Learning Outcomes from Business Simulation Exercises: Challenges for the implementation of learning technologies

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ABSTRACT

Purpose- High order leadership, problem solving skills, and the capacity for innovation in new markets, and technologically complex and multidimensional contexts, are the new set of skills that will most valued by companies and employers alike. Business simulation exercises are one way of enhancing these skills. This article examines the capacity of business simulations to deliver the learning outcomes they have the potential to achieve, and the challenges faced in implementing these technologies.

Methodology – A literature of the learning outcomes from business simulations, and critical assessment of the challenges and problems involved in the implementation of learning technologies.

Findings- Traditionally, post graduate business education programs have adopted the functional silos that provide the organizational framework for the design of the curriculum. Business problems rarely present themselves in the compartmentalized silo supply-driven disciplinary framework. The question of how to achieve greater convergence of the business curriculum programs that offers students more practical oriented experiences to develop their conceptual understanding in *cross functional decision making* and *analytical thinking abilities* through "*learning by doing*" of real business problems, has concerned business education for a considerable time.

Originality -The prospect of adopting a broad-based, integrative approach that goes beyond the conventional lectures and case studies complemented by business simulations and emerging technologies has significant potential to resolve the traditional problems of business education convergence of the curriculum.

Keywords- Business simulations, cross functional decision making, business curriculum

Type of paper- Literature survey and critical analysis

DEFINITION OF COMPUTER-BASED BUSINESS SIMULATION

Authors use different terminologies to define business simulation technologies that range from top management, flight simulators, business simulators, simulation games, macro-worlds/ micro-worlds to learning laboratories. Gilgeous et al. (1996) explains that because of the connotations of each word, there is much confusion as to what these games are and why are called games. This has led to some people to not use them because they are unaware of their full scope and benefits, therefore it is important to define them in a realistic way.

The following definitions help to clarify the confusion, for example, Thavikulwat, (2004) proposes that 'a simulation is an exercise involving reality of function in an artificial environment, a case study but with the participants inside.' According to Summers (2004), these are usually firm or industry business games, where 'players learn by managing a simulated firm, most often with a competitive industry or environment. Learners make decisions usually but not exclusively by allocating resources. The simulations can focus on the firm's internal mechanisms/dynamics, its interaction with its environment, or both. In some games, decisions focus on a particular business function or analysis or span many business functional areas'.

With reference to the pedagogical aspect of business simulations , Akilli (2007) refers to games and simulations as experiential exercises in which there is "*learning how to learn*" that provides something more than "*plain thinking: beyond thinking*". Day and Reibstein (1997) define them as "*a facsimile of reality"*, which is intended to display what would transpire if the assumed conditions were to occur in reality as, "*simulations offer a more effective way to understand the future than the extrapolation of trend lines, forecasting and brainstorming."* Keys (1990) note the useful aspect of these experiential environments is that, "*learning and behavioural changes can be observed"*. The emphasis of the simulation learning environments is on running experiments, testing different strategies, and building a better understanding of key aspects of the real world, where '*Cooperation* is the key; as participants have to determine whether they can solve the problems and achieve the goals that the simulation presents from a range of multiple decision/outcome possibilities and levels of online feedback/coaching' (Kenworthy and Wong, 2005), (Romme, 2004).

Not only does this added component embed insights about the theory in its context, but users also experience the dynamics of that theory as it plays out through time in common strategic challenges,

as experimenting and learning how one decision can impact on another provides revelations that will prove useful back in the workplace (Hawker, et.al., 2006).

LEARNING OUTCOMES

A literature review on learning outcomes expected to be achieved, identified many claims for and against the usefulness of simulations in enhancing learning. Many authors assert that using educational electronic web-based or software-based simulations to complement conventional teaching tools has the potential to enhance learning, attitudes and behaviours; (as shown in the table below).

Table 1. Learning Outcomes from Business Simulation Exercises

Motivation	
Stimulate the enjoyment, motivation and engagement in experiencing and learning from close to real situations, otherwise too costly, difficult or impractical to implement. Increase students' motivation, and ability to explore, experiment and collaborate by testing hypotheses and investigating "what if' scenarios.	Fripp, (1993); Prensky (2001); Aldrich, (2003, 2005). BECTA, (2008), Chakravorty &Franza, (2005), De Freitas, et.al (2006, 2007); BECTA (2007).
Problem solving- analytical thinking skills	
As simulations can be designed to replicate dynamic actual economic, market and business events, they help students to understand and augment or experience management concepts and the interrelations among the various functions of business, with alignment and commitment surrounding complex corporate strategies, business models, initiatives.	Cadotte, (1995); Senge, (1995); Vinod, (2004); Wolfe & Keys, (1993); Fulmer, et.al (1998), Cadotte, (1995); Chakravorty & Franza, (2005); BECTA (2008)
Development of intuition and problem solving-skills in the context of real complex and ill structured business problems, including flexibility in the application and communication of knowledge for use in different situations that require analysis from multiple perspectives and articulation of knowledge. Simulations addresses the lack of opportunities to learn real problem solving skills by actively involving students in the decision making process of business issues	Hawker, et al., (2006), Romme, (2002, 2004); Aldrich, (2003, 2005); Salopek, (1998); Anetta et.el. (2007); Cadotte, (1995); Keys & Wolfe, (1997); Thorne, (1999); Doyle, (2000); Arias-Aranda, (2007); Kenworthy & Wong, (2005), Anderson & Lawton, (2004); O'Hara, 2007.

