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A survey of business educational simulations and their adoption by business educators.

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A Survey of Business Educational Simulations and Their Adoption by Business Educators

By

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Abstract

A survey was designed to investigate the current usage of business simulations in academic education. The purpose of the study was to discover i) differences between current users, non-users and former users of educational simulations ii) modes of communication used for information iii) reasons for adoption and iv) currently used simulations.

An Internet survey invited 14,497 educators from the professional organizations of ABSEL, ISAGA and AACSB member affiliated business schools. The invitations were accepted by 1085 respondents who were categorized into i) 30.5% current business simulation users ii) 17.3% non- users and iii) 52.2% former users.

It was found that users and former users have no significant differences in demographic and attitudinal characteristics between them. However, non-users have differences in attitudes that distinguish them from users. Work experience was found to have no relationship to one's adoption of simulations. Teaching experience, however, was related. It was reported that, the primary advantages and reasons for adopting simulation games into the course curriculum was that they "Provide experiential learning" (40.9%), " Integrate different functional areas" (31.9%) allow for theoretical application (28.6%) and have "greater decision making experience" (22.0%). All survey respondents reported that games "allow for theoretical application", "enhance teamwork", and "provide realism".

The reasons provided by nonusers for not using simulations were the "preparation time", "inappropriateness to course", and "lack of information". Most non-users (73.5%)

were not familiar with business games. Conversely, former users reported that they would re-adopt if the pedagogy improved.

Lastly, the communication channels and the currently used simulation game titles were analysed. Respondents reported inadequate communication through advertisements, publisher representatives, and conference presence. Across users (78%) former users (85%) and non- users (94%), it was reported that publishers do not talk about simulation games. Subsequently, the first experience of a game as a student and word of mouth through colleagues is the modus operand for simulation communication. Users reported first awareness of simulations by "playing as a student" (28%) and 26.2% were informed by colleagues. Educators report simulation information seeking as 31.6% Internet, while 28.3% contact the publisher and 16.9% talk to their colleagues.

Dedication

Devotedly to my loving family and friends. To my wife Heidi for all of your beauty, strength and support without which I would not be where or who I am. I also devote my work to my mother and father who are my inspiration having supported me through thick and thin; ups and subterranean downs. I dedicate this to the memory of my grandparents. In memory of friends who were lost in the Air India bombing of 1985. Lastly, I dedicate this thesis to the planet; moving forward with music, peace and love in the universe fuelling the eternal quest for knowledge of the great unknown.

Acknowledgements

I would like to acknowledge the guidance, support, and wisdom received from Dr. Wellington to whom I am indebted for involving me in such a large and enlightening research project. Also to Dr. Faria and the University of Windsor Marketing department who introduced me to marketing simulations with his research and as a teacher. Thanks to Aaron West for your Java development expertise and perseverance, and everyone involved in the laborious task of data mining for the database including Mathieu Zwinkles, Nirosha and Heidi Baker. In addition, I would like to acknowledge University of Windsor IT services for accommodating this server intense project. Thank you Richard Dumala for designing the perfect web questionnaire with seamless database integration. I would also like to thank my brother Koushik for his analytical help. I would also like to thank everyone on my thesis defence committee and all at the Odette School of Business and the University of Windsor Department of Graduate Research.

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Definition of Terms

Academic

An educator who works at a college or university; associated with academia or an academy

Adoption

The act of accepting (simulation) with approval; favourable reception; "its adoption by society"

Curricula

A course and content of academic studies

Computer Simulation

The technique or application that represents the real world by a computer program; also, a simulation should imitate the internal processes and not merely the results of the thing being simulated.

Debriefing

Report or relaying information of a mission or task including rules, regulations, the timelines and outcomes

Demographic

A statistic characterizing human populations (or segments of human populations broken down by age or sex or income etc.)

Experiential Learning

Learning through participation and interaction of environmental and situational variables exposed to the participant (learner).

Former User

Educator who at one time used simulation games in their curricula but currently does not

Internet

A computer network consisting of a worldwide network of computer networks that use the TCP/IP network protocols to facilitate data transmission and exchange. i.e. World Wide Web.

Innovation

A novel technology or invention.

Java

A simple platform-independent object-oriented computer programming language used for writing applets that are downloaded from the World Wide Web by a client and run on the client's machine

Non-User

Educator who does not use simulation games in their curricula

Pedagogy

The activities of educating or instructing or teaching; activities that impart knowledge or skill.

Server

On a network, the central computer that uploads programs, files (WebPages) and data to client computers. Email Servers store and transfer messages on the network.

Simulation

A role-playing exercise in the real world, with other people, in order to practice and learn from a situation in advance of it actually happening (such as a business situation). Simulations allow people to learn new behaviours or skills in a risk-free environment.

Survey

An examination, of all the parts or components of a population, with a design to ascertain the demographics, condition, environment, interactions, quantity, or quality; i.e. through a series of questions.

User

Educator who uses simulation games in their curricula

Web

A computer network consisting of a collection of Internet sites, URL's, through hypertext transfer protocol i.e. (World Wide Web).

Definition of Abbreviations

AACSB

The Association to Advance Collegiate Schools of Business. Provides Institutional accreditation of Business colleges and universities.

ABSEL

Association for Business Simulation and Experiential Learning (See Appendix 12)

ERP

Enterprise resource planning i.e. SAP_{TM}. Used by organizations as an information backbone system. Also Management Resource Program (MRP)

ISAGA

International Simulation and Gaming Association

MRP

Materials Requirements Planning

NASAGA

North American Simulation and Gaming Association

SMTP

Simple Mail Transfer Protocol, a protocol for sending e-mail messages between servers. Most e-mail systems that send mail over the Internet use SMTP to send messages from one server to another; the messages can then be retrieved with an e-mail client using either POP or IMAP. In addition, SMTP is used to send messages from a mail client to a mail server.

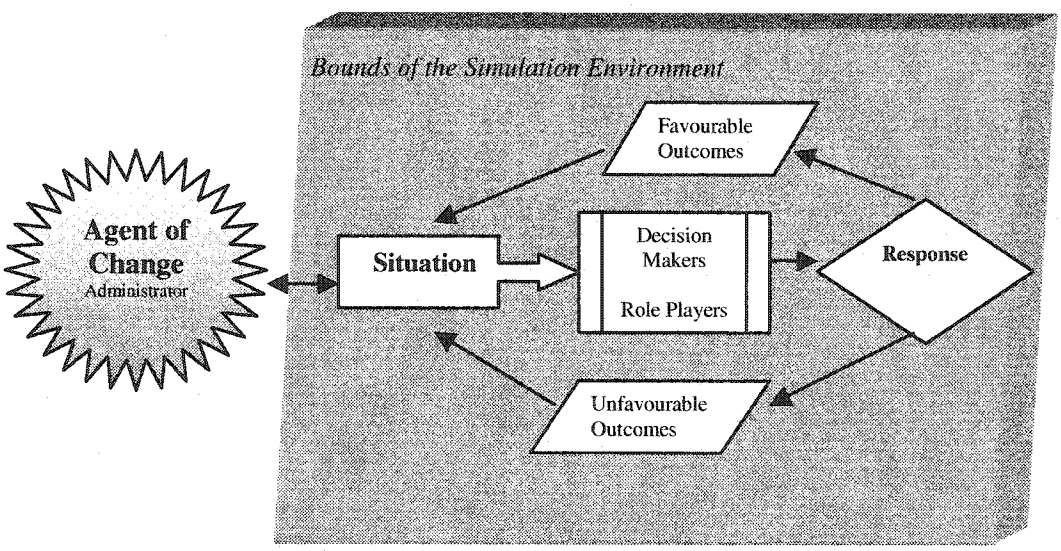
CHAPTER I. INTRODUCTION

Over the last four decades, simulation/gaming has become a popular method for education, training, consultation, and research around the world, particularly in business academia. Computer simulations have been exponentially improving as more sophisticated applications develop, running on higher performance computers and networks over the last 30 years. A simulation is defined as "the technique or application which represents the real world by a computer program. A simulation should imitate the internal processes and not merely the results of the thing being simulated" (Armstrong, 1994). For the purpose of this research, simulation gaming is to be taken in its broadest meaning, to encompass such areas as simulation, computerized simulation, gaming, simulation/gaming, policy exercises, stock market simulation, and virtual reality. This thesis examines the attitudes and adoption of simulations by business educators. This thesis will explore the application of the simulation game to current university academic teaching and the attitudes surrounding simulation adoption.

> In computerized business games, game players (students) assume the role of decision-makers in organizations. The participants are grouped into teams of three or more members. The participants are provided with a player's manual that presents the "rules of the game", describes the environment, and gives a starting point for the firm. The participants submit a set of decisions for their firm to the game administrator (the instructor or trainer or his/her designee). The game's administrator, using the computer, processes the decisions and returns the results to the participants. The participants, given their current situation, prepare another set of decisions, which are then processed by the game administrator. The fact that participants make decisions for a number of decision periods forces them to live with the consequences of previous decisions (Biggs 1990, p23).

There are many questions surrounding the advent of computer application driven education many of which have been corroborated by several reputable researchers for ABSEL, ISAGA and NASAGA associations (see definitions). These questions involve the learning efficacies, impact of time constraints and pressure, debriefing concerns, and the learning curve of these applications. This study will compile an exploratory piece revolving around the current real trends in the academic world by utilizing a survey to gather information about this field of knowledge.

Figure 1.1. Gaming-Simulation: An outline Definition[i]



[i] Armstrong, R. "Gaming – Simulation in Perspective".
Simulation and Gaming across Disciplines and Cultures; ISAGA at a Watershed. Edited by D. Crookall, Kiyoshi Arai. Ann Arbour. Sage1995 p217

Background

Business and management educators are often criticized for being behind the times and not providing adequate education of the skills and knowledge needed to function in the business world in this day and age. There has been rapid change and strategic renewal in many institutions by professors who have adapted and integrated computer simulation and gaming into the core of their classes for teaching a wide range of business school fields from marketing to finance and strategic leadership. Many of these computer simulation games are known as powerful tools for enhancing learning through reality based experience. As the costs of technology decline, and software becomes more accessible, the use of customized computer simulations in business academia is becoming a viable option for many business management programs and course curricula.

Management, Strategy, Accounting, Marketing and Leadership simulation software is readily available for most disciplines of study for which customized game-world computer simulations can be used to promote learning, teamwork, competitiveness, timeliness and co-operation. Goals of these games include development of new strategies for competition in the industry and a new teaching revelation for teachers. A distinguishing quality of these applications is that success in the game world is measured and systematically evaluated often both by the software computer program ranking of the competition as well as the professor's own judgment and criteria. A significant impact on improved co-operation, individual and group learning is observed. Experienced users of business game simulations have also experimented with the factors surrounding the game such as group formation dynamics, and pressure through deadlines. Debriefing of

the rules of the game has also been experimented with. This exploratory piece will examine the characteristics of simulation adoption and challenges to simulation designers, their marketers, and the end users (teachers). In conclusion, this research study aims to collect demographic information and attitudes towards adoption and the usage of business simulation game users, non-users, and former users. Lastly, the discussion section of the thesis will interpret the findings towards suggestions for guiding principles for successful business simulation design, marketing strategies, and teaching applications for future simulation development and research.

Business School Simulation Use

The University of Washington, in 1957, became the first school to use a business simulation game as part of a regular university class (Watson, 1981). Many other schools quickly followed, as several surveys of AACSB member schools would indicate. In the earliest study of this type, Dale and Klassen (1962) surveyed 107 AACSB member schools and found that two of the responding schools were using business games in at least one course. Two surveys undertaken in 1967 reported that 91% (Graham and Gray, 1969) and 94% (Day, 1968) of sampled AACSB schools were using simulation games. However, these studies had small sample sizes and only surveyed AACSB schools. In order to determine more accurate usage level changes, Roberts and Strauss (1975) resurveyed the same schools that Dale and Klassen had surveyed in 1962. They found that simulation game usage at these schools had increased to 94.5% in 1975 from 71.1% in 1962. These studies indicate that simulation adoption had been increasing over the last three decades.

In another recent meta analysis, Faria (1990) found that his survey results indicated that business game usage is quite extensive and, if not still growing. Simulation had certainly not been declining in the years up to 1990. The survey of heads of business programs indicated that business games were used in approximately 86.1% of all four-year degree granting schools in the U.S. Projecting this percentage to 2,013 four-year schools resulted in an estimate of 1,733 schools in which business games were currently used in the United States in 1990.

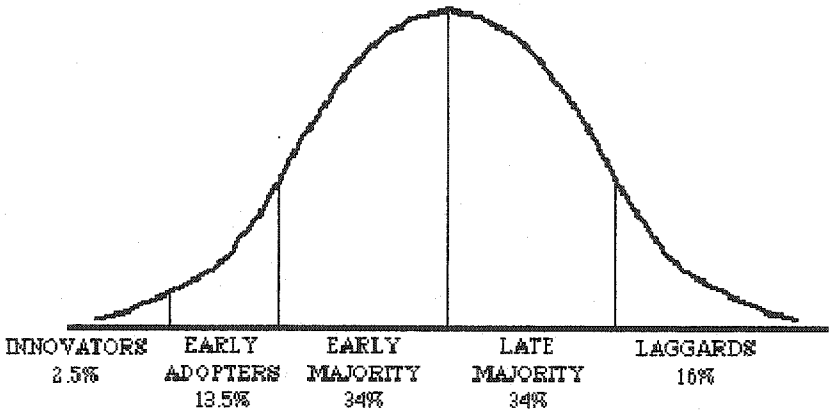
Simulation Adoption in Academia

This exploratory research is centred on the innovation of the experiential learning simulation applications and the acceptance and general adaptation of these new models of learning. In today's competitive environment, technology has become the backbone of the successful enterprise. As stated by Bill Gates, founder of Microsoft, "In the past decade, computers and networks have become an integral part of business processes and everyday life. In the Digital Decade we're now embarking on, billions of intelligent devices connected to the Internet" (Gates 2003). As the computer simulation connectivity expands beyond geographical limits of the classroom academia may embark on a new era of team simulation learning over networks i.e. the World Wide Web. Yet, how readily is the transfer of innovation accepted by academia? What are the factors necessary to recruit and retain simulation adopters?

Rogers' diffusion of innovation theory (Rogers 1979) offers useful insights into how to manage and market products based on new technology most effectively.

Figure 1.2. Roger's model of Diffusion of Innovation

(Burgelman, Maidique and Wheelwright, 2002; p 267)

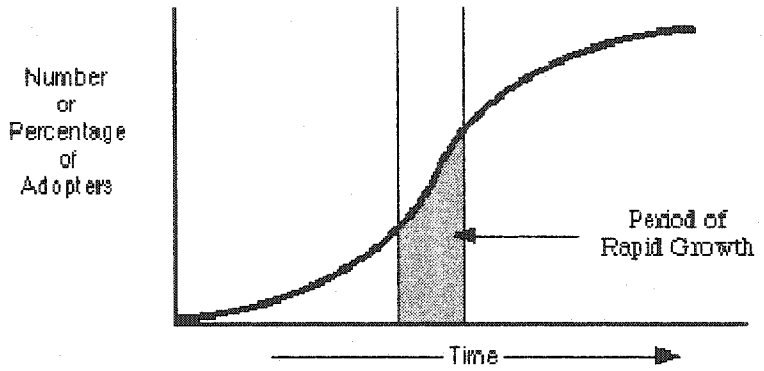


Bell shaped curve showing categories of individual innovativeness and percentages within each category

However, the current diffusion model does not explain the adoption and diffusion of simulation technology among organizations owing to the fact that simulation usage findings have not been considered into the diffusion model. The intent of this thesis is to integrate the findings into the diffusion model by gathering data from current users, non-users, and former users.

Diffusion is defined as the process by which an innovation is adopted and gains acceptance by members of a certain community. A number of factors interact to influence the diffusion of an innovation. The four major factors that influences the diffusion process are the innovation itself, how information about the innovation is communicated, time, and the nature of the social system into which the innovation is being introduced (Rogers, 1995).

Figure 1.3. The technology s-curve shows the diffusion of an innovation[ii]



S-curve representing rate of adoption of an innovation over time

(Burgelman, Maidique and Wheelwright, 2002; p 126)

Goosen (2001) performed a study about adopters of simulations. It was found that there are many problems facing an instructor adopting a new game. The research revealed several issues and problems faced by someone who adopts a completely new game. These involve technological aptitude, learning, testing new programs, and other issues for both the teacher and the student. The first perspective is that of a new gamester and the second is of those educators who have used games before but have not used the newly introduced game. The third perspective is the game's author who summarizes the materials created to help the adopter adjust to the game's requirements. This research is a recent addition to the profiling of simulation adopters and brings to light the needs of the new simulation adopter, the simulation switcher, and former users.

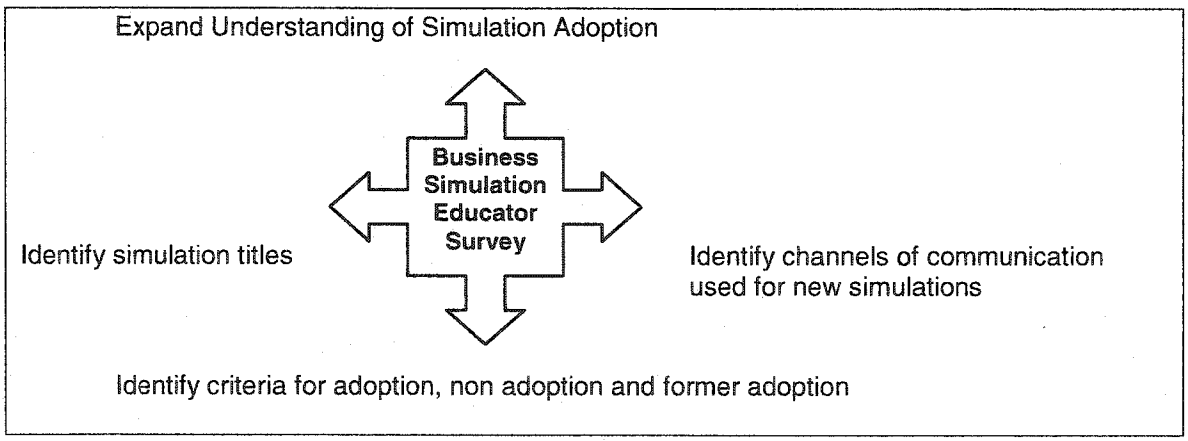
[ii] Burgelman, R. , Maidique, M. and Wheelwright, S. Management of Innovations and Technology. McGrawHill. 2002; p 126

Research Purpose

The purpose of this thesis is to conduct an exploratory study 1) of differences in the adoption of educational simulation applications in Business School Academia 2) to explore the current usage of simulations, including the communication channels through which simulation information is relayed and 3) the titles that are currently use.

