APPLYING BLOOM'S REVISED TAXONOMY IN BUSINESS GAMES

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ABSTRACT

This paper discusses business games as teaching tools in business schools. The business discipline's traditional teaching methods, while appropriate for the dissemination of foundational knowledge, cannot provide students with a platform to link abstract concepts and real-world problems. Using an assessment framework known as the Revised Taxonomy of Educational Objectives, we suggest that business simulation games are an effective way to engage students in business-related topics; that they compel students to understand and cope with the ambiguities associated with real-world organizations. Specifically, we discuss our experience with the International Operations Simulation Mark/2000 (INTOPIA), a game designed to channel students into a stream of entrepreneurial decision-making. We employed the game over 12 semesters with approximately 1000 advanced MBA candidates. Our findings indicate that business games represent a novel instructional approach: this pedagogy has a real potential to promote the exchange of new ideas on teaching and learning within and across courses in the business curriculum.

INTRODUCTION

"If we learn something from each game that we play, we have accomplished something; and we just need to implement that into our everyday play". Joyce Bickers' words are relevant to the ensuing discussion on games and their merits. From an educational perspective, games are important motivational and learning tools (Garris et al., 2002), a link between abstract concepts and real-world problems, a "learning by doing" or "hands-on" approach to learning (Martin, 2000; Kolodner et al., 2003). From a technical perspective, games help remedy education's long-standing struggle to maintain fluency in end-user computing, the world-wide-web, distance learning and cooperative learning (Erkut, 2000). Educators desire to work with technology to create more meaningful learning experiences (Souza e Silva and Delacruz, 2006). Therefore, exploring novel approaches to technology-friendly games for teaching and learning is eminently justifiable.

This research is an extension of previous research by the authors (2007) who studied the educational effects of games in the management science disciple. The current research takes a broader view of the entire business discipline and also presents an expansion of an educational objectives taxonomy, acting as an assessment framework.

Our focus is games as teaching tools in higher education. Organized in five sections, the next section explores current challenges in business education. Then, we define business games and their pedagogical efficacy. Next, we discuss business games and experiential learning. We also introduce a metric for report on a specific business game employed in a business classroom. Finally, we present our conclusions and recommendations for future inquiry.

CHALLENGES FACING BUSINESS EDUCATORS

The reexamination of business curriculum, prompted by concerns over a static, content-oriented pedagogy (Leitch and Harrison, 1999) reflects a broader problem facing the business disciplines. That is, the traditional education paradigm, content and knowledge transmission (Larréché, 1987), is insufficient. Today's business realities mandate a multidimensional teaching approach, where teachers (1) transmit core competencies and (2) provide a forum for students to think independently, to challenge assumptions and widely held beliefs (Prince and Steward, 2000). Aram and Noble (1999) argue that business schools do not adequately prepare students to understand and cope with the ambiguities they will inevitably face in real-world organizations. The authors suggest that the teaching and learning models that dominate current academic practice do not include the paradoxical and unpredictable characteristics of the contemporary business world. This is particularly problematic for graduate students to the extent that adult working students typically enroll in such programs as a direct result of their lived experience in organizations (Dehler, 2006, p. 637).

Another perennial problem with business curricula is integration. Integration assumes that postsecondary learning is a complex social and cognitive process of mastery and discovery (Warren, 2002). Integration also mirrors the dominant management paradigm, the resource-based view of the firm (Stephen et al., 2002). Yet, despite the literature

advocating curriculum integration, which is neither sparse nor new (Bruner, 1977; Collins, 1996; Dewey, 1966, Fogarty, 1999; Grubb, 2005; Huber and Hutchings, 2004; Lorents et al., 2003), business schools often operate as a loose amalgam of independent, miscellaneous units. Business curricula are poor at offering students the opportunity to develop integrated knowledge (Stephen et al., 2002). This arrangement fosters partitioned skill acquisition. As a result, students often graduate with excellent analytical skills but have no idea how to translate them into systems thinking or to put ideas into practice (Markulis et al., 2005). Walker and Black (2000) suggest that business studies should reflect a series of integrated activities instead of largely independent functions.