Transfer of knowledge	
Enable transfer of knowledge to real business situations, as simulations provide opportunities for practicing business skills in a realistic risk-free learning environment where participants assume management roles, *and point* to the face validity of simulations as evidence that they will transfer what they have learned in the classroom.	Senge (1995); Aldrich (2003); Gibson (2007); Gilgeous et.al., (1996); Aldrich (2005); Cadotte 1995; Cadotte & Anistal 2007; Anderson & Lawton 2009.
Decision making and cross functional skills	
Learn and improve management capacity in the business functional areas, Learn and improve their strategic management capacity, Improve their teamwork capacity and leadership skills, and improve the "quality" of the corporate decisions they make. Effective at getting students to apply concepts that they have learned through lectures or reading	Toki, (2000), Keys & Wolfe, (1997) BECTA (2008); Bolt (2005): Aldrich (2005); Gibson (2007) Anderson & Lawton (2005), Romme, (2002)
Increased retention of knowledge	
Simulations provide active learning that involves the learning by being engaged in the instructional process by exploring, analyzing, communicating, creating, reflecting, or using new information or experiences. Simulations that teach *problem solving skills*, can be used effectively to provoke interest, teach domain knowledge and shore up retention when specific instructional objectives were targeted.	Clark, (2007); Cadotte, (1995); Galernau and Zibit, 2007; Randel, (1992); BECTA (2007) Anderson &Lawton (2005)
Adaptable learning	
Accelerate learning ability to and encourages faster learner comprehension of complex skills than other learning methods allow. Provide remediation and coaching that is adaptable to different needs	Senge, (1995), Romme (2002) Aldrich, (2005); Dede, (2007).
Behavioural, attitudinal and knowledge change	
Evidence that use of business simulation exercises to induce targeted change in a decision maker's mental models. Actively engage in situations where they 'must act and observe the consequences of their actions' and since everyone taking part shares the same experiences 'learning occurs through dialogue among participants who share observations, feelings and thoughts and arrive together at conclusions about what has been learned**'.**	Sherpereel, (2005) Kolb, D A, I M Rubin and J M McIntyre, (1984); Keys, (1990,)

However, as many of these findings on the educational merits of simulations are based on *perceptions* of learning as reported by participants and instructors and not objective assessments, it measures the affective not cognitive learning. Therefore, there is so much debate about the legitimacy and the fact that the studies have not yet produced firm conclusions. (Anderson & Lawton, 2009; De Freitas & Jarvis, 2007; Wolfe, et.al.,1989).

THE LEARNING TECHNOLOGIES INDUSTRY

The learning technology industry aimed at higher education is composed of a mixture of academicians and entrepreneurs (Gibson, 2007). According to the literature and a survey on the web, the domain of researchers and academics interested in this field consist of global organizations that serve as a meeting point for scientists and practitioners developing and using learning technologies, simulation, gaming and related methodologies. These organisations provide a wealth of information in all areas for the integration of these technologies with instructional design and business education and the research is addressed to faculty and students needs of higher education. Their resources include free access to journal, research papers, and policy development reports, and resources dedicated to teaching business through innovative and effective methods and professional training. Members of these organizations contribute towards business simulations, experiential exercises, effective teaching, assessment of training methods, learning theory, simulation research and multimedia and advanced technologies, etc. A list of some of these organisations include:

BECTA British Educational Communications & Technology Agency 1

ISAGA International Simulation & Gaming Association http://www.isaga.info

ABSEL Association for Business Simulation and Experimental Learning http://www.absel.org/

MERLOT Multimedia Educational Resources for Learning & Online Teaching http://business.merlot.org/

INSEAD CALT Centre for Advanced Learning Technologies http://www.calt.insead.edu/

NASAGA North American Simulation & Gaming Society http://www.unice.fr/sg/resources/index.html

SIAA Simulation Industry Association of Australia http://www.siaa.asn.au/

CRESS Centre for Research in Social Simulation http://cress.soc.surrey.ac.uk/index.html

IITSEC Inter-service Industry Training Simulation & Education http://www.iitsec.org/index.cfm

EDUCAUSE A nonprofit association whose mission is to advance higher education by promoting the intelligent use of information technology. http://www.educause.edu/

Simulations comprise one of the six types of pedagogically-defined learning products, serving eight markets as shown in table below.