This thesis is based around a survey that was deployed to 14,497 university professors to gather information concerning attitudes and reasons for adoption or rejection of simulation games for teaching university/ college curricula.

Figure 1.4. Exploratory Research Goals



The simulation research is expanding rapidly in science, social studies, education, engineering, and business areas. An innovation-diffusion view of implementation of enterprise resource planning (ERP) systems is a good example of such. Organizations around the world have been implementing enterprise resource planning (ERP) systems such as Peoplesoft$_{TM}$ or SAP$_{TM}$ since the 1990s in order to have a centralized information system in their respective organizations and to link their business processes

(Palaniswamy and Rajagopal 2002). The effort to create a model of organizational adoption and diffusion of innovations has ranged from integrated simulation models to global web models and enterprise management models, "Organization and institutions, both of which entail selective connections, aid knowledge, and knowledge consists of conjectured connections, open to refutation" (Loasby, 2002). In an educational institute, it is important for professors to become part of the early majority to accept computer simulations. Enterprises and organizations should follow the same learning construct. Successful ERPs have a history of research and user feedback of attitudes and experiences of users. This steers the strategy towards the upgrading and evolution of the product. Information about reasons and attitudes towards the adoption and non-use of simulations is crucial to the evolution of a simulation platform for development, teaching and marketing.

Simulation adoption in Academic Business Curricula

There are many types of computer driven business simulations. As experiential learning models, computer based simulations provide environments within which students experience the reality of the business environment that are risk-free and are specifically designed to "eliminate certain costs and extraneous details inherent in the typical manager's operating environment" (Faria, 1997). These computer-based simulations also offer sufficient insight into the actual operations of the business area so that participants can later transfer the simulation model strategies into real-life situations. Behaviours, social skills, and attitudes are all improved in the real world context. Enterprise simulation games develop these behaviours and attitudes with operant learning, repetition and constant reinforcement (Faria, 1997). These technologies provide

fast feedback on decisions to the participants as well as positive peer pressure to succeed. The participation in the simulations also has the potential to provide students with opportunities to practice and develop evaluation skills.

This research intends to reveal the academic educator's awareness of the potential of simulation implementation into the curricula. The initial research questions are: What are the differences in simulation usage and attitudes across disciplines?

There are many applications of computer simulations complementing the studies in the respective fields of business education. Although the simulations will have different content testing with different core knowledge and concepts, there are similarities along the lines of different applications. This research will attempt to find the similarities both in the nature of the experiential learning and the attitudes of the educators who utilize them in their teaching. To explore the current state of simulation adoption and the attitudes surrounding, the following questions were applied to the research study.

Research Questions Outline

The following research questions were the framework for the thesis. They are divided into section A; comparing the entire sample of simulation users, former users and non-users. These three groups are the main categorical groups of the survey respondents divided by game usage. Section A examines the three groups. This includes demographics, differences across disciplines, the reporting of reasons for adoption and advantages. Section B to D pertains to the reasons which users adopted reasons that former users stopped using simulations and the reasons that non-users do not use

simulations in their teaching. Section E and F involves the sources of information which communicate new simulation applications and which titles are most prevalent currently.

Section A-1: Overall Sample Demographics

1. What significant differences exist between the demographic characteristics of business simulation using educators, non-users and those who once used simulations but have stopped doing so (former users)?

Section A-2: Across group attitudes towards Simulations

2. Across groups, are their differences in the reported advantages of using simulation games compared to traditional teaching methods?

Section B: Simulation USERS

3. What are the reasons for users to adopt simulations in their educational curricula?
4. Is there a significant difference in attitudes between early adopters and the late majority for simulation games in the business education?
5. What are the significant reasons for users of simulations to switch to different titles?

Section C: Simulation FORMER USERS

6. What reasons do former users report for ceasing to use business simulation games?
7. What differences exist between the attitudes reported for simulation adoption of users and former users?

Section D: Simulation NON-USERS

8. What reasons do non-adopters report for not using business simulation games in their curricula?

Section E: Simulation Communication Channels

9. How do educators first discover simulations?
10. Which channels of communication are used to communicate information about simulations?

Section F: Currently used Business Simulation Titles

11. What are the prominent business simulation application titles?

The research questions are the framework for this study. The questions are intended to help find the demographic characteristics of the three groups of simulation users, non-users, and former users. The second main objective of this research is to find out what the currently used titles are and how their information is being communicated.

In the survey deployed as specified in Chapter 3, attitudinal responses will be collected and categorized for three groups of simulation using educators: the first group are the users, the second are the former users and the last group are the non-users. The user group will then be split into early majority adopters and late majority according to Rogers' diffusion model (Rogers 1979). The universal question to be answered is; why are adopters using computerized business simulations?

The adopters will be analyzed with respect to a number of characteristics, such as discipline and usage profile of adopter (the educator). One profiling study showed that the majority of adopters belong to 1) United States educational institutions 2) 4-year rather than 2-year educational institutions 3) public rather than private and 4) large rather than small (Biggs, 1979). The membership lists of the Association for Business Simulation and Experiential Learning (ABSEL) in conjunction with AACSB data have

provided estimates that there were between 500 and 800 simulation users at AACSB member institutions in the late 1970's (Goosen 1977). These findings support the notion of increased simulation game usage among business academics. The usage or non-usage of business simulation games is the basis around which the profile of the sampled business educators will be built.

Implementing computer simulations into the classroom requires much planning and maintenance. The real world experience of the professor should correlate with the usage of the respective application. The next general research question is thus: What are the differences in attitudes towards simulations influencing adoption?

Granted, computer simulations have traditionally been associated with great complexity and a high learning and difficulty level. The newer applications however, have made it easier to implement into the classroom. For the game administrator, there are usually fixed templates or a default mode in which the game should run immediately after beginning with little maintenance from the instructor. Hence, the survey study brings together these attitudes of both simulation adopters and former adopters while comparing those to the non-adopter.

Table 1.1. Business Simulation Applications

There are many business simulation applications available. The following titles have been identified from the literature of the Association for Business Simulation and Experiential Learning (ABSEL; see Appendix 6 and 13)

- AIRLINE: A Business Simulation
- Alacrity Team Simulation Exercise
- Micro Business Publications
- Business Policy Game, The
- Business-Sims.Com
- BusSim: An Integrated Business Instruction System
- Capstone: The Business and Financial Strategy Simulation
- CEO: A Business Simulation for Policy and Strategic Management
- Collective Bargaining Simulated
- COMPETE: A Dynamic Marketing Simulation
- The Global Business Game
- Corporation: A Global Business Simulation
- DEAL: An Entrepreneurship Gaming Simulation
- Entrepreneur: A Business Simulation in Retailing
- GEO: An International-Business Gaming Simulation
- The Human Resources Management Simulation
- INFOGAME: Game for Research and Education in Information Systems
- INTOPIA: International Operations Simulation/Mark 2000
- MAGEUR: A General Business Game

- MANAGEMENT 500: A Business Simulation for Production and Operations Management
- Management Accounting Simulation, The
- Manager: A Simulation Game
- Marketer: A Simulation Game
- Marketplace: a web based business simulation game with several levels of difficulty.

CHAPTER II. REVIEW OF THE LITERATURE

This review examines the current knowledge pertaining to simulations, learning and simulation adoption. It will encompass a) simulation models and theories; b) enterprise applications; c) learning and experiential learning; d) ABSEL; f) Problem based learning; g) the measurement of learning; and h) simulation learning models. The last part of this section examines the literature concerning Internet survey methodologies and design.

There is ample research towards the revelation of the true potential of the ever-evolving domain of business simulation applications and their implementation in university education. Much of the literature revolves around the professional 'real life use' of current applications and modern simulation environments. In the real world of business, uses of simulations include accounting, payroll, SAP, MRP, queuing, value chain, product testing, scheduling and inventory control. Simulation environments are now user-friendly, and software is competitively priced, in a competitive marketplace. In most of these applications, the manager does the model building by using icon-driven simulation tools that enable a system to be "drawn" on the screen or behind the scenes of the environment. The software and its run time application help to reduce the gap between manager and modeller in order to optimize the learning of the user. The gap is further reduced if the manager understands something of simulation terminology and methods. Simulation is a tool, which can aid managers in policy making and decision-making (Lehaney, 1993).

Computer simulations are often used by a wide range of managers, in a wide range of disciplines and in all types of organizations for decision-making. One typical application is in accounting. In this field "for auditors to do a competent quality audit in a timely and efficient way, they must familiarize themselves with the techniques, know how it is used in the decision process and be aware of its shortcomings. The use of computer modeling and simulation during an audit to validate an auditor-developed model, simulate the outcome of an auditee's plans, test an auditee's in-place system, and, finally, help enhance the credibility of auditor recommendations" (Zachea, 1995, p.25). In many other faculties, computer simulations are used in the decision process. Another arena of simulation use is in aerospace where computer simulations help to minimize costs, for example NASA's "lifeboat" for the international space station (Eckhardt and Zori, 2002). Yet, another example includes health care computer simulations being used to create efficiencies to maximize hospital patient flow (Lehaney, Kogetsidis and Clarke, 1996). Computer simulations can also provide a method for studying the behaviour of business systems under a variety of assumed conditions for analyzing the simultaneous interaction of many variables to produce valuable insights into problems (Proctor, 1994). Simulations can help to provide answers to complex decisions and problems that cannot be solved by conventional methods. Computer simulations have infused themselves into many different arenas in the world.

Computer games and simulations have always included an educational component. As they improve and become commonplace in the educational curriculum they are better integrated into the university environment. The games are more true to real life and have an experiential role unfound in traditional classroom style learning

(Feinstein, Mann and Corsun, 2001). Education simulation games stimulate learning that is more rigorous and possibly create a wider range of skills including interpersonal skills and group dynamics as well as real life decision making (Faria and Wellington, 2001).

Diagram 1. A Definition of a Simulation[iii]

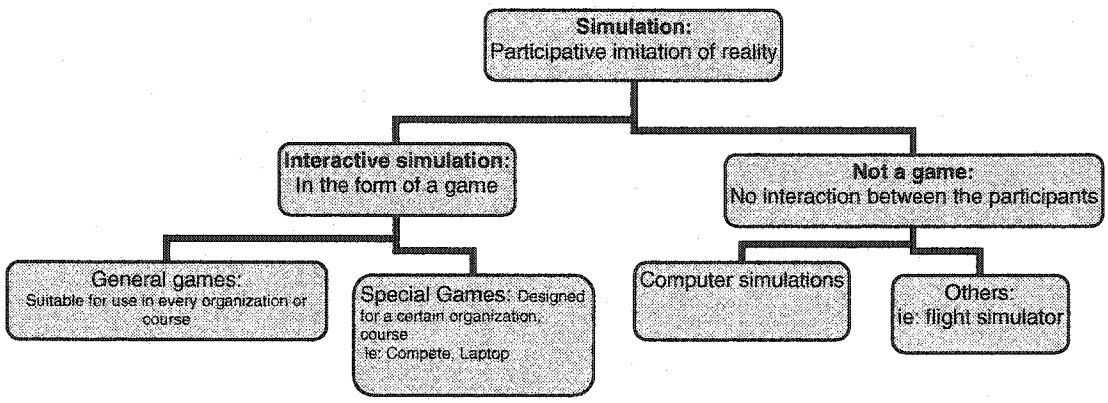


Diagram 1: Definition of the simulation (Forssen-Nyberg, 1995)

Experiential learning through computer simulations is not a novelty to business school education. The applications range from the areas of finance, accounting, marketing and even strategy and leadership. In these types of applications, non-traditional learning styles and use of software can create a more successful learning environment. An online stock market simulation emphasizes the integration of the computer into academic curricula. The simulation can be implemented with different audiences to gain an understanding of how the stock market functions with students in elementary, secondary school and with undergraduate business students. The stock market simulation involves teams of students investing US$100,000 in "play" money into a portfolio of stocks that the students research and track. Then they make discretionary

[iii] Forssen-Nyberg, M. and Luhtala, R. "Increasing Customer Satisfaction – building a Simulation game for the work Vol. 4. process of a newspaper," in The Simulation and Gaming Yearbook: Games and Simulations o Enhance Quality Learning. London: SAGSET; 1996, pg. 96-125.

buy and sell decisions. Teachers have experienced many learning benefits by utilizing applications such as the stock market simulation. By problem solving in small groups, team-building skills are introduced. Through the research and tracking stage of stock selection, critical thinking and deductive reasoning skills are developed and a new curriculum is born that mirrors the reality of the stock market (Altymyer, 2000). In other areas, there are applications such as the online stock market simulation that may be used as a cross-disciplinary learning enhancer particularly as it emulates the real life stock market (Appendix 8).

While business game usage is very high, there are certainly additional opportunities for growth. It has been estimated that over 40,000 business instructors do not currently use business games. Approximately half of all business firms with training and development managers do not use simulation exercises in their training programs (Faria, 1990). Among business school instructors, usage of simulation games is particularly low outside of the policy and marketing areas.

Enterprise simulation applications

Simulation games are commonplace for training environments within the corporate environments of today. Often positions such as Senior Training Officers are commanding salaries of $200,000 US, often comparable to CEO pay. They are hired to run workshops and training seminars. Other costs to an organization to supplement its employees training and individual developmental needs can include outside training seminars, travel, and higher education. Overlooked however, is the actual reality of the internal environment of the enterprise. Enterprise simulations provide competitive

advantages by showing cost savings, focus, and specialization unseen with other education. These advantages are in training, simulation, and areas such as materials, logistics, process analysis, and activity based costing.

In enterprise simulations, there are rare occasions of custom applications but the available experiential educational gaming simulations apply effectively. "EXECUTIVE", a business simulation, was used is used to enhance the induction and retention of graduate trainees in the world's largest accountancy and management consultancy firm. Teams of four to ten people solved problems of marketing, production and personnel problems. This study concludes that the simulation was valuable and they are now looking complex applications for senior management (Henfrey, 1990).

In Materials Requirements Planning (MRP), simulations can provide the enterprise great long-term savings by creating efficiencies and streamline processes. Studies of traditional computer-based material resource planning (MRP) systems are often implemented on large, mini-computer systems. The MRP module is frequently one, albeit a central one, of a complex of modules together referred to as MRP II or Manufacturing Resources Planning. These systems present a problem when used for training purposes. The number of facilities available and complexity of use often means that a lengthy training period is required. One article evaluates a PC-based MRP simulation package that encompasses the main features of existing MRP packages available in industry. "This kind of package is ideal for training purposes. It allows typical MRP activities to be performed and basic knowledge of the most important MRP features to be gained. Great emphasis has been placed on a user-friendly interface" (Kruegar, Galletly and Bicheno. 1992).

Activity-based costing (ABC) is one example of the tremendous impact simulations can have on the organizations. Many traditional cost accounting methods can result in distorted cost information as they allocate overheads in proportion to labour. This can result in a low technology product being overcosted and a high technology product being undercosted. ABC allocates costs more accurately and pinpoints areas of waste. The simulation software that introduces ABC demonstrates "the difference between ABC and conventional cost accounting by means of simulating a production environment for the user to explore. The simulator should foster improved understanding of the opportunities of ABC" (Helberg, Galletly and Bicheno, 1994). This focused simulation application demonstrates the beneficial impact of educational simulations for enterprises.

Thus, the results of this study of computer simulation use in academic curricula apply to the real life enterprise world particularly those, which are real-life simulations. Theoretical frameworks for learning and training have evolved from the advent of the computer simulation. In Wood's framework for learning, the major theories of learning and instruction influential to the design of recent computer-based systems to support education and training are evaluated (Wood 1995). Successful systems are limited currently to classes of learning task that are well structured. He argues that less well-structured tasks demand a different approach to training and are best served by technology designed to support collaborative learning in small groups. There are "practical limits on the creation and exploitation of technology... and implications for future developments of technological aids to training and training research (Wood, 1995). Education through simulation learning combined with the problem based learning

research of Neufeld and Barrows (1974) leads way to the simulation and education research from associations such as ABSEL and NASAGA. The enterprise of today will gain new insights from the results of this research, as will academic educators.

Learning organizations have evolved through the influence of fast change and rapid innovation global environments. Computer simulation applications for educational purposes are needed. Rustogi, Stumpf and Watson, (1994) in their article "Leadership in a Global Village: Creating Practice Fields to Develop Learning Organizations" discuss the impact of such simulations on the learning organization. For a practice field to be of greatest value in developing global leadership capability, it needs to be constructed to combine meaningful cultural and national issues with realistic interpersonal dynamics. They examine how two practice fields designed to facilitate systems thinking and organizational learning - Foodcorp International and Globalcorp - accomplish this task. Both are behavioural simulations (not computer simulations) and each creates a realistic context, a micro world, for people to interact on business and global issues. Both can be used to: (1) reveal cultural assumptions in a social-business context where they can be observed, tracked and discussed relative to various effectiveness criteria; (2) create a team capable of performing with a shared vision and common mental models; and (3) develop leaders who can create as well as accommodate micro cultural norms. A growing number of organizations (e.g. Apple Computer, Citicorp, American Express, AT&T, Northern Telecom, GlaxoWelcome-SmithKline) and educational institutions (e.g. University of Michigan, Dartmouth College, Indiana University, New York University and the University of Tampa) use such tools in their educational efforts (Rastogi, Stumpf

and Watson, 1994). This will lead to the examination of the utility of these educational simulation tools in management development.

Simulations in Education

Participant involvement is another key to the determinants of success for educational simulations. In "Simulations and Learning: Dialog and directions" Goosen (2001) describe a foundation focusing on aspects of participant learning in simulations. Fifteen types of independent variables were identified as possible bases for examining learning. These provide an opening framework for discussion of learning investigations. Their emphasis was to focus on the research basis on simulation learning including:

1) *Instructor behaviour in introducing the simulation.* These include whether proper explanations of the purposes and the unique features of the simulation are provided to players the extent to which the mechanics of the simulation are introduced before play begins.

2) The extent and form of *practice experienced by players before the game.*

3) *The instructor's role* and the degree to the instructor can influence learning and performance gains.

4) *Predictions* that are made by the instructor about how industries are likely to behave.

5) *The debriefing* of the simulation experience, its length, content and structure.

6) *Accessibility* of office hours available for student help

7) The extent to which the instructor helps the students process the experience, i.e., helps them discover what they are learning.