Static, content-oriented teaching methods obviate curriculum integration, and weak curriculum integration minimizes desired educational outcomes. If knowledge is not translatable or transferable, its relevancy to students and the practice of the business discipline may be negligible. Knowledge in this field is a means to an end not an end in itself, and the acquisition of foundational factual knowledge is an early and important phase of the learning process but should not be the only one. "Learning Business" is doing; it is performing empirical tasks (Dehler, 2006).

LEARNING AND BUSINESS GAMES

THE NATURE OF BUSINESS GAMES

Business simulation games address many of the challenges associated with business education such as integration. They also present a promising alternative to the field's traditional methods of instruction. In fact, literature documents the educational effectiveness of simulations (Cox, 1999; Michaelson et al., 2001; Parker and Swatman, 1999; Scherpereel, 2005; Tomlinson and Masuhara, 2000; Yeo and Tan, 1999). And emerging technology renders simulation exercises more sophisticated and user friendly. Students are able to concentrate on content and learning through the gaming exercise without mastering the intricacies of the game apparatus. (Pillutla, 2003). A method of learning through games—forcing adrenalin rushes, active involvement, and motivation to their peak—may be employed to excite students and internalize subject matter. Games energize behavior (Harper et al., 2000; Rieber, 1996; Parker and Swatman, 1999; Rafaeli and Ravid, 2003; Kafai, 2006).

A general-purpose business game is a highly complex man-made environment. Business simulation games are occasionally described in the literature. Simulation & Gaming (Volume 32, No. 4, 2001) dedicated a special issue to the "state of the art and science of simulation and gaming" (p. 449). Wolfe and Crookall (1998) assessed the status of simulation and gaming as a scientific discipline.

The objective of a business game is to offer students the opportunity to learn by doing, engaging them in a simulated experience of the real-world, to immerse them in an authentic a management situation (e.g., Garris et al., 2002; Martin, 2000). Generally, this objective makes business games impractical for controlled experimentation. However, as a laboratory setting that mimics real life situations, observed behavior may be generalized to reality (e.g., Babb et al., 1966; Lainema and Makkonen, 2003).

THE MODEL

Our modest objective is to examine how business games create a new relationship between student and subject matter where a student moves from a concrete, observational realm (novice knowledge) to a more abstract, theoretical realm (expert knowledge) (Glaser, 1984). To achieve our objective, we briefly discuss the transformative nature of experiential learning and its interplay with transactional nature of simulation games. In turn, this will lead us to a metric for learning, teaching and assessing in the context of a specific business game course.

Experiential learning emphasizes the interaction between experience and learning by exploiting the subjective nature of the learning process (Kolb, 1984) and creating a transformation of experience that engenders knowledge (Mainemelis et al., 2002). Business simulation games relate directly to the nature of experiential learning. In fact, Garris et al. (2002) regard business games as a method that epitomizes experiential learning (see also Anderson and Lawton, 1988; Faria and Wellington, 2005; Ruben, 1977; 1999). Business games provide students the opportunity to (a) assume the roles and responsibilities of executives; (b) become intimately involved in decisions faced by real people in real organizations; (c) experience pressure; and (d) recognize risks. Moreover, this method is an excellent tool to test the understanding of theory, to connect theory with application, and to develop theoretical insights.

An assessment framework known as the Revised Taxonomy of Educational Objectives (Anderson and Krathwohl, 2001) typifies the relationship between experiential learning and business games. The Revised Taxonomy is a modified version of Bloom's Taxonomy of Educational Objectives (1956). The Original Taxonomy represented an effort to standardize the language of intellectual (learning) behavior. This construct is a one dimensional continuum, a cumulative hierarchical system of learning classification that uses observed student behavior to infer the level of student achievement, where more complex behaviors subsume the simpler behaviors (Athanassiou et al, 2003; Bloom, 1956; Krathwohl, 2002). However, although extensively studied in literature (e.g., Gentry et al., 1979), the Original Taxonomy has also been questioned, even by Bloom himself (Bloom et al., 1971), who admitted that certain vital concepts were not included in the model. The Revised Taxonomy extends the Original Taxonomy, augmenting the continuum to a two dimensional matrix that juxtaposes knowledge and cognitive processes. The knowledge dimension represents a continuum from concreteness to abstraction. The cognitive process dimension represents an assumed hierarchical continuum of cognitive complexity. Table 1 illustrates the general structure of the Revised Taxonomy. Each cell in the taxonomy corresponds to an educational objective (Anderson and Krathwohl, 2001).

