>	<i>PeerEval</i>	<i>Particip</i>	<i>Case</i>
<b>0.171</b>	<b>0.289</b>	0.057	<b>0.153</b>	<b>0.107</b>	<b>0.213</b>	<b>0.220</b>	<b>0.251</b>

The final grade of each student was adjusted as if that component was not part of the evaluation process. Therefore, we can determine if those who performed well on assignment 1 were also likely to perform better in the rest of course without double-counting. The results reveal that all components except for the CapSim simulation game correlated with the final grade. The highest correlation (0.29) was observed for the MCT, followed by case exam (0.25), participation (0.22), peer evaluation (0.21), assignment #1 (0.17), assignment #2 (0.15), and oral presentation (0.11).

In terms of *Research Question 2*, participation predicts overall course performance relatively well. As such, it explained 4.8% ( $0.22 \times 0.22$ ) of the total variance of the final grade. With respect to *Research Question 3*, it was observed that the individual MCT was most predictive of the overall student performance in the course; this component explained 8.4% ( $0.289 \times 0.289$ ) of final grade variance.

To answer *Research Question 4*, two Spearman correlations were analysed. First, the correlation between the CapSim grade (that represents a group evaluation component) and the final grade excluding CapSim was found to be insignificant (see Table 2). Second, no statistically significant correlation between CapSim and each individual component was observed (refer to Table 1). Therefore, group and individual evaluation components predicted the final grade independently of one another.

#### 4 Discussion

The empirical results of this study show evidence that the best predictor of overall performance in a capstone business policy and strategy course is a MCT ( $\rho = 0.29$ ), followed by case exam ( $\rho = 0.25$ ), and participation ( $\rho = 0.22$ ). The fact that the MCT was the strongest predictor of overall performance in this case-intensive course was quite surprising. It is argued that some students, because of their prior exposure to MCTs in other courses, developed higher self-efficacy and learned how to approach the test that had a familiar format. In contrast, when dealing with other evaluation components, especially a totally new simulation game, students had a lower degree of self-efficacy and lacked prior exposure to this type of performance evaluation. However, of these assessment methods, MCTs are not a common feature of most modern capstone strategy courses. MCTs are considered assessment tools of the traditional *passive learning paradigm* which views “the student mind as an empty slate rather than a muscle that needs exercising through constant challenge” (Wright et al., 1994, p.9). MCTs are more common in first year introductory courses in areas such as psychology that attempt to impart voluminous amounts of information and are typically not used in graduating year case-based management courses.

Unfortunately, MCTs do not lend themselves well to evaluating the integration and communication capability of integrated learning which is the focus of a capstone course and more readily assessed through case exams and participation. Wright et al. (1994) argue that MCTs should be used when the following five conditions are evident:

- 1 Faculty transfers knowledge to students, who are expected to memorise and recall
- 2 Students are passive receptacles to be filled with information that is owned by the faculty
- 3 Faculty are responsible for sorting and classifying students into appropriate categories by assigning grades – often based on a statistically derived curve
- 4 Relationships between faculty and students are impersonal and interchangeable
- 5 Students operate in a competitive environment where the goal is to outperform their classmates.

Although no senior administrator at any accredited business school would admit to describing their program with any of the above conditions, the reality is that results of MCTs are deemed to be objective. Therefore, students are less inclined to argue against the accuracy of evaluation which is often a criticism of subjective case exams and participation. Furthermore, with bubble card scanning technology, MCTs are quite popular in an environment that demands quick turnaround of results with minimal labour and cost.

The use of cases and participation in the classroom represents the *active learning paradigm*. This approach has become much more common in capstone courses because recruiters often criticised business schools for graduating students that were lacking skills in areas such as cross-functional integration and oral and written communication. The active learning approach may equip students to become more effective in today's businesses by honing these skills. If the students' goal is the demonstration of knowledge, as opposed to regurgitation of information gathered, perhaps more career-enhancing opportunities will be afforded to them (Peterson, 2001). Warren (1997) suggests that

“active learning requires preparing prior to each class, talking in class even if shy, seriously listening to the comments of fellow students, solving problems, and learning to live with ambiguity instead of oversimplified answers to complex questions.” (Warren, 1997, p.17)

Preparation is necessary for each class, not just when exams or quizzes are given. The rationale behind this is that the learning that takes place outside the classroom is “the most significant educational experience for roughly 40% of students” (Moffatt, 1989, p.32).

It was also interesting to discover the lack of relationship between the group and individual assignment. Three assumptions may explain this fact. First, the group assignment was a new simulation game and students had a lower extent of self-efficacy. Second, in CapSim, there was a slight element of luck involved since the profitability of a company and, therefore, the grade depended on the actions of other teams in the course. Third, even if a specific student put substantial efforts to succeed at the game, the overall outcome depended on the contribution of his or her team members.