8) *Features of the game.* These include the proximity of competitors to each other and to the game administrator(s), game duration, and game complexity (in terms of decisions per round, words in the player's manual and the size of the simulation program).

9) The *context of the game* and the degree to which it is integrated with the course or the training session of which it is a part.

10) The extent to which other *activities are integrated* into the simulation experience. These include strikes, potentially unethical purchasing opportunities, group-dynamic oriented interventions, and use of an expert system.

11) The *grade percentage* allocated to game performance.

12) The method players are *assessed in addition to game performance scores.* The hypothesis is that players will learn more faced with some assessment methods.

13) *Player objectives under administrator control.* These objectives might reflect a competitive standard (e.g., profit) or some measure of excellence (e.g., organizational stability or quality).

14) *Team characteristics* including size and diversity.

15) *Instructional intent,* for example, choice of game and consistency with teaching objectives and students' levels of knowledge and sophistication. Aspects of games worthy of consideration include functional area integration potential, the strategic management knowledge base, and analytic methods to be utilized.

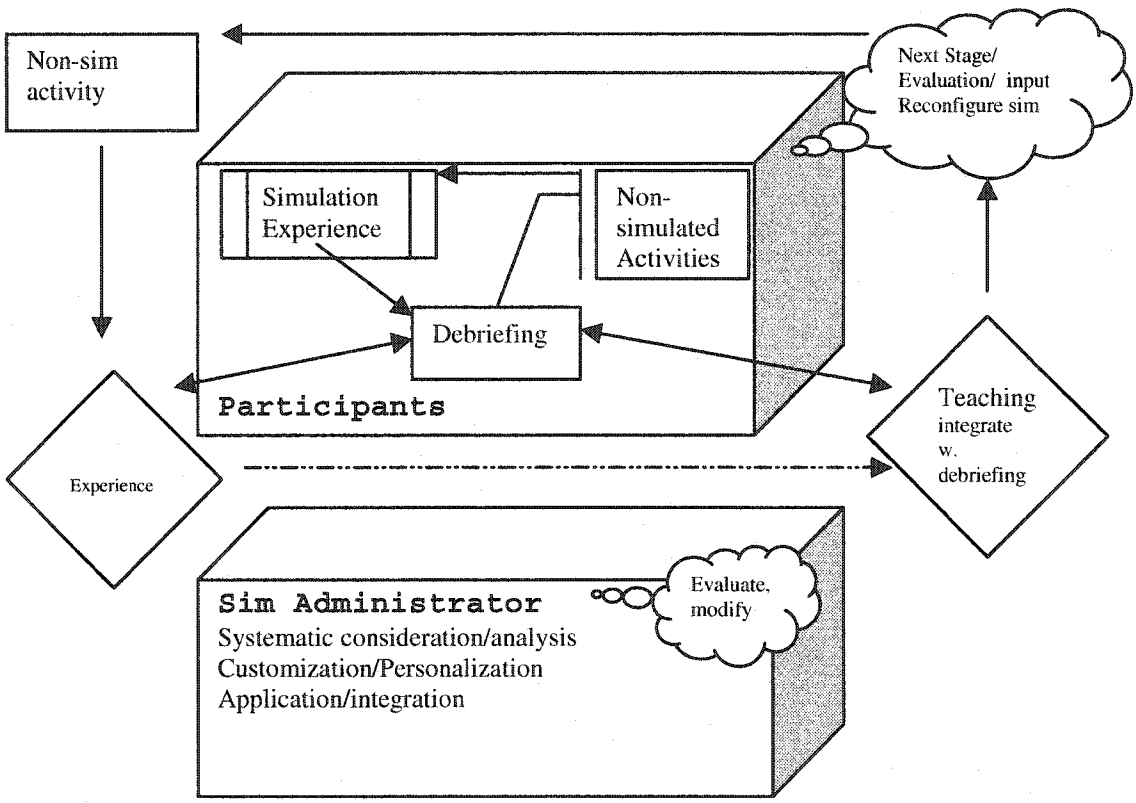
Further to the objective analysis of simulation, learning is the analysis of the simulations as educational tools. In "*A framework for evaluating simulations as educational tools*" (Schumann and Scott, 1985) a framework for the evaluation of

business simulations as educational tool is formed. Four dimensions of measuring the effectiveness of simulations are described; (1) the reactions of the students, (2) the amount of learning achieved by the students, (3) the degree to which the behaviour of students in other settings reflects what they have learned, and (4) the extent to which results are improved over time. These are key considerations in the evaluation of any educational simulation.

Since quantitative evaluation of simulation usage should be measurable and evidence based there is a rising question of the method for analysis of simulation and game usage. In "How Do We Measure the 'Learning' in Experiential Learning," by Wellington et al. (1991), many truths, and aspects of this area were reported to ABSEL regarding learning, measurement, and the learning process. Wellington et al (1991) reported that by making decisions that are consistent with the environment defined by the game's parameters, it is assumed that the game player has learned how best to adapt to the simulation environment. The findings of the study suggest that simulation play results in operant conditioning with cognitive learning playing a secondary role. In another pivotal work, Gosenpud (1991) reported that "Learning" is difficult to identify partially because it is a process, which one can observe indirectly. Educators see the behavioural changes that result from learning but cannot see the learning itself. Defining and measuring learning in simulations is particularly difficult because how one learns and what is learned is often different across individuals. This indicates that there is no easily identified relationship between performance and motivational aspects. Lowenstein (1994:93) noted that 'educators know much more about educating motivated students than they do about motivating them in the first place.' Loewenstein (1994) developed a

model of curiosity based on the notion of manageable gaps in one's knowledge. The model emphasises the use of experiential learning to be highly motivational. These are among the attitudes and feelings to be collected in this thesis survey for the teachers who use the simulations and those who do not.

Diagram 2: A model of the relationships in experience-based learning[iv]



Simulation Games and Experiential Learning

Experiential teaching and learning is the evolution of classroom learning. Traditional lecture style (subject based learning) has been integrated with group learning such as problem-based learning (Neufeld & Barrows, 1974), and team projects. In many

[iv] Adaptation from Kato F. and Lederman, Linda.
"Debriefing the debriefing process; A New Look" Simulation and Gaming across Disciplines and Cultures" ISAGA at a Watershed. Edited by D. Crookall, Kiyoshi Arai. Ann Arbor. Sage1995 p238

instances, the learning curve of the rules and regulations or the administrative and procedural maintenance of the simulations or teams interfere with the effectiveness of the education and may deter from the instructor using the software package. The initial selection and deployment stage is the biggest hurdle, as the start-up costs are frequently quite high. Selecting a game or an experiential exercise is difficult, as the information and marketing of particular products are not disseminated to the instructors adequately. Questions emergent to this research: What problems are associated with existing tools? Are these problems the main concerns of the discontinuation of simulation use? Can these problems be remedied to nurture adoption of simulation use for new adopters?

Problem Based Learning

Problem based learning (PBL) has gained recognition as a pedagogical support for designing courses. PBL was officially adopted as a pedagogical approach in 1968 at McMaster University, medical school (Neufeld & Barrows, 1974), because students were unable to apply their substantial amount of basic scientific knowledge to clinical real life situations. Students in small groups investigate and analyze problems/scenarios. Using an organizer process of; 1) identifying the FACTS in the problem/scenario; 2) generating (un-criticized) their IDEAS about the scenario/problem and identifying just "what is the problem"; 3) finally identifying the things they have to LEARN about - in order to test their hypotheses (ideas). The PBL model of learning is a component of modern educational simulations and one of several reasons for adopting simulation games into course curricula.

In order to reinforce the merits of simulation games, the internal parameters have been researched. The relationship between game performance level and recency of play

on exam scores was researched (Faria & Wellington, 1991). Their study examined the relationship between simulation participation, level of performance in a simulation competition, and the recency of play with exam scores in a principles of marketing course. The controlled experiment involving 389 students found no relationship between simulation play and exam scores, level of simulation performance and exam scores, and recency of simulation play and exam scores. Their findings suggested that a different kind of learning was occurring. This and similar research suggests that simulation games can be seamlessly integrated into a course with other components such as exams.

Most recently, the focus has shifted to player adaptability in the game world also coined the 'micro world'. It is important to understand the player and team dynamics in their interactions with this virtual game world environment. The micro world is the environment dictated by the computer simulation, manipulated by the simulation designer, in most cases the instructors. Many of the players often engage in playing the simulation games without any knowledge of the dynamics of the game world. Often these players perform well by being naive and having no intentional strategy. The research examining participant adaptability to parameters in computerized business simulation games examines the extent to which game participants comprehend the environment within which the game exists. The research suggests that participants most often do not understand their environments. Most of this literature suggests that the complexity of the simulations used in these studies contributed to the lack of significant findings. The study conducted by Faria and Wellington (1994) study used a simple simulation game in which the game administrator can only manipulate two game parameters. Decision responses were gathered from 331 single player competitive

companies assigned to fifty-nine six-team industries for a nine period competition. In past studies, only moderate learning of the simple environment was found. "Traditionally, game performance outcomes, such as earnings per share or return on investment, are used as measures of game performance success and learning. When a participant outperforms a competitor, it is assumed that the winner has better understood the simulation environment and has translated that learning into better decisions. Rather than simply measuring performance outcomes, asking participants to articulate their understanding of the simulation environment is another way to measure learning" (Faria and Wellington, 2001). The finding suggested that a different kind of learning was occurring.

Computer and Behaviourally Based Simulation Learning models

As experiential learning models, computer based simulations provide environments wherein participants experience realities of the business world that are risk-free and are specifically designed to eliminate certain costs and extraneous details inherent in the real world manager's operating environment. Business simulations can be categorized into two general types: computer based and behaviourally based. The computer-based simulations offer insight into the actual operations of a business so that participants can later transfer the simulation model strategies into real-life situations. Further, certain attitudes and behaviours that are consistent with success can be acquired and enhanced. Total enterprise simulation games seem to lend themselves well to the development of such attitudes and behaviours through practice and constant reinforcement. These simulation games provide not only immediate feedback on decisions to the participants but also offer positive competitive peer pressure to succeed.

They also have the potential to provide students with opportunities to practice and develop evaluation skills and real world group dynamics. Competition, real world decision-making, teamwork, and theoretical application are prime merits of simulation adoption.

As experiential learning models, computer based simulations provide environments wherein participants experience realities of the business world. Behaviourally based simulations, though difficult to empirically grade or evaluate, are very effective educational tools. It has been suggested that behavioural simulation technologies, which have been successfully used to teach strategic and organizational processes and to diagnose and develop managerial skills, may be appropriate for developing entrepreneurial skills. Empirical data was used to support the argument that behavioural simulations create an appropriate teacher-learner environment to accomplish many of the learning objectives of entrepreneurship education (Stumph, Mullen and Dunbar, 1991). A behavioural model of the firm and economic growth has been used where the level of economic efficiency, the choices of technology, and the rate of technical change, are all affected by firm organization and institutional variables (Altman, 2003). Behavioural models enable learners to change behaviour patterns. In a research project of financial stress reduction and optimization of the financial quality of life a behavioural simulation was implemented. Strategies for reducing financial stress included identifying and naming the source of financial stress as well as identifying behavioural and financial strategies to reshape behaviour creating an optimal quality of life (Maddux, 2002). Behavioural components have been introduced into computer business simulations. In complex computer-behavioural simulations that replicate a

hypothetical project and behavioural learning, the learner learns by adapting to situations. In these applications, the simulation's strength depends on the participant (Suddah and Zeh, 1999). In "A Realism Comparison of Simulation Technologies/ Methodologies," cases and experiential exercises are often used by instructors as a means to achieve the educational objectives sought, including knowledge, comprehension, application, analysis, synthesis, and evaluation (Sanders et al, 1990). Behavioural educational simulations such as role-play and similar exercises are also very effective for business learning, though limited in accuracy of student evaluation.

E-mail and Internet survey design

Internet usage is estimated to be available to approximately 22% of households (Witt, 1997) so getting a representative sample using an Internet survey of the general population can be very hard. In this study, given that the sample population was being drawn from among academics at AACSB members' schools, it is assumed that Internet access would be close to one hundred percent since most academics have their own email addresses, which they check routinely. A threat to the sampling frame comes from those universities that have one email address for the entire department or school. It was hoped that the aforementioned schools were in the minority and that surveys that were sent to their email addresses were routed to the educators. Else, email is an effective device for surveys rendering a quick feedback of responses.

Email surveys though noted for their fast return rate, low cost and quick deployment are known to have a low yield of responses (Bachmann, Elfrink and Vazzana, 1996; Kittleson, 1995; Mehta and Sivada, 1995; Sproull, 1986). Email surveys can be done faster than telephone surveys, particularly for large samples. They are

inexpensive in comparison with traditional paper base mail out surveys. To eliminate coverage error, the email method was augmented with a mail version upon request.

There is limited research on email survey data quality but there has been research about response rates and open-ended questions. Parker (1992) reported higher response rates could be achieved by email surveys if they are not perceived as junk mail. A side factor is the "hi-tech" novelty of email has worn out for most 'newbie's' and may even have become an annoyance with the preponderance of SPAM saturation and unsolicited email. It has also been found that the number of attempts made to reach the target is the most powerful determinant of response rate (Dillman et al, 1974; Goyder, 1987; Scott,1961). Single contact emails are much less successful than multiple contacts (Mehta and Sivadas, 1995). Another element deemed important is the personalization of the email survey. The personalized letter shows the recipient that he or she is important (Dillman, 1978; 1991). It is very important that the email go directly to the recipient not part of a mailing list. This also ensures confidentiality of the others on the mailing list if they are part of the list on the "send to" or "cc" field.

There have been some studies comparing the quality of replies to open ended questions compared to hand written mail surveys. Mehta and Sivadas (1995) and Tse (1995) report that there is no difference. However, Bachmann, Elfrink and Vazzana (1996) report that the length of email/web open-ended question response was longer than written mail out surveys. The Internet survey is compliant with the aforementioned research and reinforces several of these findings from the literature. Generally, open-ended question responses have been found to be lengthier and more comprehensive for on-line surveys in comparison to paper based mail surveys.

CHAPTER III. METHODOLOGY

This chapter outlines the procedures used to research the usage of simulations in business academia through the responses from the Internet survey. The chapter presents a) the data collection and email deployment b) the survey design and c) response data collection and analysis. In the email deployment section, there is detail about the proprietary software application developed for this research.

Research Purpose

The purpose of this thesis was to conduct an exploratory study 1) of differences in the adoption of educational simulation applications among Business School Academics 2) to explore the current usage of simulations, including the communication channels through which simulation information is relayed and 3) which titles are in current use.

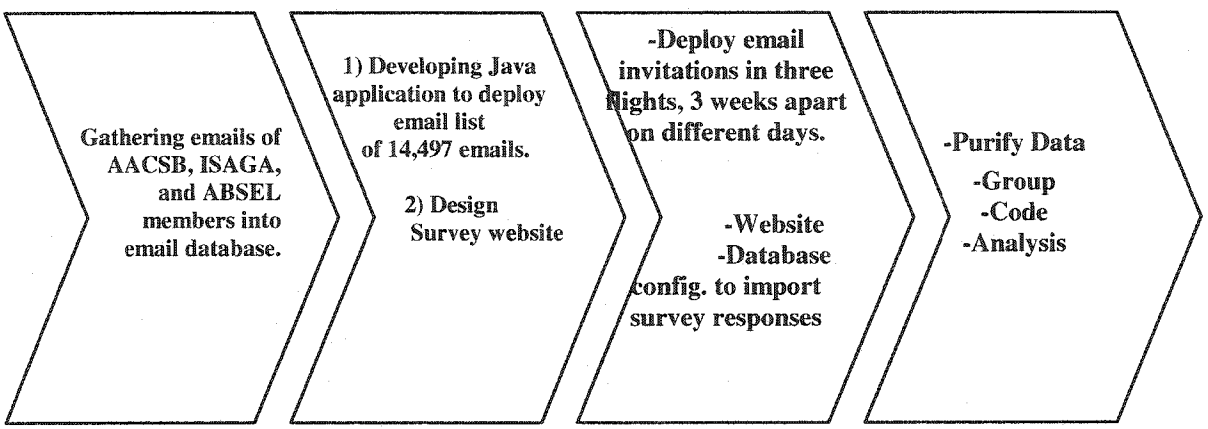
Study Population

The researchers invited 14,497 business faculty members from the professional associations of ABSEL, ISAGA, and AACSB member Business schools to participate. Only English speaking schools were selected and only email addresses from the ABSEL and ISAGA member lists and faculty members of AACSB member schools whose email addresses appeared in the faculty's link from their Institutions Home Web page were used. Due to the confidential nature of this study, the responses were considered a simple random sample of the ABSEL, ISAGA, and AACSB email data list. Business schools from across the globe were represented and invited to participate in the survey.

Survey Design

The first step of the survey methodology was sending an email invitation to the ISAGA, ABSEL, and AACSB members, requesting participation in the survey (Appendix 5). The survey design and implementation followed the guidelines set by Fowler 1993, Dillman 1978, and Nesbary 2000. The survey was served on a website hosted by the University of Windsor IT Department. No email invitations were sent until after the University of Windsor Research ethics committee approved the research. Responses were received over the course of 3 months. Each potential respondent from the initial 14,497 list was invited 3 times and the email invitations were flighted every 3 weeks on different days so that there would not be any temporally influenced survey response bias (Church, 1993). That is, the first invite was sent on the Monday week 1, the next was sent on the Wednesday of week 3, and the final invitations were sent week 6 on the Thursday.

Diagram 3. Stages of Research Data Collection



Instrumentation

The survey was constructed to collect overall sample demographic information and then collect information according to the usage group (user, non-user, former user) for which a separate survey was deployed to each group (Appendix 4a, b, c). The classification questions, 1 to 7, were the same for each respondent. The second part of the questionnaire was specific to each of the three usage categories. There were 17 questions for current users, 9 questions for former users, and 7 questions for non-users. This gives a total of 33 questions being asked. Some of the questions had "multiple" response areas so they represented different variables when they were coded for analysis. There were a number of common questions and 23 unique questions. In order to make comparisons across the three groups on the common questions the data was structured to import into the same variables for the similar questions. This instrumentation imported the data for analysis efficiently directly from the web questionnaire.