Table 2 Business Simulations Product Classification

8 Buyers Segments

Consumer	PreK-12	Higher Education	Corporations & Businesses	Federal Government	State & local government	Associations, NGOs& Non-Profits	Healthcare

Buy 6 types of Pedagogically-defined Learning Products

Self-paced eLearning Courseware	Digital Video, Text & Audio Reference	Exam Products	Collaborative & Social Network Learning	Simulation & Game-based Learning	Cognitive Learning	Process-embedded Learning	Mobile Learning

From 4 types of Suppliers

Packaged Content	Custom Services	Software as a Service (SaaS)	Installed Technology

Source: Ambient Insight Research 2009.

Thavikulwat, (2009) states that business simulations have been classified in many ways, and proposes a classification that relates directly to the purpose for which a particular simulation may be used, such as:

a) Discipline (accounting, marketing, strategy, entrepreneurship, international business, etc);
b) Industry (advertising, aerospace, banking, etc.);
c) Scope (e.g., Functional, total enterprise, and total economy);
d) Difficulty (simple and complex); and
e) Dependence (Independent and dependent across firms)

Throughout the literature, various authors referred to business simulations distinguished by the following characteristics:

1) Micro-world simulations, those that represent *functional business areas* as they involve intra-company efficiencies or in-house competitions, they are either custom designed by commercial specialized tailoring consultants, or bought as a generic representations of many scenarios that span across different industries from airline, retail, financial, telecommunication services, hospitality, pharmaceutical, and manufacturing (Romme, 2002; Keys, 1990; Wolfe and Keys, 1997).

2) Macroworld simulations, those that involve *complex systematic problems* with horizontal learning across industry by teams or participants, representing different companies, who are competing for market share of products that deal with the entire organization, provide a balanced number of decisions variables in marketing, production and finance and thus require the strategic integration of several subunits for organization performance. *Financial modeling simulations*, falls in this category: this type of simulation allows users to learn situations that are difficult to experience and are based on tough scenarios by learning to adopt "what-if " to see the impact of their decisions and course of action. For example, the impact of an interest rate changes on a discounted cash flow analysis or other type of financial equation. (Keys, 1997; Wolfe, et.al., 1998; Cadotte, 1995; Vinod, 2004).

3) Interpersonal skills simulations, those that focus on specific training needs allowing the manager to practice different high-stakes interpersonal scenarios with peers, for example on how to deal with a critical customer escalation, development of critical decision making skills, operations and induction. (Bolt,2005; Aldrich, 2005; Gibson, 2007)

4) Business acumen simulations , those that focus on development of skills on formulating strategy, allocate scarce resources, develop products and services, attempt to meet customer requirements, manage financial metrics, contend with exogenous disruptions, and compete against other managers in a shifting competitive landscape. (Toki, 2000; Keys, 1987; Keys, 1990; Bolt, 2005).

To help differentiate among these types, Bolt (2005), proposes the flight simulation analogy, from which in the flight simulation context: "The first three types of simulation would be subset activities of the fourth. For example, a process flow simulation could examine the rate at which passengers exit and enter the plane. The interpersonal simulation could examine how to deal with a difficult passenger on a plane. The financial modeling simulation would be analogous to analyzing different combinations of lift and drag on the speed of the plane. The business acumen simulation would be the most comprehensive of the four—actually flying the plane".

It was notable in the review, that many of these simulations are geared towards final year degree students in the areas of strategy , business policy, marketing and general management, and are integrated into a wide range of business, accounting and management subjects such as statistics, operational management, accounting, marketing, decision-making, information systems, e-commerce, finance, supply chain, business process management.

Currently a wide range of business simulations exist and they can be acquired as outlined in Table 3.

Table 3 Main Sources for Business Simulations

Off the Shelf CD ROM software packages	For some products the activation key is valid for one year only and/or by number of users, after the period has expired new charges incur in order to have access.
Accessed through the web	A fee is charged per student per term that is expected to be covered by the student and not by the institution. Professors gain an account to access their students' progress and feedback; administer the simulation, exam questions and relevant information, free of charge. The provider of the simulation administers the game and sets up the competitions between universities across the globe. Also a range of complimentary resources and services is available for students ranging from tutorials, exercises to feedback.
Accessed through the web for free	No fee or membership is charged to access these simu-

	lations and competitions, but are required to register and abide to their code of behaviour. Companies that provide these resources include *BT* Better Business, *IBM* Innov8, and *Loreal business competitions*
Purchased individually through a book publisher as a companion website	This type of software simulation comes with a textbook, an activation key is provided and in some cases registration is required. It consists of a simulated case study spanning across contents of the textbook integrating functional and corporate aspects of business problems, where different teams play against each other. The instructor plays a key role as the administrator of the game and in setting up the competition by using disks as opposed to the web.
Custom made simulations	These type of simulations are generally very expensive as they are customized by consultancy firms around the institution's courses subject learning outcomes, curriculum design, and institution's logo. They are offered as off the shelf CD ROM software packages or through the web. They can be managed either by the faculty staff or by the provider who can also provide trained instructors.