Table 1
The Revised Taxonomy: The Knowledge and the Cognitive Process Dimensions

Knowledge Dimension	Cognitive Process Dimension					
	Remember	Understand	Apply	Analyze	Evaluate	Create
A. Factual Knowledge						
B. Conceptual Knowledge						
C. Procedural Knowledge						
D. Meta-Cognitive Knowledge						

Table 2
The Revised Taxonomy, including all subcategories

		Cognitive Process Dimension																	
		1		2							3		4			5		6		
Knowledge Dimension		1.1	1.2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	3.1	3.2	4.1	4.2	4.3	5.1	5.2	6.1	6.2	6.3
A	A_a																			
	A_b																			
B	B_a																			
	B_b																			
	B_c																			
C	C_a																			
	C_b																			
	C_c																			
D	D_a																			
	D_b																			
	D_c																			

The knowledge dimension includes four knowledge types: (A) *factual*, (B) *conceptual*, (C) *procedural*, and (D) *meta-cognitive*. Concrete, *factual knowledge* includes (A_a) the knowledge of terminology and (A_b) the knowledge of specific details and elements. *Conceptual knowledge* represents a synthesis of factual knowledge and movement towards an understanding of principles and theories associated with a given discipline. It includes (B_a) the knowledge of classifications and categories, (B_b) knowledge of principles and generalizations, and (B_c) knowledge of theories, models and structures. *Procedural knowledge* involves one's grasp of how to study something. This includes (C_a) knowledge of subject-specific skills and algorithms, (C_b) knowledge of subject-specific techniques and methods, and (C_c) knowledge of criteria for determining when to use appropriate procedures. *Meta-cognitive knowledge* is summarizing knowledge; theoretical and conceptual knowledge that synthesizes the lesser dimensions. It consists of (D_a) strategic knowledge, that is, the knowledge of outlining as a means of capturing the structure of a unit of the subject matter, (D_b) knowledge about cognitive tasks, including appropriate contextual and conditional knowledge, and (D_c) self-knowledge, that is, knowledge of one's strengths and weaknesses in relation to cognition and learning. It is knowledge of cognition in general but also knowledge of one's own intellectual prowess (Anderson and Krathwohl, 2001).

The cognitive process dimension includes six cognitive types: (1) *remember*, (2) *understand*, (3) *apply*, (4) *analyze*, (5) *evaluate*, and (6) *create*. The *remember* process is a basic cognitive retrieval process consists of (1.1) recognizing and (1.2) recalling. Namely, locating and retrieving knowledge in long-term memory that is consistent with presented material. The *understand* process constructs meaning from instructional messages, including oral, written and graphic communication. This process includes the following subcategories: (2.1) interpreting, (2.2) exemplifying, (2.3) classifying, (2.4) summarizing, (2.5) inferring, (2.6) comparing, and (2.7) explaining. The *apply* process includes (3.1) executing and (3.2) implementing procedures in a given situation. The *analyze* process consists of: (4.1) differentiating between elements, (4.2) organizing elements (determining their fit), and (4.3) attributing (deconstructing). That is, breaking the material into its constituent parts and determines how the parts relate to one another and to an overall structure or purpose. The evaluate process, consists of (5.1) checking and (5.2) critiquing, makes judgments based on criteria and standards. The most advanced pattern matching and planning process, *create*, consists of (6.1) generating hypotheses, (6.2) planning or designing and (6.3) producing or constructing. Namely, putting elements together to form a coherent or functional whole and recognizing elements into a new pattern or structure. This entire range from *remember* to *create* represents a transition from recognizing and recalling facts to theory generation and successful learning habits (Anderson and Krathwohl, 2001).

As Table 1 depicts the general structure of the Revised Taxonomy, Table 2 illustrates also the subcategories of each dimension.

This framework represents a practical heuristic for exploring the interplay between teaching, learning,

assessment and business games. Thus, we discuss a specific business game course in the context of the Revised Taxonomy.