Based upon the theoretical frameworks and instruments suggested by Nesbary (2000) and Dillman (1999) the simulation survey was created to measure factors influencing adoption (Appendix 4 a-d). The survey consists of demographic questions A1 to 5, which are; Discipline, years teaching, current teaching rank, highest degree earned and courses most often taught. Section B involves questions pertaining to attitudes and measurements of factors concerning simulation adoption. These are; the number of years of usage, the reasons for first adopting, reasons for switching, percentage of final grade allocation, game advantages for students, advantages for teachers, course objective fulfillment, first awareness, simulation information seeking, the simulation titles used, likelihood of stoppage, and yes/ no answers to specific items regarding

communication channels. The other two groups had similar questions orientated to their adoption group i.e.; "Why did you stop using business games?" for former users, and "If you have considered using a business simulation game but have not, what has stopped you?" for non-users.

The survey consisted of items that used Likert scale measures, number data input, yes/no questions, and open-ended attitudinal questions. Based on Fowler (1993), a 10 point Likert scale (1=not likely, 10=Very likely) and 4 point was used to measure specific items from the respondents. These items were; the likelihood of stopping, familiarity with business games (4-point scale) and objective fulfillment. For example, the question 11 "On a scale of one to ten, with one representing complete accomplishment, how well do you feel that you are accomplishing the objectives you have stated above through your business game?", the simulation using respondent answered a one for completely accomplished and a ten for completely unaccomplished. In addition, the percentage chance of adoption (out of 100) information was collected by the non-user group. The survey also collected percentage data from; the percentage of course grade allocated to simulation game and the percentage out of 100 allotted to course components namely lectures, cases, game, and other. The remainder of the survey items involved open-ended questions concerning attitudinal responses to questions regarding simulations and their adoption. These included questions such as "Why did you first adopt? What are the advantages of simulations?" These responses were grouped and analysed using the protocol for content analysis (see Appendix 10) and tabulated in SPSS 11.5. Lastly, the most widely used game title information was collected in an open-ended exploratory fashion in the last section.

Data Collection and Email Deployment

The e-mail - Web survey was undertaken to estimate the current usage level of business simulation games among business school educators. The mail survey involved three separate questionnaires directed to the following groups: 1) Current Simulation users 2) non-users and 3) former users. The survey produced a total of 1085 questionnaire responses of which 1083 were completed online and 2 educators requested and completed a print questionnaire. The breakdown of respondents by questionnaire type was 330 users, 187 – former users and 564 non-users.

Table 3.2. Respondent Sample representation (Total N=1085)

Group	N	% of Sample
Users	331	30.5
Former	187	17.3
Nonusers	564	52.17

Research Data Collection for Simulation Survey

The Development of Fast mail

Email Data was extracted from AACSB, ABSEL, and ISAGA member websites using manual techniques and email extraction software into a comma delimited text file (flat file). The data files were then purified to delete duplicate emails to ensuring that each mail recipient would only get one single email concerning the survey. The elimination of duplicates was done with Microsoft Access$_{TM}$ and [v]Email Extractor lite v1.3$_{TM}$.

[v] Email Extractor lite v1.3$_{TM}$ owned by Benjamin Leow.

The Fastmail$_{TM}$ JAVA program was developed by Himadri Ghosh and Aaron West to overcome obstacles confronted with the conventional email deployment tools. MS Outlook$_{TM}$, hotmail$_{TM}$ and most other email clients have limitations that bottleneck the number of emails that one can assign to the email addressee list. Another obstacle was the fact that the Internet service provider (ISP) had a limit to the bandwidth one can use and this caused blockages, dropouts, and even disruption of the flow of bulk mailing. Yet another hurdle was the recipient's server firewall and security filters that detect and bounce emails which are either a) not addressed directly to the recipient or b) are detected as being that of a bulk mail list or a large cc: group list. The last hurdle was of a personal nature in that the recipient's inclination or motivation to participate and respond to the survey may be influenced by their perception as to whether this email is a message directed to them personally or a SPAM message that is not worth responding to. To tackle these obstacles FASTMAIL was developed for the email deployment phase of this research project.

Fast mail was developed as a Java based program designed for research purposes at the University of Windsor Dept. of Marketing. It was designed as a server side program, which will send email messages to the recipient according to a data file consisting of only email addresses. The JAVA platform was selected to run on the server side before any 'application layers' to expedite deployment time. Other advantages of the Java runtime environment J2RE was that it was cross platform and the email protocol was very streamlined and efficient for the research purposes.

To tackle the above challenges the researchers designed the program to run on the University of Windsor server and send out single emails rather then one bulk carbon

copied email through a mail client such as web mail. This allowed the deployment of the emails to the lists to run through the email data list, one single email at a time until the last email of the list is sent.

Email Deployment and Web Survey

To reduce the email load, the researchers divided and chunked the entire list of 14,497 emails into nine chunks that were deployed on Mondays, Tuesdays, Wednesday, and Thursday evenings. Three flights of emails were sent three weeks apart, which is the optimal time to separate large-scale surveys such as this. In addition, emails were sent on different days (one day subsequent to last mail out) to ensure temporal stability of the responses (Dickinson, 1999).

To ensure ethical standards and goodwill, the original email database was maintained by removing those people who requested a removal, or responses from their host's mail server, indicated that their mail was "undeliverable" to the recipient due to security precautions or account closure. On two occasions, a follow up interaction with the server administrator was needed to authenticate the researchers' academic research and intent.

To maintain confidentiality, privacy, and security an SSL authenticating ASP was used on the web page only recording the respondent as a unique identifying number and the time at which they submitted their response. No institutional server identity or other identity was recorded. No cookies were used as "cookies in their most benign form may store your city and postal code in order to customize the web page. In their dangerous form, cookies may retain your name, password, and personal settings" (Wing, 2003). In accordance with the following principle: "Trustworthy Computing initiative is

responding to customers' demands for technology that protects the confidentiality and privacy of their information" (Balmer, 2003); the Java application deployed email contained a small message that was easily detected as being virus free and also directly from the researchers to the addressees.

Java Development of FASTMAIL$_{TM}$

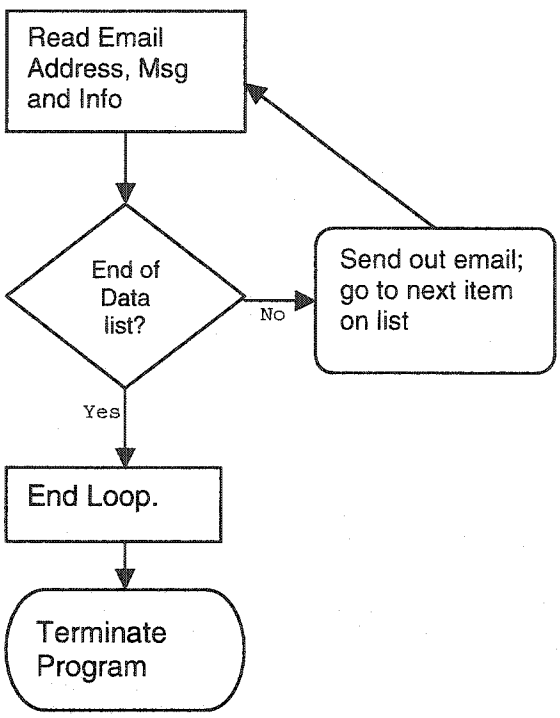
1) The bulk email program mailed out survey invitation emails in the following way

- Reads email body from flat file (*.txt) and places the name into the " to:" field of email
- Places Letter.txt into the body of the message
- Places an email address from the data list in the "from: field
- The program runs until the end of the data file regardless of emails, which have bounced because it is sending out each email individually.

2) From the responses to the survey the data submitted was;

- Divided into 3 categories –current user, former, non users (coding 1,2,3) and grouped
- Protocol was used for content analysis
- Imported into SPSS

Figure 3.5. Logic Diagram of Java e-mail Program (Fastmail$_{TM}$)



Why Java?

- Previous Java code base – the application was largely based on a custom library developed in-house
- Cross platform graphical user interface toolkit (Swing) also had option to use command line interface
- Availability of Java Mail toolkit with support for the SMTP protocol used in e-mail transport

What tools?

- *JBuilder Enterprise edition* –deployment tools were useful for distributing a standard Windows executable Compatible with Java 2 standard edition 1.3 or 1.4

Java process flow

- Parse command line arguments
- Parse file of e-mail addresses (one of the arguments) and reads them into a list data structure
- Parse file containing message text and stores it in memory
- Enter a loop – for each pass of this loop:
- Construct an individual message for each recipient and stores in a list data structure
- Connects to the SMTP server and sends these messages
- Clean-up and exits the program

LIMITATIONS

1. **The period in which the emails were deployed** was between May and July 2003, a time when many respondents would be on summer vacation from the regular school year. However, in North America, the college year runs September to June, but in Europe and Asia, the year runs from January to August so this researcher had proportionate balance of respondents across the globe. It was also assumed that professors would check their email periodically even when on sabbatical or leave. As such, the degree to which the response rate was affected by respondent availability cannot be determined.
2. **A number of "Delivery Failures"** of emails, which were deployed, were clustered among educational institutions located in the state of California. Messages were received from several universities in Northern California and surrounding area that there was a "Delivery Failure". Coincidentally, in the news, California was experiencing **"Blackouts" of electricity** on their power grid, which created disruption to the Internet and email delivery in those areas. These emails were delivered with confirmation of receipt during the next flight of emails.
3. **The mode of data collection** was impersonal and gathered through website searches. Although the intent of the research was personal, this researcher grants that the collection of the email addresses was not. This is reflected in the large non-response. Some of the causes for non-response and AACSB data list email exclusion can be attributed to: a) faculty and department websites which were not updated to include new faculty, b) department sites which do not list their

educators, c) sites which only list professors who are currently teaching, d) sites in which the email addresses are unlisted or in the form of a graphic so that they cannot be fetched by the html text query, e) College sites which do not have departmental information, and f) University sites which restrict access to faculty email directories or listings. In the cases where individual emails could not be acquired a letter was deployed to the general mail address (both university and department) in the hopes that it would be forwarded to the appropriate people. Nevertheless, in several cases, feedback indicating that the invitation was received and forwarded to the appropriate parties was received indicating that the message was indeed forwarded.

4. Because of the **exploratory nature of the research,** the potential to explore many causal or correlation relationships that might be of interest. However, through open-ended questions the universe of attitudes towards simulations was collected from the sample population.
5. Simple questioning was employed to minimize ambiguity and **misinterpretation;** however, the researchers recognize the fact that there was some misinterpretation of questions. These were found to be rarities.

DELIMITATIONS

The sample was delineated in scope to include members of ABSEL, ISAGA, NASAGA, and educators of AACSB member schools only. The survey was confidential so there were no geographic factors considered, however; it is assumed that since the data list was representative of every AACSB member school internationally, respondents

represented schools internationally. The survey was conducted in a three-month period with three reminder invitation emails segmenting the study into three rounds.

Non-Response Bias

Non-response can potentially lead to a smaller final sample size and thus a loss of accuracy in population estimate. However, if the non-response is not related to the research variable of interest, taking larger samples can compensate for this loss. The sample of this survey invited every business educator from ABSEL, NASAGA, ISAGA, and AACSB member schools. On the other hand, since non-response is directly related to simulation non-usage there may have been distortions in the survey results. There is always a potential for non-response bias if the sample educators who did not participate in the survey have somewhat different characteristics than those who did. This non-response bias occurs when a significant number of people in the survey sample failed to respond and have relevant characteristics that differ from the respondents (Dillman, 2000).

The commonly used method to correct for non response bias is corrective weighting of the survey data (Demming, 1944) by use of the demographic variables (Mayer and Pratt, 1966) however, it has been shown that this method does not correct the bias sufficiently, because the inherent assumption that respondents and non respondents within the same demographic category are also equal in the outcome variable (Van Goor and Stuiver, 1998). Because of the nature of our Internet survey sample, it is implausible to locate and test the nonrespondents so this weighted technique was not used. The data from the study was not weighted to estimate non-response bias. Since it was not possible

to access the information required to derive a subjective estimate of non-response bias, the extrapolation and known value approaches were considered.

Late respondents are considered to provide a good measure of the characteristics of no respondents (Armstrong and Overton 1977). To test for non-response bias, early survey respondents were compared with late respondents with respect to their demographic simulation usage groups. Following Armstrong and Overton (1977) several tests were made to ensure that the respondents were representative of the sample and thus the population. By the use of Pearson's P 2 tests, respondents answering before receiving the reminder letter were compared to respondents answering after receiving the second reminder and the response from round two were subsequently compared with round three (after the third invitation reminder). A chi-square analysis was undertaken to determine if the differences in percentages responding at the different times were significant.

Table 3.3. Response Time by Usage Classification

	Response Time			
	Round 1	**Round 2**	**Round 3**	**Totals**
	(N=625)	*(N=198)*	*(N=262)*	*(N=1085)*
User	37.1% (232)	24.2% (48)	19.8% (52)	30.6% (332)
Former User	17.6% (110)	17.7% (35)	15.6% (41)	17.1% (186)
Non-User	45.3% (283)	58.1% (115)	64.5% (169)	52.3% (567)
	Chi-square Significance - .000**			

The findings shown in Table 3.3 indicate that simulation users responded sooner after the reminder was sent than non-users. This was likely due to their interest in the subject of business simulations. Based on the classification information, it would appear that there are differences between early and late respondents and therefore the survey has response bias. It would appear from our analysis of responses by the e-mail round that non-respondents are more likely to be non-users of business simulation games

(approximately 2/3rds). This is not surprising given that non-users would be less interested in replying to a survey on a form of pedagogy not used.

As shown in Table 3.3, of the total of 1085 respondents to our survey, 30.6% are current simulation game users, 17.1% are former simulation game users, while 52.3% have never used a business simulation game. These findings are consistent with those reported in a large mail survey of business faculty by Faria (1998). Since the frequencies of the simulation, usage groups between the three rounds were not significantly different and the proportions of users, non-users, and former users were similar to previous research (Faria, 1997; Goosen, 2001) the proportions were not weighted.

Open Ended Question Content Analysis

"Content analysis has been defined as a systematic, replicable technique for compressing many words of text into fewer content categories, based on explicit rules of coding" (Berelson, 1952). A broad definition of content analysis is, "any technique for making inferences by objectively and systematically identifying specified characteristics of messages" (Lindzey, 1968: 597). For the open-ended attitudinal questions a protocol and schema was designed from the manual evaluation of the answers for counting responses from the open-ended questions. Preliminary data word and phrase counts did not reflect the true meaning and occurrence of concepts that were defined by the content analysis protocol.

Qualitative content analysis follows a recursive and reflexive movement between concept development-sampling data, collection-data, coding-data, and analysis-interpretation. Categories and variables initially guided the study, but others were

allowed and emerged throughout the study, including an orientation toward constant discovery and constant comparison of relevant situations, settings, styles, images, meanings and nuances (Altheide, 1996)."The major goal of qualitative content analysis is to capture and make sense of the meanings, emphasis, and themes of texts and to understand the organization and process of how and why these are presented" (Altheide, 1996: 33). Each survey response was carefully read to gain the deep meaning of what was submitted via the Internet.

The general goal of qualitative content analysis is to capture and make sense of the meanings, emphasis, and themes of texts, and to understand the organization and process of how and why these texts are presented. As Altheide (1996) and others note, this requires the inclusion of a wide range of relevant texts in a sample (see also Berelson, 1952). It is difficult, however, to know what this range and variety of this sample will be at the start of the research. To a varying degree, the range and variety of texts, which come to be included in the sample, emerge as the researcher inspects and reflects upon initial materials. Similarly, rather than trap the analysis with too many preset categories and cases derived from a rigid pre-determined sampling strategy, a progressive theoretical sampling strategy was employed.

Protocol

The analysis of the open-ended questions began with the development of a protocol (Appendix 10). Altheide (1996: 27) describes a protocol as a list of questions, items, categories, or variables that guide data collection from the source. Several items or categories (variables) were listed to guide data collection and to draft a protocol. The protocol consisted of pre-coded categories derived from the themes outlined in the

literature review. These themes include things such as attitudes akin to "experiential, experience learning, integrative" etc.

Each theme contains listings of several categories designed to guide data collection (note: these listings are elaborated on in the findings section). The protocol categories have more than one possible outcome or value to them. For example, an answer of simply "integrative" was counted as "integrated classroom material" and "integrates theory."

The protocol categories were coded using a combination of latent and manifest coding techniques. Using manifest coding – the coding of visible, surface content in a text – a coding system was developed to list terms, which were located in the open responses, counted, and recorded. Terms were located in the responses and recorded in the protocol using Microsoft Word™ and Excel™ to validate the general magnitude of the findings but not as the results since certain key words, such as "integrative" may appear in a multitude of contexts. Using latent coding, the underlying, implicit meaning in the content of the text was examined by reviewing the entire text and making a judgment as to how the text should be classified. It was found that a number of the responses explicitly stated the values for its pertaining category, through comments and statements by the specific events, applications, and simulations. However, there were a percentage of answers in which the researcher interpreted the values of a category based on the entire sense of the answer established by the author's presentation of facts, opinions, and implicit messages, guided by general rules of the coding system. The protocol derives from the coding as the list of terms is organized into separate categories that represent different themes and content. These interpretations were cross-validated by two distinct

coders. Overall, the research reflects the researchers' best intent to encompass and report the spectrum of answers submitted in the Internet survey. The work of this research was embodied in attempting to accurately report the findings extracted from the survey in the most suitable manner.

Data Analysis

The statistical procedures utilized to analyze the data are outlined in this section. SPSS 11.5 for Windows$_{TM}$ computer software package was used to analyse the data. The data was coded according to the protocol in Appendix 10. The survey provided a variety of types of information including metric, interval, ordinal and categorical. The nature of the data determined the form of "statistical" tests performed to determine relationships and differences. Most of the data collected was categorical. Ordinal data included; teaching ranks, degree earned familiarity with simulations. Metric data from the survey included: years teaching, years full-time work experience and years using simulations, Likert scale type data using a 1 to 10 scale to measure; "chances you might use a simulation next year", and "likelihood you will stop using simulations" represent interval scaled data. The remaining survey questions were categorical binary, "yes/ no" answers such as; "did you receive direct promotion from a publisher" and "have you ever switched simulation titles?" In addition, the open-ended questions from the survey were coded using content analysis, (see pg. 61) into categorical variables. For example, the reasons for adopted simulations were binary coded 1 or 0 meaning gave the reason or did not (see Appendix 12). These reasons were summed up and reported in numbers and percentages.