Changing trends in the industry

The biggest changes are with distribution: since some publishers, who were once the main distribution channel, are leaving the industry or merging out of the business. Simultaneously, suppliers are moving delivery to the internet and providing complementary services to academics that go beyond running the simulation such as students' exercises and information that academics can use in their courses, which is a major change that might consolidate the industry (Summers, 2004).

Challenges for the implementation of learning technologies

Among the major challenges presented to the adopters of business simulations are:

- Adapting flexibly to pedagogical change and professional development
- Developing and updating infrastructure
- Sustaining continuity of learning
- Meeting learners expectations
- Negotiating the role of the instructor and
- Delivering appropriate learning spaces.

These were the main challenges highlighted in the literature review. In order to effectively implement a culture of adoption of these technologies that will lead to a sustainable innovative education, these challenges need to be met as described in table 4.

Table 4 Challenges in Implementing Learning Technologies

Infrastructure Technology Services	**Pedagogical Change and professional Development**
Access to reliable, sustainable infrastructure, including technical support. The integration of systems in smaller higher education institutions is not well advanced, which may be linked to lack of funds, planning and in-house ability *(JISC Measuring and Understanding Systems Integration Change, 2006*). Distinction between resources that offer good value to teaching and learning, under the premise that, although there are good products and services available, many digital tools and resources offer limited value to teaching and learning. (*BECTA Computer Games in Education 2007 Report)*	Though there is evidence of significant integration of technology across the curriculum, the range of uses remains fairly limited and practitioners rarely realize the benefits in supporting learners. Use of digital resources and tools is regarded as optional in many cases, suggesting a need to ensure professional standards and requirements, and cultures of practice, are in place which recognize the technology as a core tool in a modern education and skills system. (*BECTA, Harnessing Technology: Next Generation Learning 2008-14*)

Continuity of Learning Overall progress in continuity of learning and recognition of informal learning has so far been limited. Although technology offers opportunities for continuity and flexibility in learning, this use is not yet widespread as few universities are making use of the extended learning opportunities now available. (*BECTA, Harnessing Technology: Next Generation Learning 2008-14*)	**Learner Expectations** This type of technology fluent students expect ICT technologies to be just as present in their formal learning environment as it is at home, and thus assume it will also be present at university, expect to be able set themselves up, technologically, in the same way that they are perhaps used to, they will not expect either their connectivity to decrease or for the technology to encroach on what they see as the key benefits of university – interaction and learning. (*JISC, Student Expectations 2007.)* Learners commonly report that they enjoy learning with technology, and increasingly use a range of tools and approaches to support their learning, including the use of Web 2.0 Technologies, which may not be recognized and supported in formal settings. (*BECTA, Harnessing Technology: Next Generation Learning 2008-14*)

Next Generation Learning Spaces

The development of innovative curriculum coupled with the integration of innovative teaching technologies, must also deliver next generation learning spaces that provide flexibility and ease in design and technology to enable different teaching and learning modes to connect, collaborate, share, reflect and report, face to face and online.

An institution should clearly articulate its learning objectives and then place a high priority on including curriculum redesign in the planning process for new learning spaces. Faculty who are genuinely engaged in pedagogy, along with others who are concerned with the teaching and learning aspects of the space, should play a central, not peripheral, role in planning groups. (Lippincott, 2009)

The Instructor Role

In order to enhance the tutorial aspects of an educational experience of which computer assisted learning is a part, ample opportunity must be afforded the student to interact with fellow students and explore learning in greater depth under the guidance of tutors and lecturers. Addressing these issues of '*going beyond' and 'interacting'* is important if the potential of computer assisted learning for teaching and learning in higher education is to be fully realized above and beyond the mere enhancements in the quantity and quality of presentation of information. (Rainbow & Sadler-Smith, 2003)

Dealing effectively with these multi-dimensional challenges is required to achieve the potential of business simulations and other learning technologies. The fact that many educational institutions often are not able to resolve these issues effectively undermines the potential impact and use of business simulations and other learning technologies. However the producers of simulations need to do more to improve the accessibility, functionality and relevance of the simulations they offer.

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