THE BUSINESS GAME COURSE

COURSE OBJECTIVES

Because the business game course is one of the summarizing courses in the MBA program, the primary, explicit course objective is to improve students' management and thinking skills by practicing in "real conditions". We consider the game as a tool that allows for learning to occur at multiple levels of the Revised Taxonomy. Thus, we had to exploit the more implicit course objectives manifest in assessment and instructional activities to identify where exactly the principal objectives fit into the taxonomic table. Implicit course goals relate to: (1) strategy in decision making, where (2) students implement lessons learned from previous coursework. We found that the first objective relates to *understanding conceptual knowledge* because strategy denotes a particular knowledge domain. Students must understand the basic elements of strategy and how those elements interact. The second objective involves *applying procedural knowledge*, as the summarizing nature of the course requires that students invoke skills and methods learned in other courses and integrate that knowledge.

THE GAME

This course utilizes the international version of a popular business game developed in the United States. It is known as the International Operations Simulation Mark/2000 (hereafter INTOPIA™). The primary purpose of this business game is to increase participants' understanding of strategic management of international operations, relative to the multinational corporation. The game is designed to yield substantial payoffs in management training. It forces participants into a stream of entrepreneurial decision making, where they engage in a search for logic and synergy in the business objectives-strategy-implementation sequence (Thorelli et al., 1995).

The game is highly realistic, meant to simulate the total environment. Participants immerse themselves in an artificially created world. They form small teams, allocate responsibilities for specific functions, and work to achieve common goals which they themselves define. While each participant becomes a specialist in his or her function, a group effort is required to pursue the common objectives of the company.

The simulated markets are similar to the markets in the United States (US), the European Union (EU) and Brazil, where each company can operate a local branch. "Operate" is a broad concept and may cover one or any combination of the manufacturing, marketing, distributing, exporting, importing, financing and licensing functions. Incoming participants enter a "going concern" with four periods of simulated history and play six to ten additional game periods. The length of each time period simulated is commonly considered one year.

Although the INTOPIA business game is explored in literature (e.g., Barden, 1997; Dittrich, 1977; Huston et al. 1982), most studies refer to the game as a case study, describing experiences and providing concrete examples of what worked and what did not. This study employs a learning model that explores the game on different levels of learning with a hierarchical structure among them.

PARTICIPANTS

The study was conducted in a university accredited by the Association to Advance Collegiate Schools of Business (AACSB). The participants were senior MBA candidates. Approximately 1000 students participated in business game classes. We followed the business game classes from fall 2002 through spring 2006. In each semester the students were divided into groups (corporations) that included five participants assuming executive roles. The formation of companies and the allocation of executive roles proceeded without external intervention or manipulation.

INSTRUCTIONAL ACTIVITIES

The game is played for a full semester and is operated by up to 25 competing companies. It commences after five weeks of lecture, at which point the instructor adopts a rather passive role. That is, the class is expected to apply classroom knowledge to the game with little direction. This approach is designed to challenge the students' ingenuity and creativity.

The game is conducted by three instructors, who emphasize the importance of teamwork. While each student becomes a specialist in his or her function, the game requires a collaborative effort to achieve the common goals of the company which the students themselves define. Teams make functional and strategic decisions in each simulated period. The decision data are then e-mailed to the game administrator for database entry. After the program runs the data, it generates company outputs that include financial reports (e.g., a balance sheet; an income statement), production reports and market research. These outputs are then e-mailed to the companies and are used for decision-making in subsequent periods.

Decisions are made once a week. Dozens of decisions—encompassing the entire range of a typical business—are required of a company in each period. The decision-making process is based on an analysis of the company's history (as presented to players at the beginning of the game), interaction with other companies and external agents of the game (e.g., bankers, board of directors), and the constraints stated in the player's manual (e.g., procedures for production, types of marketing channels available). Thus, company performance in each period is affected by its past decisions and performance, current decisions, simulated customer behavior and the competition – the other companies in the industry.