A MANOVA test was performed for the responses of each survey item to determine the reasons that were statistically significant and to determine if the proportion of response was dependent on user group. For other analysis of the research questions the Chi square test was used as a statistical test testing the null hypothesis that the means of the educator populations (users, non-users and former users) were equal. A multivariate analysis of variance (MANOVA) was used as the technique that assesses the relationship between two or more dependent variables and classificatory variables to test differences among the related survey items. It was used for the research questions that involved a relationship between the groups and ordinal or interval data. MANOVA was performed for one multi level nominal independent variable (simulation adoption group, 1= user, 2= former user and 3=nonuser) and multiple dependant variables (years teaching experience and years fulltime work experience). From the MANOVA it was determined whether the classificatory demographic variables (users, nonusers, former users) were significantly different from each other with respect to teaching experience and fulltime work experience.

The Chi-Square (χ^2) test was used in the survey items that involved nominal data. In this survey research, it was used to test for significant differences between the observed distribution of data among categories and the expected distribution based on the null hypothesis. Specifically, the components in a particular survey item (i.e. reasons for adoption) were tested against the null hypothesis that all of the reasons occurred equally. In each research question, the null hypothesis was based on the expected frequency of the reasons in each category of usage group, coded A7 in the data. Then the deviations of the actual frequencies in each category were compared with the hypothesized frequency.

The greater the difference between them, the less was the probability that these differences were attributable to chance alone. The value of χ^2 is the measure that expresses the difference from the occurrence by chance. The larger and more significant the divergence, the greater the value of the χ^2.

Individual responses to open ended questions were tested using chi-square analysis to determine whether the proportion of top responses were dependent on user, former user, and non-user groups. In addition, chi square analysis was undertaken to compare the groups in relation to the number of years of teaching experience and the number of years of non-academic work experience. Through these statistical tests, the findings interpreted in order to answer the research questions in chapter four.

CHAPTER IV. FINDINGS

This chapter contains the survey research findings from the Business Educators survey of 1085 university business professors. The Internet survey was conducted over the course of 3 months between April to June 2003. The survey instrument was designed to determine significant differences in demographic characteristics and attitudes towards adoption. Included is the statistical testing of the results in Tables 4.1 to 4.28.

The chapter is divided into 5 sections covering A) Overall Sample Demographics and Across Group Attitudes B) Current Simulation Users C) Former-Users D) Non-users E) Communication channels for Simulation Games and F) currently used Business Simulations.

The following research questions are the framework for the thesis findings. Section A divides and compares the entire sample into the categories of simulation users, former users, and non-users. This includes demographics, academic ranking, and differences across disciplines, the reporting of reasons for adoption and advantages. Sections B to D report the attitudinal responses for: why users adopted simulations, the reasons that former users stopped using simulations, and the reasons that non-users do not use simulations in their teaching. Sections E and F present the sources of information which communicate new simulation applications and which titles are currently the most prevalent.

Overview of Research Questions

Section A-1: Overall Sample Demographics

1. What significant differences exist between the demographic characteristics of business simulation using educators, non-users and those who once used simulations but have stopped doing so (former users)?

Section A-2: Across group attitudes towards Simulations

2. Across groups, are their differences in the reported advantages of using simulation games compared to traditional teaching methods?

Section B: Simulation USERS

3. What are the reasons for users to adopt simulations in their educational curricula?
4. Is there a significant difference in attitudes between early adopters and the late majority for simulation games in the business education?
5. What are the significant reasons for users of simulations to switch to different titles?

Section C: Simulation FORMER USERS

6. What reasons do former users report for ceasing to use business simulation games?
7. What differences exist between the attitudes reported for simulation adoption of users and former users?

Section D: Simulation NON-USERS

8. What reasons do non-adopters report for not using business simulation games in their curricula?

Section E: Simulation Communication Channels

9. How do educators first discover simulations?
10. Which channels of communication are used to communicate information about simulations?

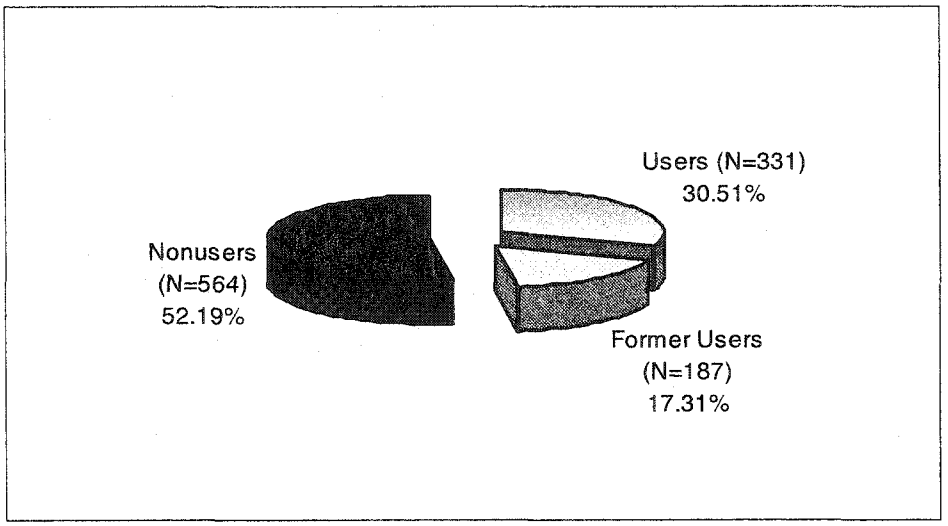
Section F: Currently used Business Simulation Titles

11. What are the prominent business simulation applications/titles?

Section A-1: Overall Sample Demographics

Summary data for each survey response cluster (users, former users and non-users) is presented in Figure 4.1.

Figure 4.1. Simulation Survey Respondent Sample representation (Total N=1085)



A unique, non-identifiable number classified the survey respondents to maintain confidentiality. This unique identifier was not linked to any information compromising the respondents' confidentiality. Through the web survey, 1093 responses were imported into the database. However, eight records were redundancies having duplicate entries. Duplicate data was removed giving an overall sample of N=1085. The overall response sample of the total 1085 respondents was comprised of 30.5% users, 52.19% non-users, and 17.31% former users. The margin of error in the sample of 1085 university educators is 0.03048.

The first research question was stated as:

1. What significant differences exist between the demographic characteristics of business simulation using educators, non-users and those who once used simulations but have stopped doing so (former users)?

Multivariate Analysis of Variance (MANOVA) was used to examine similarities and differences among the multivariate mean of users, non-users and former users. The MANOVA was computed to investigate the multivariate effects of simulation adoption with two independent variables (number of years teaching experience and the number of years fulltime work experience) for the entire survey sample, the user group, non-users and former user group (H_o: $\mu 1=\mu 2=\mu 3$) where the dependant variable is the usage category; 1=users, 2= former users and 3= non-users. The results of the MANOVA (Appendix 13) indicate that significant differences exist between the user group (*reject* H_o) and the non-user group. Furthermore, no significant differences exist between former users and users with respect to work experience, ($p=0.074$). However, years teaching experience was found to have a significant effect. See Table 4.1 below.

Table 4.1. Average Years of Business and Teaching Experience

	Users		Former Users		Non-Users	
	Mean (N)	S.D.	Mean (N)	S.D.	Mean (N)	S.D.
Years Teaching*	15.82 (330)	9.90	19.70 (184)	9.96	12.88 (557)	9.39
Years Working full-time	10.32 (328)	8.58	8.98 (181)	7.86	8.96 (550)	9.20

Table 4.2. MANOVA of Years Teaching and Years Working on Usage Group

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	A2YRSTCH	6092.655[a]	2	3046.327	32.921	.000
	A6YRSWRK	405.178[b]	2	202.589	2.609	.074
Intercept	A2YRSTCH	222205.707	1	222205.707	2401.295	.000
	A6YRSWRK	76424.763	1	76424.763	984.282	.000
A7CLASSI	A2YRSTCH	6092.655	2	3046.327	32.921	.000
	A6YRSWRK	405.178	2	202.589	2.609	.074
Error	A2YRSTCH	97162.582	1050	92.536		
	A6YRSWRK	81527.418	1050	77.645		
Total	A2YRSTCH	338174.500	1053			
	A6YRSWRK	174680.750	1053			
Corrected Total	A2YRSTCH	103255.237	1052			
	A6YRSWRK	81932.596	1052			

a. R Squared = .059 (Adjusted R Squared = .057)

b. R Squared = .005 (Adjusted R Squared = .003)

The coding for the data is as follows; a1=discipline, a2=years teaching, a3=current rank, a4=highest degree, a6=years work, a7= category (Full Coding of Survey on Appendix10).

The demographic categorical characteristics of the survey respondents are presented in table 4.3 summarized into a) the Ranks of Respondents b) the highest degree they have earned and c) their teaching discipline area. Ranks of respondents refer to their occupational status with the academic institute. Highest degree was categorized into Masters/M.B.A, PhD/D.B.A., and all undergraduate and others were grouped together. In table 4.2 c., 'teaching discipline' accounts for the top six disciplines outside of those respondents grouped into the 'other' category.

Table 4.3. Respondent Demographics

a) Ranks of Respondents

	% User (N=327)	% Former User (N=183)	% Nonuser (N=553)	% Total (N=1062)
Full Professor	30.1 (98)	40.4 (74)	20.8 (115)	27.0 (287)
Associate Professor	29.4 (96)	27.9 (51)	21.2 (117)	24.9 (264)
Assistant Professor	23.9 (78)	16.4 (30)	35.1 (194)	28.4 (302)
Lecturer/Instructor	11.0 (36)	12.0 (22)	16.3 (90)	13.9 (148)
Graduate Assistant	2.1 (7)	0.0 (0)	2.5 (14)	2.0 (21)
Other	3.4 (11)	3.3 (6)	4.2 (23)	3.8 (40)

Table 4.3. Respondent Demographics (Continued)

b) Highest Degree Earned

	% User (N=330)	% Former User (N=184)	% Nonuser (N=561)	% Total (N=1075)
Ph.D./DBA	79.7 (263)	87.0 (160)	75.8 (425)	78.9 (848)
MBA	13.0 (43)	9.2 (17)	11.2 (63)	11.4 (123)
Other	7.3 (24)	3.8 (7)	13.0 (73)	9.7 (104)

c) Discipline Area

	% User (N=330)	% Former User (N=185)	% Non-user (N=561)	% Total (N=1076)
Management	31.2 (103)	25.4 (47)	18.0 (101)	23.3 (251)
Marketing	27.3 (90)	27.6 (51)	14.1 (79)	20.4 (220)
Policy	15.8 (52)	11.4 (21)	5.5 (31)	9.7 (104)
Management Science	11.5 (38)	15.1 (28)	22.3 (125)	17.8 (191)
Finance	5.8 (19)	8.1 (15)	8.9 (50)	7.8 (84)
Accounting	4.2 (14)	7.0 (13)	18.7 (105)	12.3 (132)
Other (Mainly Economics)	4.2 (14)	5.4 (10)	12.5 (70)	8.7 (94)

As an exploratory activity, inspection of Chi-square (χ^2) test showed that there is a significant difference in work experience between users and former users. The χ^2 test also indicates that there is no significant difference in teaching experience between the user, former, and non-user groups Chi-square (χ^2) analysis was undertaken to compare the three groups in terms of the number of years of teaching experience and the number of years of non-academic work experience.

Table 4.4.a Years of Teaching Experience

Dependent Variable: A2YRSTCH

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	6791.157(a)	2	3395.579	36.477	.000
Intercept	228329.372	1	228329.372	2452.822	.000
A7CLASSI	6791.157	2	3395.579	36.477	.000
Error	99418.452	1068	93.088		
Total	345836.500	1071			
Corrected Total	106209.609	1070			

R Squared = .064 (Adjusted R Squared = .062)

There is a significant difference between the three groups with respect to number of years teaching experience. Multiple comparisons (Table 4.4.c) were performed to see which ones are actually significantly different.

Table 4.4.b Years of Teaching Experience LSD

Dependent Variable: A2YRSTCH Multiple Comparisons **LSD**

(I) A7CLASSI	(J) A7CLASSI	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	-3.88(*)	.888	.000	-5.62	-2.14
	3	2.94(*)	.670	.000	1.63	4.26
2	1	3.88(*)	.888	.000	2.14	5.62
	3	6.82(*)	.820	.000	5.21	8.43
3	1	-2.94(*)	.670	.000	-4.26	-1.63
	2	-6.82(*)	.820	.000	-8.43	-5.21

Based on observed means.
* The mean difference is significant at the .05 level.

All three groups are significantly different from each other in terms of teaching experience.

Table 4.5a Work Experience

Tests of Between-Subjects Effects

Dependent Variable: A6YRSWRK

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	419.847(a)	2	209.924	2.713	.067
Intercept	76865.841	1	76865.841	993.321	.000
A7CLASSI	419.847	2	209.924	2.713	.067
Error	81716.098	1056	77.383		
Total	175406.750	1059			
Corrected Total	82135.945	1058			

R Squared = .005 (Adjusted R Squared = .003)

The three groups are not significantly different with respect to work experience.

Table 4.5.b Descriptive: Years Teaching Experience and Years Work Experience

All groups; Users (group1), Former (group2) and Non-users (group3)

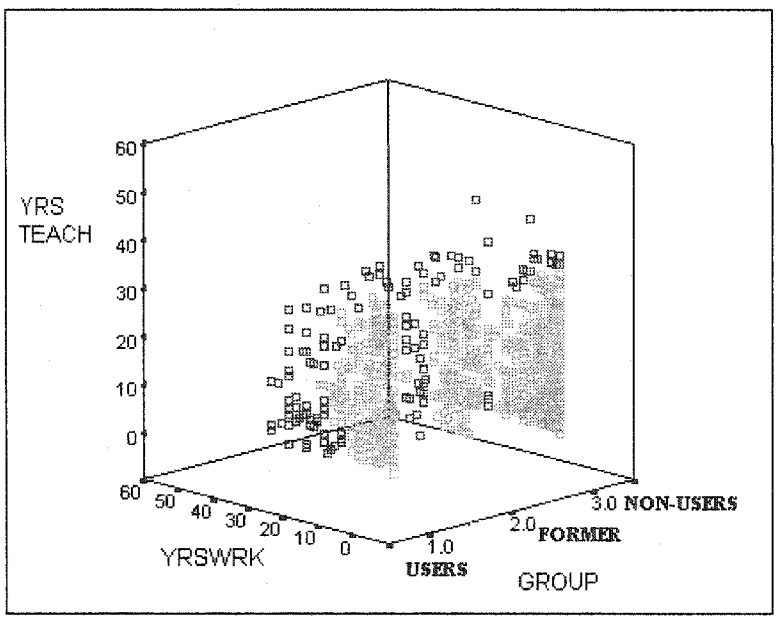
Descriptives

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
A2YRSTCH	1	330	15.82	9.902	.545	14.75	16.89	1	43
	2	184	19.70	9.962	.734	18.25	21.15	1	53
	3	557	12.88	9.388	.398	12.10	13.66	0	43
	Total	1071	14.96	9.963	.304	14.36	15.56	0	53
A6YRSWRK	1	328	10.32	8.584	.474	9.39	11.26	0	35
	2	181	8.98	7.859	.584	7.83	10.13	0	40
	3	550	8.96	9.204	.392	8.19	9.73	0	52
	Total	1059	9.38	8.811	.271	8.85	9.92	0	52

From Table 4.4 a to d the results indicate firstly, that statistically significant differences exist between non-users, users and former users for teaching experience ($p=0.000$) but work experience has no relationship in the three groups ($p=0.067$).

From the three density scatter plots on the 3D plot below, it was interpreted that there is no difference between the three groups in relation to teaching or work.

Figure 4.2. 3D Scatter Plots of Years Teaching vs. Work Experience vs. Adoption.



From the distribution in the above 3D scatter plot it was verified that teaching experience was of significance in relationship between the users, former, or non-user groups while there was no difference related to work experience. The next observation was that the discipline areas of management and marketing had the highest incidence of simulation users but membership to those disciplines does not have an effect whether an educator will adopt a business game or simulation ($p>0.05$).

SECTION A2. Across group attitudes towards Simulations

The next research question was phrased as:

2. Across groups, are their differences in the reported advantages of using simulation games compared to traditional teaching methods?

The web-survey question "What are the primary teaching/learning advantages of a business game over other teaching methods?" was common to the survey's catering to all three groups. Although, it was expected to have lower responses to this open-ended question by the non-user group, the content of the responses from the survey showed that there were similarities across groups in this area. The statistical across group and within group variance followed a standard curve and the key concepts were extracted through manual content analysis not keyword occurrence. (i.e. word search counts).

The question on the web survey was split in context towards the student and for the teacher. Across the three groups (users, former users and non-users), the main reported advantage of business games for students in comparison to other teaching methods was that, "they provide experiential learning". The next two top reasons were that they integrate different functional areas into the students learning; and that business gaming "allow for theoretical application" (See Table 4.6).

Table 4.6. Advantages for the Student

What are the primary teaching/learning advantages of a business game over other teaching methods?

	Users % (N)	Former % (N)	Nonuser % (N)
Provide experiential learning	40.9 (139)	30.1 (56)	19.2 (109)
Integrate different functional areas	31.9 (106)	28.0 (52)	6.7 (38)
Allows for theory application	28.6 (95)	25.3 (47)	14.6 (83)
Consequences of decisions are seen	22.0 (73)	14.5 (27)	6.2 (35)
They require teamwork	18.1 (60)	18.3 (34)	3.2 (18)
They require more involvement	17.2 (57)	12.9 (24)	6.9 (39)
They are interactive/dynamic exercises	15.4 (51)	4.3 (8)	5.1 (29)
They are "realistic" exercises	13.6 (45)	15.1 (28)	15.3 (87)
Expose students to business competition	12.0 (40)	6.5 (12)	2.1 (12)
They are fun	11.7 (39)	7.0 (13)	5.8 (33)
They interest and motivate students	10.2 (34)	9.1 (17)	6.7 (38)
No Advantages/Don't Know of Any	1.2 (4)	2.7 (5)	4.8 (27)

A variety of answers such as "they are fun", "easy to administer", "foster teamwork" and "realistic" were reported in a range from 2-8%. There were also a less than 3% incidence of across group sentiment that "there are no advantages or not aware of any" (1.2% users, 2.7% former, 4.8% non-users).

The primary learning advantages of business games over teaching convention with respect to the teacher was reported across groups as "that they are interactive/ dynamic exercises" (See Table 4.7). This occurred in 27.4% of the users, 50% of former users, and 17.5% of the non-users. The second most prevalent reason was that simulations "allow for theory application" (24% users, 25.8% former, 9.9% non-user). Also reported were that "they interest and motivate students" (21% former) and "measure comprehension/ understanding" (14.5% users). Other attitudes of advantages for the teachers were that "they add variety", "fun", "require more instructor involvement", "they are lots of work", "require teamwork" and that they add "ease to grading". Some responses though similar in nature were segregated because of the high number of like reporting, for example "they are easy to administer" (9.9% users), referring to the

simulation, was made separate from they are "easy to grade" since they were reported to be distinct by the respondents.