The results of this project were shared with several of the instructors who had previously taught this course. This was done as part of a member checking process as suggested by Creswell (2003). Indeed, it is the goal of management research to develop knowledge that may be further employed by professionals (Bennis and O'Toole, 2005). In this case, the final users of the findings of this project are instructors developing and delivering 4PA3 or similar business strategy courses. Therefore, it may be important to solicit and document their opinion to validate and disseminate the results. As such, three 4PA3 instructors and one TA coordinator were presented with the outcomes of this study and asked for their reaction. The following comments were received:

“In my experience over the years, I have observed that students who have the ability to maximise MCT marks are those who are successfully able to: (1) invert (and cancel out) negatively posed questions with negatively posed answers; (2) select from two correct answers on the basis that the one which is a sub-set of the other is ‘more’ correct, i.e., ‘vertical integration’ vs. ‘backward integration’; (3) manipulate with ease several linear algebraic finance formulas, and (4) answer questions from marketing (best done by students with good prior learning retention). I believe that the results of this study may show that good performance in the course may not necessarily be spawned by mastering the content but instead by smart students knowing how to deal with MCTs. Another reason I think the MCT prevails as a correlation ‘leader’ is that it is unfairly benefiting from comparison with the participation component. The unfairness is borne-out by the fact that the MCT occurs once and all students tend to prepare for it whereas participation is evaluated in every class throughout the term and some students may simply have an ‘off-day’. I have also observed that the highest-performing participators (i.e., top 10% of the class) are typically the highest performing students. I believe that those who do well in business, particularly at the higher levels, have been able to rise within

the organisation driven to a large extent by their ability to speak out (We appear to elect politicians on that basis alone!). So if we were to do some analysis on sub-sets of students, I'd suspect that the participation factor would be a stronger indicator of success in course performance and in business after graduation."

"I believe that our capstone course takes a more holistic perspective on student evaluation. For those that have difficulty with participation, because of personality or even cultural affects, the MCT and case exam allow them to excel through more traditional assessment techniques. If we had a more highly weighted participation component (that is greater than 25%), I would be fearful that students would arrive in class without mastering the core content and still be able to perform in discussions by being good listeners. I also believe that the simulation game brings an extra dimension of reality to the course in that it forces students to work in teams (like the real world) and deal with very complex algorithms and decision trees as well as free riders."

"I am quite surprised that the MCT had a stronger link to overall performance compared to the case exam and participation. I guess this proves that mastery of core content is still the most important precursor to higher-order analytics. It would clearly be difficult for students to analyse a set of financial statements if they did not understand basic ratios. Perhaps since this is the capstone course, it is important for instructors to test the understanding of core curriculum in the beginning of the course with an MCT, before jumping into integrated learning through cases."

"I might suggest to students that based on these results, they should be prepared to access a wide scope of knowledge and abilities. I think the results reveal that each of the evaluation items is quite a bit different from each other since none of the correlations are greater than 0.3. This might validate that this is a capstone course focused on multiple functional as well as evaluative areas. This might also give a TA confidence that no one 'type' of student will fare better or worse than another. For instance, those with strengths in presentations will not necessarily overshadow those who perform well in groups (peer evaluations). My gut reaction that peer evaluations were going to overshadow other marks is unfounded, suggesting that total mark attainment for students is a more complicated process than I originally thought. At the same time, I am surprised to see the importance of the MCT as an overall performance predictor."

As such, these instructors were interested in the findings of this study. In fact, they confirmed the existence of the prior MCT experience factor when some students performed better on the MCTs just because of their prior training on dealing with the test. At the same time, it was evident that they suggested that it was vital to maintain the other evaluation components of the course to ensure that students are tested on various dimensions for knowledge of class material.

## **5 Conclusions and directions for future research**

Business schools in particular have an obligation to prepare students for careers, not simply theoretical knowledge. A huge number of career choices after graduation still require an extensive and complex MCT to gain entry (e.g., CFA, CA, CPA, CMA, CGA, CFP, etc.). Furthermore, the AACSB International requires member schools to evaluate the quality of exiting students. The Major Field Test (MFT) is used in this case and students without MCT experience would be ill-equipped to perform well.



When making the choice of several evaluation components in a course, one must also consider the cultural profile of the class. For example, exchange students from Asian cultures such as China are not used to making individualistic statements that explicitly express personal ideas. Assuming they speak English well enough, they would still typically suffer with participation or presentation components given their introversion. Given the diversity of many business schools in Canada and the USA, it would be prudent in such cases to offer a multitude of assessment components.

A new direction for research would be to test for a correlation between high achievers in the simulation game and high achievers on the MCT (that tests for the central concepts the simulation is intended to elucidate). In our study, all students on the same team received the same grade given their team's simulation results. Of course, this assumes that all students in a team equally shared in the team's effort. Anecdotal evidence would suggest, as in many group assignments, that one or more students in a group either shirk all responsibility for contributing their fair share, or absorb most of the responsibility on behalf of the team. This divergence of effort and resultant performance might have skewed our results for this component. However, as in the real business world, one of the indirect learning lessons of group work is team management so that students can learn to deal with such situations.

Given the results of this study we recommend the following to capstone course curriculum designers. First, even if the intent of the capstone course is to be heavily laden with real-life case content, it is important to include at least one grade component that requires the student to perform on an individual MCT. Second, MCTs should also be used as post-hoc assessment of other components. For example, one could extend the performance in another component with a specifically designed post-hoc MCT. As of 2007, the makers of the Capstone Simulation are in fact starting to develop an MCT that they are suggesting instructors use as a post-hoc evaluation component to support group-based marks from their simulation. This way, students and instructors benefit from both active and passive learning opportunities.

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