The game's instructional activities promote learning at several of levels of the taxonomy. Lectures, for example, first emphasize knowledge of terminology. Then, they progress to integration of factual knowledge from different disciplines. Thus, instructional activities promote *remember*

(specifically, recognizing) *factual and conceptual knowledge*. However, when the instructors adopt passive roles and the students play the game, the students are required to engage in progressively more independent strategic decision making and therefore, learn at a higher level of the taxonomy. Students (teams) are forced to rely on self-knowledge. They have to analyze different management situations and evaluate their decisions based on their knowledge of procedures articulated in the lectures; to *analyze and evaluate procedural knowledge*. Further, at a more abstract level, the less invasive instructor role mandates that students understand how and why they make decisions. Such conditions make it important for students to understand their strengths and weaknesses; to *understand meta-cognitive knowledge*.

ASSESSMENT ACTIVITIES

Grading is based on two quizzes, two written reports and two oral presentations. The first quiz measures the students' command of rules and general information about the game. The second quiz assesses team-specific knowledge on periodic outputs and market research. The first oral presentation and written report include factual, baseline corporate information such as a description of mission and vision. They also include: (1) a description of corporate aims and positioning; (2) an initial strategic analysis; (3) a preliminary development of business and competitive strategy based on the strategic analysis; and (4) a preliminary projected profit and loss report. The first presentation is presented only to the instructors who assume the role of board of directors. In the second presentation, before their classmates, the teams analyze their activities in the game, revealing their objectives and strategy. The second oral presentation and written report necessarily build upon the first. Teams must submit a fully strategic analysis (updated mission and vision statements), market analysis, operational analysis, and financial analysis based upon the game's results. The expectation is that each team will learn from one another, given the different backgrounds of students. The final grade also incorporates the company's performance (i.e., the decision making throughout the game).

The first quiz measures remembering information or facts (e.g., how much does it cost to build a plant in the United States?). So, we placed it at the intersection of *remember* (specifically, recalling) and *factual knowledge*. The second quiz requires that students understand financial and market data (e.g., what was the average return on investment of European manufacturers?). As such, we classified the second quiz as *understand conceptual knowledge* (knowledge of classifications and categories).

The aim of the reports is to promote higher-order cognitive processes, such as strategic analysis and development. We classified both reports as applications of meta-cognitive knowledge because they are activities that require teams to articulate corporate aims and strategic knowledge. We categorized the first report as *analyze meta-cognitive knowledge*, as analysis is the highest level required for the first report (particularly, organizing; that is, determining how the game's elements fit or function together, creating a unified structure). We also located the presentations at that intersection, as by presenting their work the students are asked to distinguish between important and unimportant pasts (i.e., to differentiate) and to determine a point of view (i.e., to attribute values or intent). However, we suggest that the culminating final report requires learning to occur at the highest level of the taxonomy, based on two factors. First, teams were required to (1) hypothesize about subsequent business periods that are not actually played; (2) explain procedures on how to perpetuate their going concern; and (3) update their previous work based upon strategic knowledge. Second, the final report was (1) a self (team) critique of previous work; and (2) a vehicle for team's to explain their command of the structure and function of the course using strategic knowledge. Thus, we classified the final report as *create meta-cognitive knowledge*.

THE TAXONOMY REVISITED

Pursuant to business games, the Revised Taxonomy is an important tool. It allows educators to analyze the interaction of students with course materials. Simultaneously, it allows educators to analyze the ways in which an individual's knowledge is structured. These two activities are fundamentally important in education (Anderson and Krathwohl, 2001). We also found the

Table 3
The Use of the Revised Taxonomy in INTOPIA

Knowledge Dimension	**Cognitive Process Dimension**					
	Remember	Understand	Apply	Analyze	Evaluate	Create
Factual Knowledge	Quiz 1 Lectures			`		
Conceptual Knowledge	Lectures	Objective 1; Quiz 2				
Procedural Knowledge			Objective 2	Passive Instructor Role	Passive eInstructor Rol	
Meta-Cognitive Knowledge		Passive Instructor Role		First Report; Presentations		Final Report

Table 4
The learning process in INTOPIA

Knowledge Dimension		Cognitive Process Dimension																	
		1		2							3		4			5		6		
		1.1	1.2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	3.1	3.2	4.1	4.2	4.3	5.1	5.2	6.1	6.2	6.3
A	A_a																			
	A_b																			
B	B_a																			
	B_b																			
	B_c																			
C	C_a																			
	C_b																			
	C_c																			
D	D_a																			
	D_b																			
	D_c																			

Revised Taxonomy a useful analytic framework for assessing the degree business games foster alignment between pedagogy and student learning. Table 3 illustrates our understanding of how the knowledge and cognitive processes relate to the INTOPIA business game.