Figure 4.3a. Reported Advantages for Students across Groups

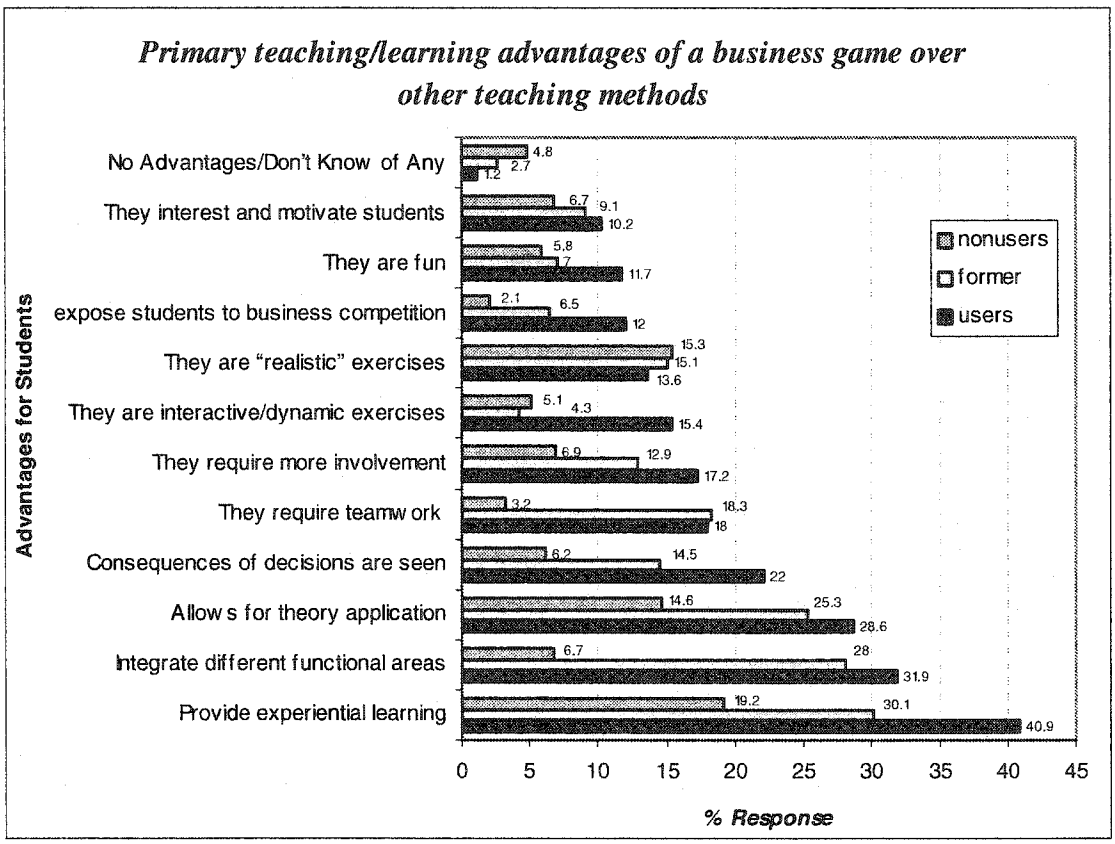


Table 4.7. Advantages for Students across Groups

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
B7AIntegrate	1085	1.82	.385	1	2	2.00	2.00	2.00
B7AExperiential	1085	1.72	.449	1	2	1.00	2.00	2.00
B7AApplyTheory	1085	1.79	.406	1	2	2.00	2.00	2.00
B7ATeamwrk	1085	1.90	.304	1	2	2.00	2.00	2.00
B7ARealism	1085	1.85	.355	1	2	2.00	2.00	2.00
B7AConsequence	1085	1.88	.330	1	2	2.00	2.00	2.00

Test Statistics

	B7AIntegrate	B7AExperiential	B7AApply Theory	B7ATeamwrk	B7ARealism	B7ACons equence
Chi-Square [a]	442.626	209.704	371.636	683.245	539.378	612.189
df	1	1	1	1	1	1
Asymp. Sig.	.000	.000	.000	.000	.000	.000

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 542.5.

Table 4.8. Advantages of Simulations for the Teacher

	User %(N)	Former User	Non-user
They are interactive/dynamic exercises	27.4 (91)	50.0 (93)	17.5 (99)
Allows for theory application	24.4 (81)	25.8 (48)	9.9 (56)
They interest and motivate students	15.4 (51)	21.0 (39)	8.6 (49)
Measure comprehension/understanding	14.5 (48)	7.0 (13)	3.4 (19)
Integrate different functional areas	11.1 (37)	28.5 (53)	3.2 (18)
Add Variety/Change the Course	11.1 (37)	9.1 (17)	10.4 (59)
They are easy to administer	9.9 (33)	1.6 (3)	3.9 (22)
They are fun	9.3 (31)	5.4 (10)	1.9 (11)
They require more instructor involvement	8.4 (28)	2.7 (5)	1.4 (8)
They are lots of work	5.4 (18)	3.2 (6)	0.9 (5)
They require teamwork	3.6 (12)	10.8 (20)	0.4 (2)
No Advantages/Don't Know of Any	3.6 (12)	2.7 (5)	6.3 (36)
Easy to grade	3.3 (11)	0.5 (1)	0.7 (4)
Allows for instructing bus objectives	1.8 (6)	4.8 (9)	0.2 (1)

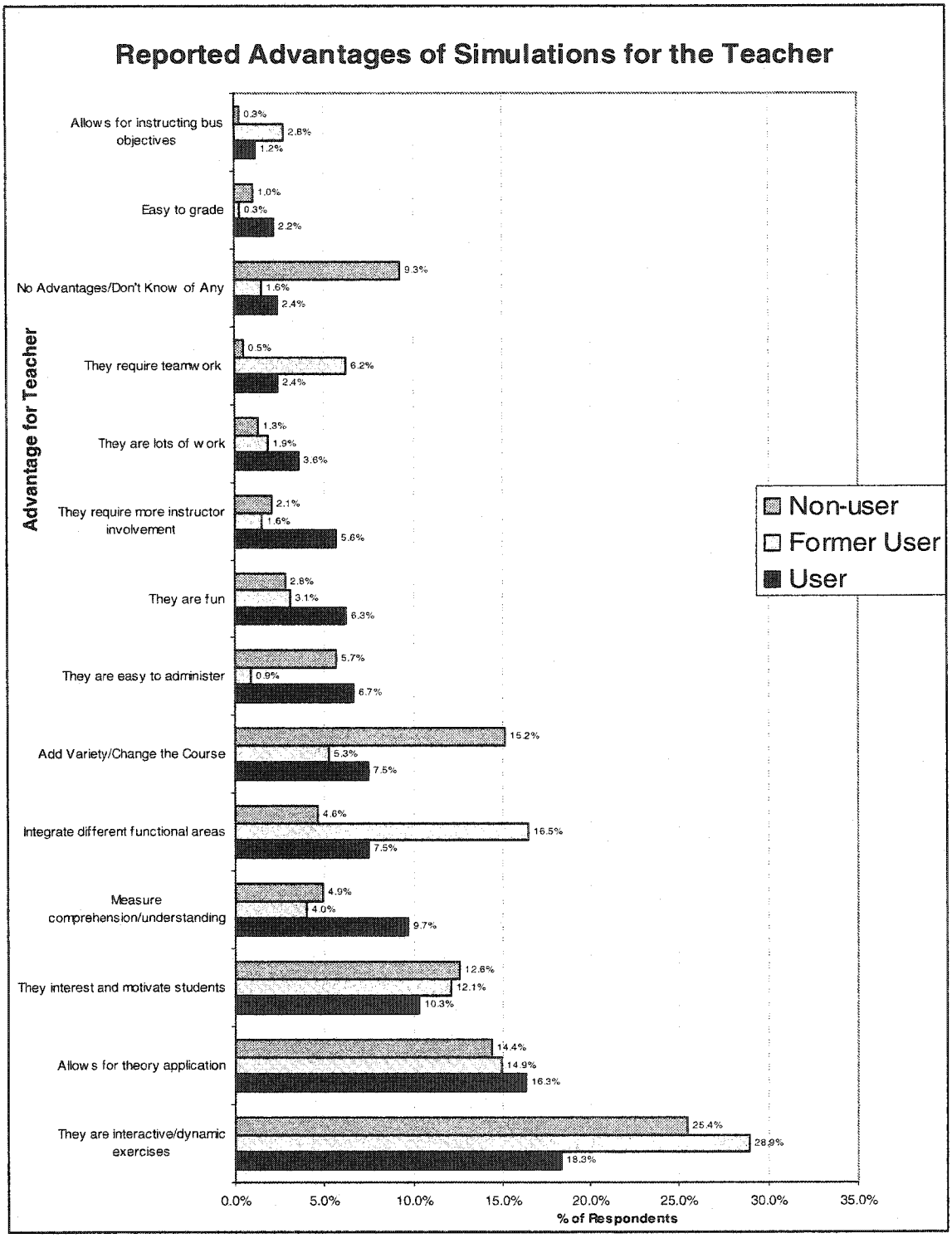
Table 4.9. Chi-Square Test of Reported Advantages

Test Statistics

	7BIntegra	7BAppl Theory	7BVariet	7BActiv Learning	7BCompre nsionChec	7BTeamw	7BEasyAdr ninstration	37BFUN	7BProbl nSolving	7BInvolv nstructo	7BInteres Motivation	7BNoAd antagesD n't Know
Chi-Squa	33.108	14.297	22.730	25.973	22.730	33.108	33.108	33.108	33.108	29.432	19.703	19.703
df	1	1	1	1	1	1	1	1	1	1	1	1
Asymp.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

a 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 18.5.

Figure 4.3b. Advantages for Teachers



One peculiarity was the reporting across groups that "there are no advantages of using simulations" or "don't know of any" to a much higher level (3.6% users, 2.7% former and 6.3% non-users). The high incidence of this was expected for non-users but not for the user group. This occurrence was attributed to reflect the attitude of those educators whom had "inherited the simulation as the course content" required from the department. Non-users indicated from Figure 4.3 above, that they "didn't know of any" (9.3%) but also the non-experience of non-users shows in their low reporting of "allowing for business objectives, ease of grading, teamwork and requirement of work". These low responses are attributable to the non-users being unexposed to these benefits of games. In addition, the former users indicated a very low reporting of ease of grading and easy to administer which may be part of the reasons for ceasing simulation game in their courses.

SECTION B: SIMULATION USERS

Research Question:

3. What are the reasons reported by users for adopting simulations in their educational curricula?

Table 4.10. Reasons for Users to Adopt Business Simulation Games

	Users % (N=332)
Decision making experience	46.1 (153)
Allows for theory application	36.1 (120)
Integrate different functional areas	31.9 (106)
They require teamwork	14.8 (49)
They require more involvement	13.9 (46)
They are interactive exercises	13.6 (45)
They interest and motivate students	12.3 (41)
They are fun	12.0 (40)

The survey shows that users report reasons for adopting business simulation games because of their "delivery of decision making experience", "Theoretical Application" and their "Integration of several functional areas. The response counts

towards this data were coded and grouped according to the protocol design (See Appendix 10). All of the responses for the 'reasons of first adoption' survey item were analysed to determine those responses that occurred at a level greater than chance. The findings to this question relate to Table 4.10 above while the χ^2 test determined which responses were significantly different (Table 4.11). The null hypothesis of the equality of the response means ($H_o=H_1=H_2\ldots$) is rejected. The χ^2 tests show that "Theoretical application", "integrate different functional areas" , "teamwork", "competition" and "fun" are significant and not due to chance (Table 4.11.)

Table 4.11. Significance testing of Reasons for First Adoption

Test Statistics

	B2Integrate	B2DecisExpe	B2ApplyTheory	B2Teamwrk	B2FUN	B2Compete
Chi-Square (a)	43.373	2.036	25.494	164.928	191.277	226.133
Df	1	1	1	1	1	1
Asymp. Sig.	.000	.154	.000	.000	.000	.000

a 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 166.0.

Research Question:

4. What is the average number of years simulation/game using educators have adopted simulations into their teaching?

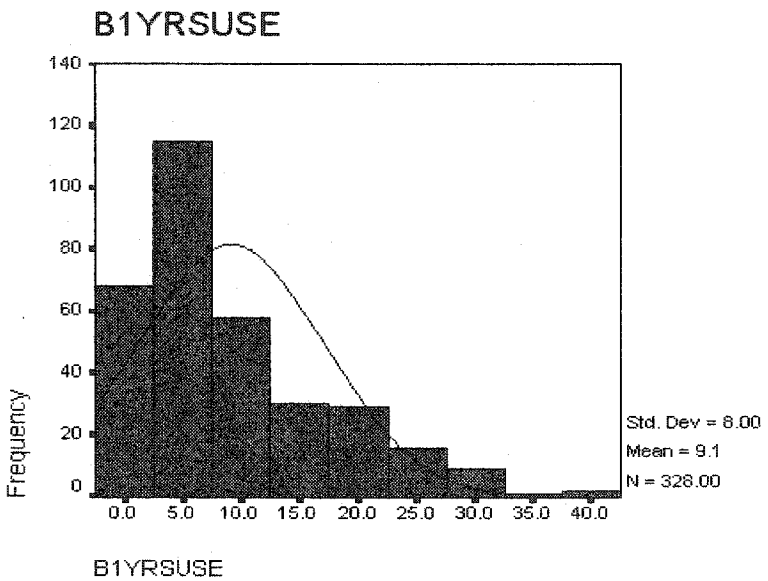
In the user group table 4.12 shows the number of years of usage from the survey question, "For approximately how many years have you been using a business simulation game?" Figure 4.4 shows the data under a normal distribution. The mean usage period was 9.12 years and the mode was 1 year (SD 8.0). The reported range however was 40 years, which skewed the distribution left; otherwise, the data was mesokurtic.

Table 4.12a. Number of Years of Simulation Use (Users)

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean	Std.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
B1YRSUSE	328	40	0	40	9.12	8.002	64.039	1.239	.135	1.048	.268
Valid N (listw	328										

Figure 4.4. Histogram of Users Distribution by Years of Usage



The similar question of, "Over how many years did you use a business game in at least one of the courses that you taught?" was asked to the former user group. Table 4.12b shows the comparison of means between the current user and the former user groups.

Table 4.12b. Number of Years of Simulation Use (Former and Users)

B1YRSUSE

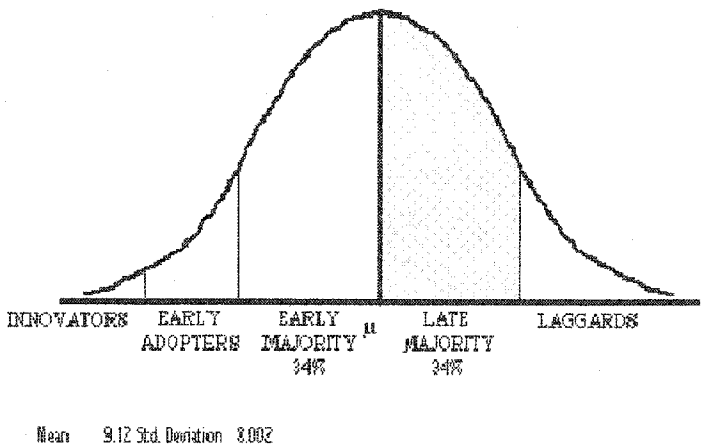
A7CLASSI	Mean	N	Std. Deviation
Users	9.12	328	8.002
Former	5.07	178	4.803
Total	7.69	506	7.301

The distribution of the number of years of simulation game usage was compared between the user and the former. The former users have a mean usage (μ=5 years, S.D.) level less than the user group (μ=9.12, S.D.=8.0). This is elaborated in section C. The next research question was stated as:

5. Is there a significant attitudinal difference between early adopters and the late majority for simulation games in the business education?

The data was for the user group was previously normalized and plotted on a density curve in Figure 4.4 above.

Figure 4.5. Sample Distribution of Simulation Adopters

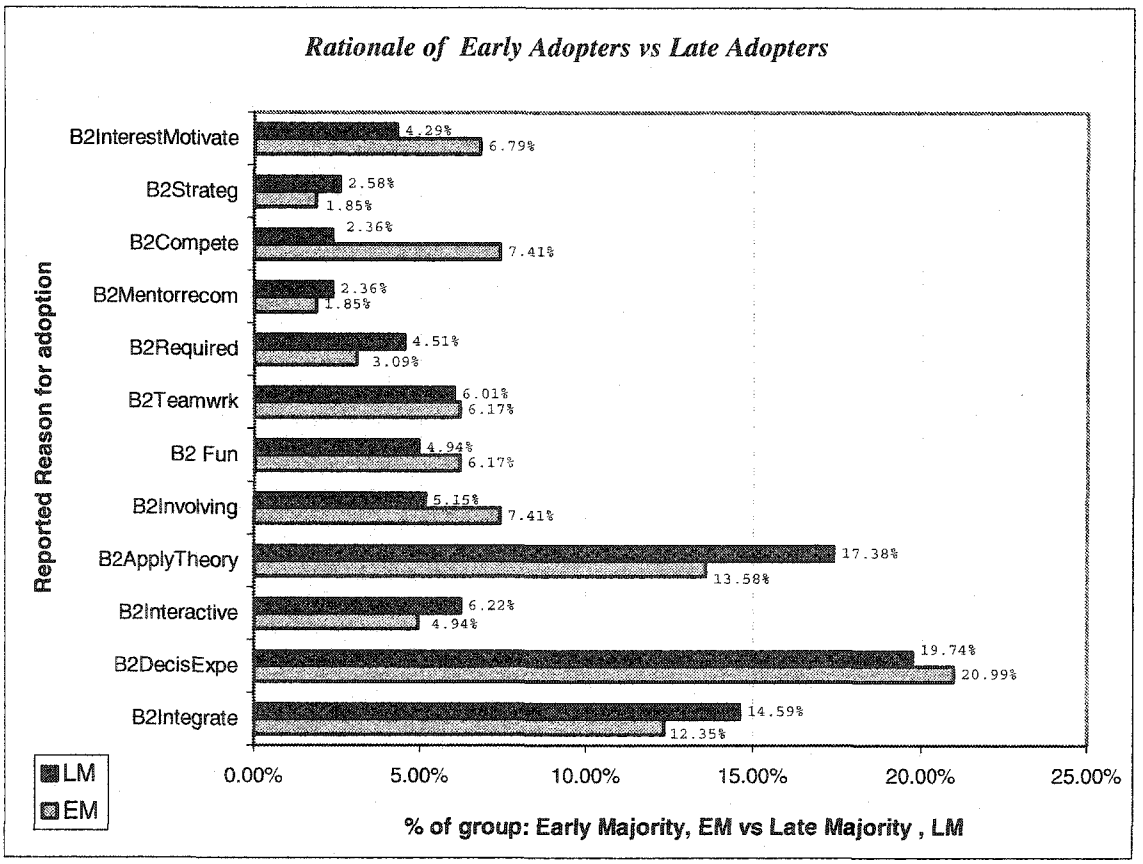


Early adopters were discriminated from the late majority (Rogers 1976) as defined by Porter's model of the Technology Adoption Life Cycle (Burgelman, Maidique and Wheelwright, 2002; p 267). The split defined the early majority group as being in the second quartile of the number of years a user has been using simulations. The Late Majority group was hence the third quartile representing the density one standard deviation (σ = 8.002) from the mean, (μ = 9.12). The density curve was used to represent the late majority as those who have been using simulations between 1 to 9 years. This

translated to the early majority, being those users who have been using simulations between 10 years and 17 years. (Figure 4.5 above).

The survey question asked "Can you identify the two, three or four most important reasons why you first adopted a business simulation game to be used in one of your courses?" This survey item allowed for multiple responses. It was acknowledged that this survey item collected multiple responses and the frequencies of the responses were weighted accordingly. Multiple responses are defined by the degree of open-endedness. In particular, a question in a survey may receive zero or more answers depending on the characteristics or behaviour of the respondent.

Figure 4.6. Late Majority and Early Majority Adoption of Simulations



**The significant reasons reported were Compete, Teamwork, Fun, Apply Theory and Integrate. (p<0.50)*

The top reason for first adoption reported by simulation users of the late majority group, was the "the decision making experience". Similar reasons were given by the early majority (those educators who have been using games between 9 and 17 years). Other similarities were the reasons of "Integration of lectures/course material," "Application of theory," "Teamwork" and "Fun". The major differences between the groups are that early majority adopters identified "Competitive qualities" and "motivational" as reasons of first adopting. On the other hand, the late majority (adopted in the last eight years) reported "Interactive" and a wider range of answers including "web capabilities". Nevertheless, there were significant differences between the late and early majority groups. See Appendix 13.

Switching

The next research question was phrased as:

What are the significant reasons for users of simulations to switch to different titles?

Table 4.13. User Switching

(a) *Have you ever switched from one simulation game to another?*

Yes 48.0% N=158 **No** 52.0% N=171

(b) *What were the reasons that caused you to switch to the new game?*

	% (N)
New simulation was easier to use	11.1 (37)
New Simulation was better	9.0 (30)
To add complexity to the simulation exercise	8.1 (27)
The new game was on the "Web"	5.7 (19)
I was seeking some variety	5.4 (18)
The old game was obsolete	5.4 (18)
The new game had better technical support	5.1 (17)
The course curriculum was changed	3.9 (13)
There was a change in learning objectives for the course	3.6 (12)
The old game exhibited poor technical performance	3.6 (12)
Disappointed with academic performance of old simulation	3.0 (10)

Switching was reported to be mainly for improvement of deficiencies in the currently used title (Table 4.13). The reasons for switching titles most reported were

answers related to the new title being "better" or "improved" with greater complexity. Variations of answers to this item ranged from, better graphical interface, DOS to Windows, variety seeking, increased complexity, or web/Internet driven.

SECTION C: SIMULATION FORMER USERS

Research Question:

7. What reasons do former users report for ceasing to use business simulation games?

The open ended survey questions, "Why did you stop using business games?" and "For approximately how many years have you been using a simulation game" (users) or "did you use a simulation game (former users)?" (See Appendix 7) were coded through the content analysis protocol (see p.45) to yield thematic and conceptually similar answers presented in Tables 4.14 and 4.15.

Table 4.14. Former Users Reasons for Stopping Usage

Why did you stop using business games?

	% (N)
Change in teaching assignment	32.8 (61)
Time they took versus learning benefits achieved	28.0 (52)
Simulation models were not very good	11.8 (22)
Curriculum was changed	8.1 (15)
The software was to complex	8.1 (15)
Students did not like them	8.1 (15)
The game became obsolete	7.0 (13)
I moved to a new school that did not use them	5.9 (11)
I had administrative problems in using them	5.4 (10)
I decided that alternative approaches were better	4.3 (8)
My colleagues were not supportive of their use	2.7 (5)

**Total N=187 Former Users*

Table 4.15. User and Former User Details

For approximately how many years have you been using a simulation game (users) or did you use a simulation game (former users)?

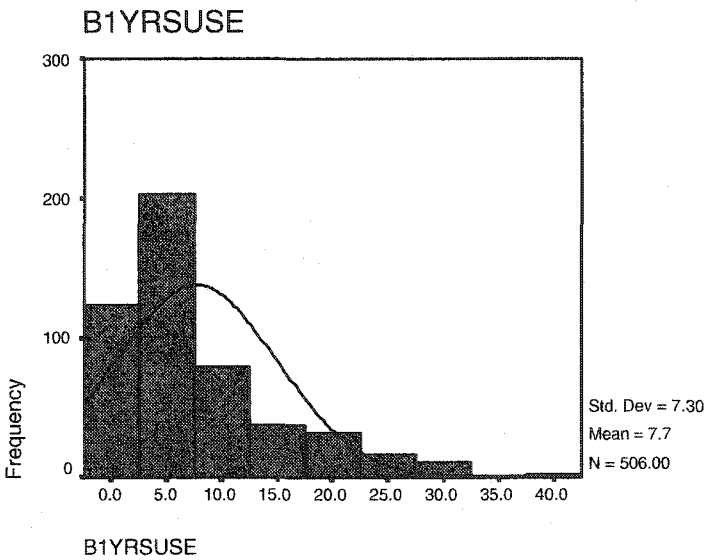
	Users	Former Users
N	328	178
Mean	9.12 years	5.07
S.D.	8.002	4.803
Minimum	0	0
Maximum	40 years	30 years

From the distribution in Table 4.16, Former users when grouped, follow a similar pattern as users. The ANOVA table shows us that there is a significant difference between the two groups with respect to the years of usage.

Table 4.16. Combined Usage of Former and Current Users

Descriptives B1YEARS USAGE

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1. users	328	9.12	8.002	.442	8.25	9.99	0	40
2. former	178	5.07	4.803	.360	4.36	5.78	0	30
Total	506	7.69	7.301	.325	7.06	8.33	0	40



The next research question was stated as:

8. What differences exist between the attitudes reported for simulation adoption of users and former users?

Table 4.17. Reasons for Former Users' First Adoption of Business Simulation*

Survey Question: Could you list the two, three or four most important reasons why you first adopted a business simulation game to use in your class?

	Users % (N)	Former Users % (N)
Provide decision making experience	46.1 (153)	38.7 (72)
Allows for theory application	36.1 (120)	30.1 (56)
Integrate different functional areas	31.9 (106)	22.6 (42)
They require teamwork	14.8 (49)	11.3 (21)
They require more involvement	13.9 (46)	13.4 (25)
They are interactive exercises	13.6 (45)	9.1 (17)
They interest and motivate students	12.3 (41)	10.2 (19)
They are fun	12.0 (40)	5.4 (10)
They are required by the course curriculum	9.0 (30)	7.0 (13)
To expose students to business competition	8.7 (29)	9.1 (17)
Add variety/Make a change to the course	6.0 (20)	5.4 (10)
To have students develop business strategy	5.4 (18)	5.9 (11)
Colleagues/Mentors recommended them	4.2 (14)	3.2 (6)
Easy and Efficient Teaching Exercise	3.3 (11)	1.3 (3)
Better than cases or lectures	3.0 (10)	0.0 (0)
It requires quantitative skill development	2.4 (8)	3.8 (7)

*User Total N=332 *Former User Total N=186

The three most frequent reasons for adopting from the table above were found to be that they 1) provide decision-making experience 2) they allow for theoretical application and 3) integrate different functional areas (Table 4.17 above). However, in figure 4.18, the three most reported reasons for first adoption were tested for significance along with the others reasons using the Chi-Squared test.

Table 4.18a. Reasons for First adoption (Former Users)

Test Statistics

	2Played sstudent	2Authorec	2Compu eLiteracy	2Quant	2Variet Change	2Easef cient	2ControlDe	2GLOBA	2Teamwt	2Require	2Mento recom	2Competi	2Strate	2Interes Motivate
Chi-Sqa	74.194	182.022	170.344	59.054	48.151	74.194	178.086	182.022	111.484	137.634	62.774	124.215	44.602	17.763
df	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Asymp.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

a.0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 93.0.

The chi squared test shows that there was no significant differences as all of the calculated χ^2 values was less than the critical level ($\alpha<0.05$), thus rejecting the null hypothesis $H_0=H_1=H_2=H_{3\ to\ 14}$. The implications of this finding suggest that there is no significant attitudinal difference between the former user groups. Furthermore, similar to the former users the current user group was also found to have no significant differences in attitudes towards adoption other than the reason of "Enhanced Decision making experience" (p=0.154). Due to this fact, no conclusions can be drawn from the data however, the frequencies of the reasons for first adoption by both the users and former users can be observed and a conclusion drawn that 'decision making experience' was the most prominent criteria for first adoption by the user group.

Table 4.18b. Reasons for First adoption (Users)

Test Statistics

	B2Interes Motivate	B2Easeff cient	B2Quantit	B2Compu leLiteracy	B2Played sstudent	B2FUN	B2Teamwr	B2Compet	B2Strated	B2Integrat	B2DecisExp	B2Interactiv	B2ApplyT heory
Chi-Squa[a]	88.253	289.458	300.771	324.048	308.434	191.277	164.928	226.133	263.904	43.373	2.036	176.398	25.494
df	1	1	1	1	1	1	1	1	1	1	1	1	1
Asymp. S	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.154	.000	.000

[a] 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 166.0.

The reasons for first adoption are similar between the users and former users, indicating that there is a collinearity of awareness of the reasons for adoption of business simulations for both groups. The range of answers in their content had subtle differences as seen in table 4.19 below, which elaborates on the reasons reported. The most frequently reported items are that "they give students greater decision making experience", "To allow for theory application", "To have students integrate business concepts" and "To get students more involved".

Table 4.19. Former Users Reasons of Adoption and Re-adoption

Can you identify the most important reasons why you first adopted a business game?

To give students decision making experience	38.7 (72)
To allow for theory application	30.1 (56)
To have students integrate business concepts	22.6 (42)
To get students more involved	13.4 (25)
To encourage teamwork for students	11.3 (21)
To interest/motivate the students	10.2 (19)
To have them experience business competition	9.1 (17)
Because they are interactive exercises	9.1 (17)
They were required by my institution	7.0 (13)
They are good for teaching strategy	5.9 (11)
They are fun	5.4 (10)
To add some variety to the class	5.4 (10)
They require quantitative skills	3.8 (7)
They were recommended by a mentor	3.2 (6)
To encourage computer literacy among my students	2.2 (4)

Are there any circumstances under which you can see yourself once again using a business simulation game in one of your classes?

If a game appropriate to my course came along	28.0 (52)
If I was assigned to a different class	18.3 (34)
Very unlikely	17.2 (32)
Yes	14.5 (27)
If they were made easy to administer	9.7 (18)
If they were less time consuming	5.4 (10)
If there was a curriculum change	2.2 (4)
If there was support from school's administrators	2.2 (4)

Could you briefly explain what would be necessary to get you to use a business game again?

Improve the pedagogy of simulations	21.5 (40)
A change in course assignment	17.7 (33)
Development of appropriate simulation models	17.2 (32)
If they were easier to administer	14.0 (26)
If they were less time consuming	5.9 (11)
Nothing could get me to use them again	5.9 (11)
If funding were available/adequate	4.8 (9)
Updated software systems at my school	3.8 (7)
A personal recommendation	3.8 (7)
A change in curriculum	3.2 (6)
Support from the schools administrators	2.7 (5)

From these findings, it is concluded that the former users' reasons for stoppage are mostly due to the disappointment or unfulfilled expectations. They reported that they would potentially re-adopt a simulation game into their course curricula if either an appropriate title came along, or they were a change in teaching assignment (to one where there was a suitable game title available). The most frequently reported criteria for re-

adoption were, Improve the pedagogy of simulations, "A change in course assignment", "Development of appropriate simulation models" and "If they were easier to administer" implying that the titles which they had previously used were inadequate in those respects. Another conclusion drawn from this information is that there are several unfulfilled gaps where appropriate simulation titles have not been developed. Overall, these results indicate that a large proportion of the former user group would be willing to readopt business simulation games once and appropriate simulation model was available or if the title previously used were made easier to administer.

SECTION D: NON-USERS

Research Question:

9. What reasons do non-adopters report for not using business simulation games in their curricula?

Table 4.20. Non-user Survey

How familiar are with business simulation games?

	%, (N)
Very Familiar	2.0 (11)
Somewhat Familiar	24.5 (138)
Not Very Familiar	41.1 (232)
Not Familiar At All	32.4 (183)

Have you ever consider using a business simulation game in one of your classes?

Yes 40.6% (N=227) **No** 59.4 (332)

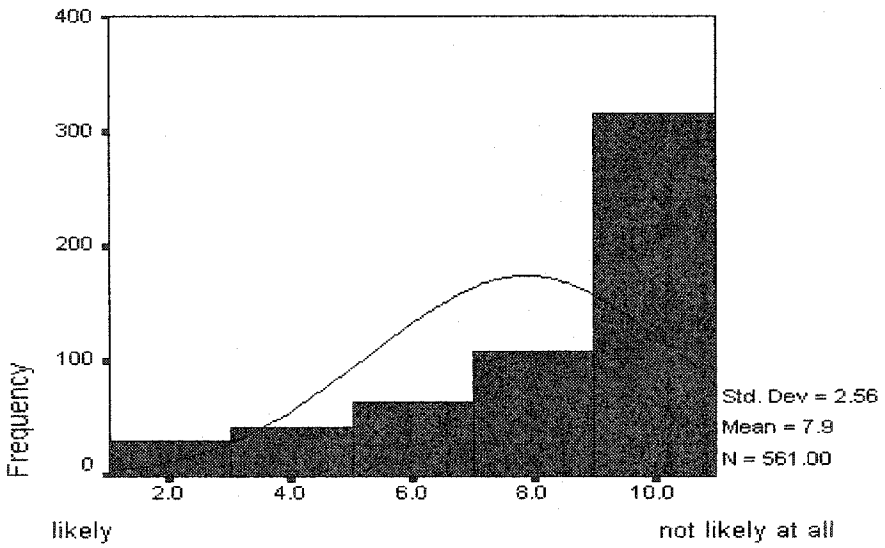
If you have considered using a business simulation game but have not, what has stopped you?

Preparation time	14.3 (81)
Poor fit with the course I teach	13.8 (78)
Lack of information on simulations	12.0 (68)
Prefer alternative pedagogy	8.6 (49)
Time it takes to use simulations	4.8 (27)
Funding	4.4 (25)
Administration issues	3.0 (17)
Technical issues	2.6 (15)

(Also see Table 4.17)

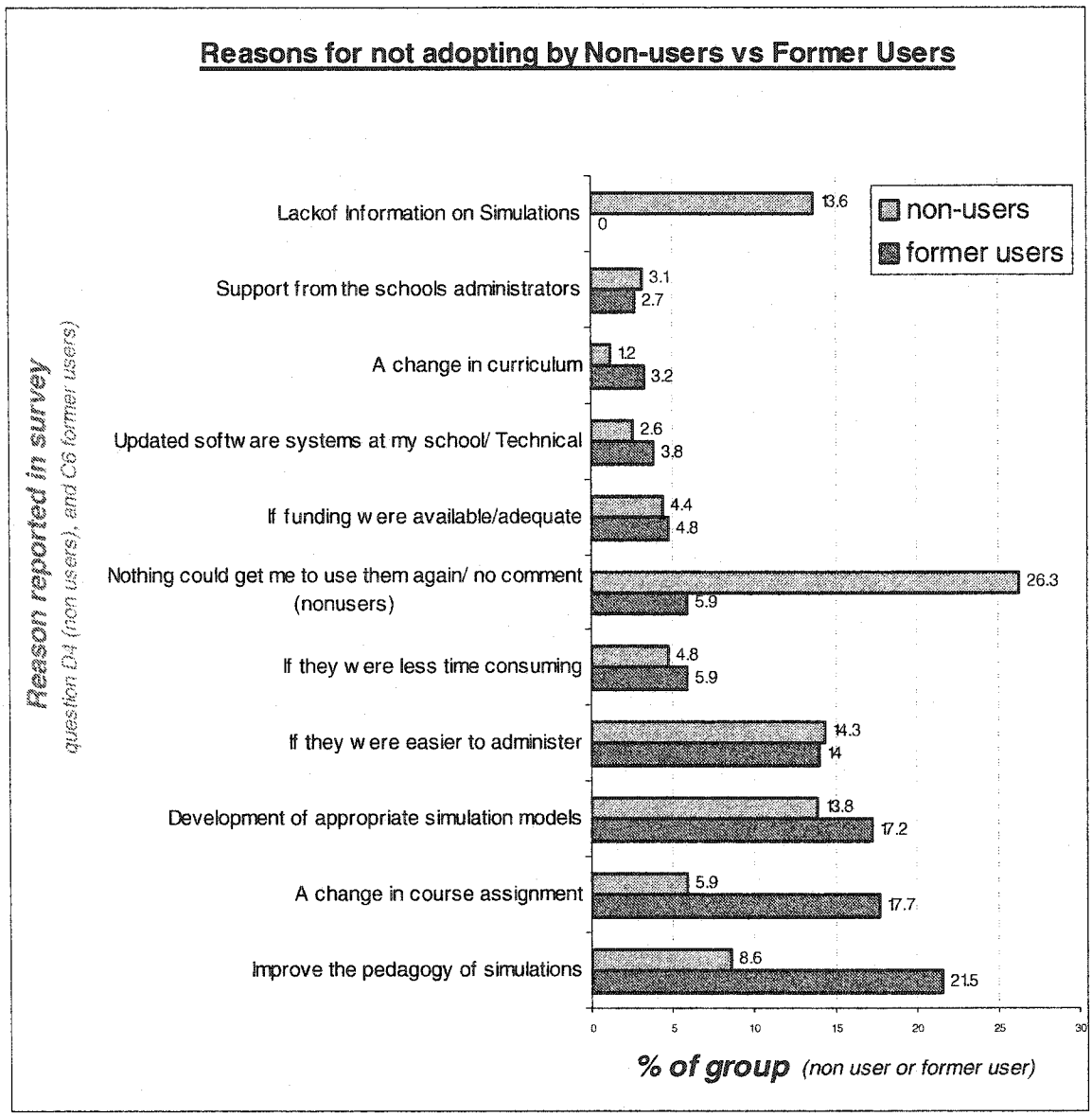
Figure 4.7. Likelihood of Non-adopter using a Simulation in the next 2 years

On a scale of one to ten with one being likely and ten not likely at all, what are the chances you might use a simulation game in the next year or two?