Our integration of the Revised Taxonomy indicates that business games allow for learning to occur at multiple levels; but not all. Table 4 illustrates the entire learning process throughout the game according to the Revised Taxonomy subcategories. The illustrated gray areas represent learning at the cross point levels of the taxonomy.

We also found a modest degree of alignment between teaching, learning and assessment. This is acceptable given that instructors may include activities which are not directly related to either objectives or assessments. The intent of such activities is to provide students with information they need to master an objective (Anderson and Krathwohl, 2001). Each instructional and assessment activity, therefore, serves as a vehicle for students to improve their managerial and cognitive skills.

Even with a modest degree of alignment, our experience with the Revised Taxonomy suggests that business games satisfy a longstanding need in business education: curriculum integration. Integration occurs because learning in business games spans from the lowest to highest levels of the taxonomy. First, students must remember, understand and apply their knowledge from previous coursework. Second, they must analyze their own strengths and weaknesses, relative to other teams. Last, they must create and simulate a corporate reality. These three factors, among others, underscore the importance and potential of business games for learning through integration. And more practically, the Revised Taxonomy confirms that business simulation games are an effective way to engage students in a variety of business topics; that they compel students to understand and cope with the ambiguities associated with real-world organizations.

DISCUSSION AND CONCLUSIONS

More generally, our experience suggests that the efficacy of business games as educational tools is threefold. First, business games are a platform for students to apply classroom concepts to real management problems. That is, business games foster the integration of knowledge from previous coursework and often disparate disciplines. Beyond its integrative properties, the game mandates that students reason clearly and carefully analyze available data. The second benefit of a business game is practical: students have the opportunity to practice the art of decision-making in a unique laboratory setting, unique because there is little corporate and personal risk involved. This environment enables students to engage is the broad range of management decisions, rather than simply experiencing a generalized, sanitized explanation of reality. Third, the simulation forces students to think independently, where they are actually engaged in a metacognitive process of exploring their own strengths and weaknesses (thinking about thinking) and monitoring the degree to which they understand the information being communicated to them. Therefore, we find that business games represent one of the most sophisticated and promising uses of technology in business education. We also find that the marriage of technology and experiential learning offers students a quality instructional experience because it enables educators to analyze the interaction of students with course materials. This is important because everything depends upon the quality of experience, not the experience itself (Dewey, 1938).

In terms of pedagogy, we find that business games provide an effective alternative to traditional teaching methods. This method exposes students to facets of organizations that other methods simply cannot. For example, students, as members of top management teams, create their own organizational culture. The emergence of a managerial culture enables students to witness first-hand how feelings, beliefs and values influence decisions which, in turn, influence the outcome of the game. It is relatively difficult, for example, to convey through lectures how an individual's experience in previous business endeavors or coursework influences the strategic decisions that they make. On the other hand, the highly interactive nature of the game's team structure makes and individual's formational experiences nearly impossible to escape. Furthermore, the realism and competitiveness of the game elicit excitement and motivation, where students strive to

make better decisions. For example, several teams developed formal decision-making models and integrated them with information systems that they themselves built (Ben-Zvi, 2007).

Student reaction to the game is positive. Most report that they enjoy playing the game and the competitiveness and realism that it brings to the classroom. Over time, the course earned high ratings in teaching important skills and contributing to the learning experience in relation to other courses (6.23 and 6.32 out of 7.00, respectively, compared to 4.58 and 5.04 in other courses). One of the students even remarked, "The only thing that I will take from my program of studies is the game."

However, although our overall conclusion is that games may promote the exchange of new ideas on teaching and learning within and across courses in the business discipline, no game can seize all aspects of the business curriculum offerings. There is still a need to determine how those games can be applied in studying various aspects of the business domain: performance and profits can be easily measured, but evaluating decision making processes is as vague in the game as it is in real life.

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