The mean score of 7.89 (S.D. 2.56) on the Likert scale of 1 to 10 indicates that there is a strong tendency for the non-user group not to adopt a simulation in the near future (Figure 4.7 above). In Figure 4.8 below, the reasons reported in survey question D4, "If you have considered using a business simulation game, but have not, what has stopped you?" for the non-user group was compared to the reasons reported in question C8 "Could you briefly explain what would be necessary to get you to use a business game again?" posed to the former user group.

Figure 4.8. Reasons Inhibiting Future Adoption



*Non-Users: Non Adoption Reasons of "Preparation Time", "Funding", "Administrative Difficulties" and "Lack of Information" were significant ($\chi^2 \geq 283.5$, $p>0.05$)

**Former Users: Non-Adoption Reasons of "Change in course", "Time vs. Benefit", "Software too complicated", "administration problems", and "poor simulation Model" were significant ($\chi^2 \geq 283.5$, $p>0.05$)

The reasons given by non-users were tested with a chi square test and are shown in table 4.21 below. They show that the reasons given are significantly different from each other. From the 26.3% reporting of "Nothing could get me to use them" or "no comments" it is apparent that a large part of the non-users have made up their mind not to adopt.

Table 4.21. χ^2-Test of Reasons for Non-adoption

a) Non-users

Test Statistics

	D4PrepTime	D4Lack Info	D4Funding	D4AdminDifficulties
Chi-Square(a)	289.286	327.621	471.409	501.039
df	1	1	1	1
Asymp. Sig.	.000	.000	.000	.000

a 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 283.5.

b) Former users

Test Statistics

	C6CrseChnge	C6TimeVsBenefit	C6ComplexSoftware	C6ProbAdministering	C6PoorModel
Chi-Square(a)	22.022	36.151	130.839	148.151	108.409
df	1	1	1	1	1
Asymp. Sig.	.000	.000	.000	.000	.000

a 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 93.0.

The results showed that the reasons not adopting simulation games given by non-users were due to lack of information (13.6%), ease of administration (14.3%) and the development of appropriate simulation models (13.8%). It should be noted that 26.3% of the non-users had pre determined not to use simulations and had no comments.

In a similar question, "What would be necessary to get you to use a business game again?" former users reported the main factors were: the improvement of the simulation pedagogy (21.5%), a change in course assignment (17.7%), the development of appropriate simulation models (17.2%) and ease of administration (14.3%).

The null hypothesis that the proportion of people reporting the response independent of the group category that they are in, H_o: $O_i=E_i$ was statistically tested. The Ha for the reasons was that H_a: $O_i \neq E_i$, That is, the proportion of the respondents who

report the reason is dependent on the group category user or non-user. For i groups using the formula $\chi^2 = \sum [(O_i - E_i)/ E_i]$, the reporting of the need for " improvement of pedagogy", $\chi^2 = 13.897$ with 1 degree of freedom being greater than the critical value of 3.84 and therefore the null hypothesis that the two groups are equal was rejected. Therefore, this reason was significant. The other significant reasons were "ease of administration"

($\chi^2 = 7.07$) and "change in course assignment" ($\chi^2 = 5.36$). Generally, course changes aside, non-adoption is attributable to administrative difficulties and inadequacies of the current simulation titles.

SECTION E. Communication Channels

The next research question follows the investigation of the reasons for adoption and first contact. The question was posed:

11. How do educators first discover simulations?

Table 4.22. First Awareness of Business Simulation Games

How did you first become aware of business simulation games?

	%, N
I played as a student	28.9 (96)
My colleagues informed me	26.2 (87)
Publisher's informed me	9.6 (32)
It was required by my institution	5.7 (19)
I was exposed to them in corporate settings	5.1 (17)
I became interested in them on my own	4.5 (15)
I learned about them at a conference	4.5 (15)
I read about them in books/journals	3.6 (12)
I do not remember	3.0 (10)
I learned about them from professional association	1.8 (6)

Educators reported that 28.9% played a simulation game as a student and 26.2% were referred to them or informed about them by a colleague. Of interest to publishers,

9.6% reported that they were first made aware through publisher information including direct mail, advertisement and other promotional efforts. Other reports of inheriting simulations through a course or departmental requirements constitute 5.7% of the sample.

The next research question separates the findings to a) which communication channels are used to relay information about simulations? In addition b), what are the channels used for new simulation titles?

12(a) Which channels of communication are used to communicate information about simulations?

Table 4.23. Communication about Simulations

Publisher's Reps Talk Often Talk About Simulations

	Users % (N)	Lap Users %	(N)Nonuser
Yes	22.0 (71)	14.5 (26)	5.4 (30)
No	78.0 (251)	85.5 (153)	94.6 (523)

I have seen an ad for business simulations in last year

	Users % (N)	Lap Users %	(N)Nonuser %
Yes	64.0 (206)	65.9 (118)	37.7 (209)
No	36.0 (116)	34.1 (61)	62.3 (345)

Business simulation games are prominently displayed at Conferences

	Users % (N)	Lap Users %	(N)Nonuser
Yes	31.9 (95)	36.8 (60)	17.0 (88)
No	68.1 (203)	63.2 (103)	83.0 (430)

From the survey data, for users 78% (251/322 users) feel that publisher representatives do not often talk about simulations. In the non-user group, 94.6% feel that representatives never talk about simulations. 64% of users report seeing advertisements for business simulations in the last year where non-users report 37.7%.

68.1% of users feel that business simulation games are not prominently displayed at conferences, and 83.0% of non-users share that sentiment (Table 4.23).

The next research question was stated:

12 (b). What are the channels of communication used to relay information about new business education simulations to academic instructors?"

The survey questions posed to the three groups with their responses are found in Appendix 4a to c. In knowing where to look for information about new simulations, it was found that while the user group was closely split (54.5% would know where and 45.5% do not know), the greater part of the non-user group (76.3%) do not know where to search for information when adopting new simulations. Further to that, a similar pattern was found by current simulation users closely divided in the binary yes-no question of whether colleagues often advocate the use of simulations. That is, Users were split by 41.7% feel that colleagues advocate simulations while 58.3% do not. However, in the non-user group 86.3% feel that their colleagues do not often advocate the use of simulations.

Table 4.24. Information about Simulations

If I wanted to adopt a new simulation I would know where to look for information

	Users % (N=321)	Former Users % (N=180)	Non-user (N=557)
Yes	54.5 (175)	50.6 (91)	23.7 (132)
No	45.5 (146)	49.4 (89)	76.3 (425)

Colleagues Often Advocate the Use of Simulations

	Users %(N)	Former Users %	Non-user %
Yes	41.7 (134)	25.8 (46)	13.7 (76)
No	58.3 (187)	74.2 (132)	86.3 (479)

Table 4.24. Information about Simulations *(Continued)*

I have received direct mail or email on simulations in the last year

	Users % (N)	Former Users % (N)	Non-user
Yes	58.8 (190)	57.5 (103)	33.9 (187)
No	41.2 (133)	42.5 (76)	66.1 (365)

From the survey data, both users and former users are split between knowing where to go for information (Table 4.24). However, in the non-user group there is a significant (p=0.05) portion (76.3%) of educators who do not know where to seek information about new simulations. Further to that, there are a large number of non-users (86.3%) whose colleagues do not promote or advocate the use of simulations to them. This follows suit in the former user group with 74.2% reporting that their colleagues do not advocate simulation use.

Since Users and Former users are equivalent in the fact that both have at one time adopted business simulation games and have experienced the transmission of simulation game information, they were grouped together. As shown in Table 4.25 below, Users and Former-users were grouped together by responses to the item "When searching for new simulation games, where do you look?" The reporting of receiving direct mail, or email, was 58.8% among the users and 57.5% among the former users. Conversely, 66.1% (365/552) teachers from the non-usage group reported not receiving direct mail or email information. A cursory analysis distinguishing differences between the two groups was not undertaken in this thesis. Generally, when searching for new simulation games Business educators look on the web, contact publishers, or hear from colleagues. Half of the Former users and the Current users know where to look for new titles. Conversely, almost three quarters of the Non-users do not know where to look. Another important observation is that both former users and non-users both report a greater than 70%

occurrence that their colleagues do not often advocate the use of simulations. Finally, while both users and former users report a low incidence of receiving 'direct mail or email about simulation games in the last year', non-users report 66.1% that they did not receive any such communication.

Table 4.25. Simulation Search

When searching for new simulation games, where do you look?

On the web	31.6 (105)
Contact publishers	28.3 (94)
Talk to colleagues	16.9 (56)
I am not looking	15.1 (50)
I look at conferences	9.6 (32)
I look at books	6.6 (22)
I contact my professional association	6.3 (21)
I write my own	3.9 (13)
Other	3.6 (12)
I do not know	0.9 (3)

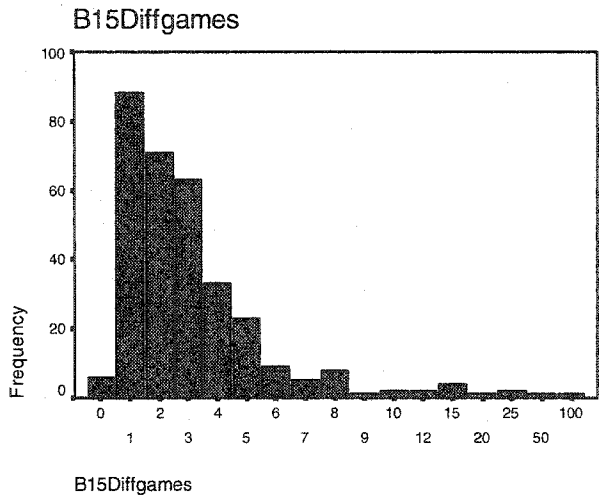
From the survey, educators, top responses to seeking information about new titles through the internet/ web, contacting publishers, or talking to colleagues.

Table 4.26. Breadth of Usage of Different Simulation Titles

How many different simulation games have you used over the years?

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
B15Diffgames	320	100	0	100	3.60	6.764	45.752
Valid N (listwise)	320						

Table 4.26. Breadth of Usage of Different Simulation Titles (Continued)



From the survey data, adopters on average have tried 3 to 4 games on average. The range of response to this question is between 1 and 25 titles except for a few individuals who have used more than 25 business simulation games.

SECTION F. CURRENTLY USED BUSINESS SIMULATIONS

Research Question:

11 . What are the prominent business simulation applications?

Table 4.27. Reported Simulation Titles

Please name the business simulation games you are currently using (users) or games that you are familiar with (nonusers).

	Users	Nonusers
Capstone	10.8 (36)	0.9 (5)
Business Strategy Game	9.9 (32)	0.5 (3)
Markstrat	8.1 (27)	7.6 (43)
CapSim	6.9 (23)	0.9 (5)
Beer	4.5 (15)	1.6 (9)
Business Policy Game	3.9 (13)	0.5 (3)
Marketing Game	3.6 (12)	0.9 (5)
Brandmaps	3.0 (10)	0.4 (2)
Compete	2.4 (8)	0.5 (3)
Threshold	1.8 (6)	0.2 (1)
Intopia	1.5 (5)	1.6 (9)

Table 4.27. Reported Simulation Titles (Continued)

Mike's Bikes	1.5 (5)	0.5 (3)
Pharmasim	1.5 (5)	0.7 (4)
Prosim	1.5 (5)	0.2 (1)
Airline	1.2 (4)	1.2 (7)
Marketplace	0.9 (3)	0.4 (2)
Micromatic	0.9 (3)	0.2 (1)
Business Game	0.3 (1)	0.0 (0)
Don't Know	0.6 (2)	6.2 (35)
Other	45.5 (151)	12.5 (71)

There is a wide range of simulation game titles representative of every discipline in Business. Titles which were proprietary or reported less than 0.1 percent were grouped into the 'Other' category.

Table 4.28. Reasons for Current Usage of Simulation Title

What are the primary reasons for using this business simulation game or games?

	Users % (N)
It is appropriate for the course I teach	28.0 (93)
It is an integrative simulation	22.0 (73)
It is the best simulation model	21.7 (72)
It is easy to administer	18.7 (62)
The simulation has good support	11.7 (39)
I am familiar/experienced with this simulation	8.7 (29)
It is a web based simulation	7.8 (26)
It is an interactive/dynamic simulation	6.3 (21)
It is interesting/motivating for the students	5.7 (19)
It is required by the institution	4.8 (16)
It is a fun simulation	4.5 (15)
It is an international simulation	4.2 (14)
It involves dynamic competition	3.3 (11)
It is not to expensive	3.3 (11)
I authored it	2.7 (9)
A Colleague recommended it	2.4 (8)

Consistent with the afore mentioned survey item of first adoption, the reasons reported here were almost identical. Most frequent of these are "Appropriateness", "Integrative", "It is the best simulation", "It is the best simulation model", "It is easy to administer", and "It has good support."

The most prominent business simulation games as reported in the random sample population were Capstone, Markstrat, The Business Strategy game, Compete and many

others. Because of the open-ended nature of this question and the capacity for multiple game listings in answer to the question "Please name the business simulation games you are currently using (users) or games that you are familiar with (nonusers)", no inferential statistical analysis was undertaken. The title findings and the percentage of incidence are reported above in table 4.27 while the reasons for using the games are listed in table 4.28. Because of the exploratory nature of this question, the design of the data collection preserved confidentiality while gathering multiple responses for the game titles. Due to this, the researchers were not able to rank the titles in their usage from the survey data. However, the researchers were able to report a spectrum of titles in current use and the reasons educators are using the adopted title. In future studies, one can correlate the reasons with the titles. Overall, the researchers found that there is a wide breadth of titles, mostly in the marketing and strategy arena. Respondents choose games which are suitable for their class (28%), integrative (22%), easy to administer (18.7%) and have relatively good support (11.7%). A graphic depiction of titles is found in Figure 5.5 on page 97.

CHAPTER V

SUMMARY, CONCLUSIONS and DISCUSSION

This study was conceived to investigate the current state of business simulation usage in academic education in an exploratory research endeavor. The primary purpose was to discover what differences exist between adopters of business education simulations, non-users and former users. The second utility of the research was to find which modes of communication are used to disseminate information about new simulations. Thirdly, the researchers wanted to find out which simulations were reported to be commonly used and explore the reasons why users adopt them.

The survey was conducted over the course of three months, inviting 14,497 business faculty educators from ABSEL, ISAGA and AACSB member Universities and Colleges around the world to participate in the Simulation Games web-survey resulting in 1085 survey respondents. These respondents were categorized into 1) current business (30.5%) simulation users 2) non- users (17.3%) and 3) former users (52.2%). To preserve anonymity and confidentiality no identifying factors were recorded in the survey. The typical respondent profile in the sample was fulltime professors who have been teaching for 0 to 13 years having MBA, Ph.D. and D.B.A. degrees with 5 to 15 years work experience. Respondents across the three groups primarily represented the disciplines of Management, Marketing, Policy, and Management Science.

Conclusions

1. The number of years of fulltime non-academic business/work experience has no relationship to the adoption of Business simulation games.
2. The number of years teaching experience has a correlation with adoption of Business Simulation games.
3. Demographic factors including rank; discipline and highest degree have no relationship with one's adoption of simulation.
4. There are significant attitudinal differences between early adopters and late adopters.
5. Simulation Switching is mainly for the purpose of finding a better simulation.
6. Former simulation users have no significant differences from users in attitudes towards adoption.
7. Former users have different reasons than Non-users for stopping the use of business simulation games.
8. Business Simulation Game information transfer occurs primarily through colleagues and word of mouth.
9. Publishers and Marketers of Business game titles need to begin a push strategy to a) promote news at conferences b) begin direct communication through sales reps c) initiate direct email and mail campaigns and d) target advertisement to both non-users and experienced users.
10. There are many Business disciplines which have none or inadequate simulation games.

The conclusions above are those based around statistical evidence from the survey sample. There are more observations of a general nature that are made in this section. From the data, it was found that the significant demographic factors, years teaching and years business experience have no relationship to one's adoption to simulations. This aside, it was found that users and former users have no significant demographic or attitudinal characteristics that can discriminate between them. However, non-users reported to have differences in attitude and awareness that characterized them. For all the groups (users, former users and non-users), it was reported that, the primary advantages and reasons for adopting simulation games into the course curricula were that they "Provided experiential learning", "Decision making experience", "Integrated different functional area", "Allow for theoretical application", "enhance teamwork," and "provide realism". The number of years in which a user or former user has had teaching experience seems to correlate to their reported reason of advantages for using a simulation. The mean number of years usage of a simulation for the user group was 9 years. By using this mean to discriminate late adopters and early adopters according to Rogers' model of adoption, the researchers compared the two groups of users. The researchers found that there were very similar attitudes and there were no significant differences between late and early adoption.

The next section of the research focused on the reason for non-use or cessation of simulation usage. The prime reason for cessation of simulation usage, reported by former users, were concerns of "preparation time", "inappropriateness to class", and "lack of

information. Of the non-user group, 73.5% were not familiar with business simulation games.

The former users, were very similar in attitudinal responses to the user group, nevertheless, they reported deficits in the application functioning to be the prime reason of ceasing usage (aside from placement changes). However, former users did report that they would be inclined to re-adopt if the pedagogy of simulations improved.

Lastly, the communication channels and the currently used simulation game titles were analyzed. It was reported that there is inadequate communication through advertisements, publisher representatives, and conference presence. In addition, word of mouth through colleagues seems to be the modus operand for simulation adoption. There was a large range of titles representative of every business discipline reported.

There is ample current research about specific simulations and their environment. However, there is insufficient research reflecting the global scope of business game usage. To contribute to the current understanding of how many teachers are using simulations, the survey was undertaken to determine the number of business game users in academia.

Summary and Implication of the Findings

The survey results indicate that business game usage has proliferated and is still gaining acceptance and adoption globally. The survey of business academic educators indicates that business games are in use in most academic organizations worldwide. Approximately 30% out of all those surveyed are current game users. Surprisingly an

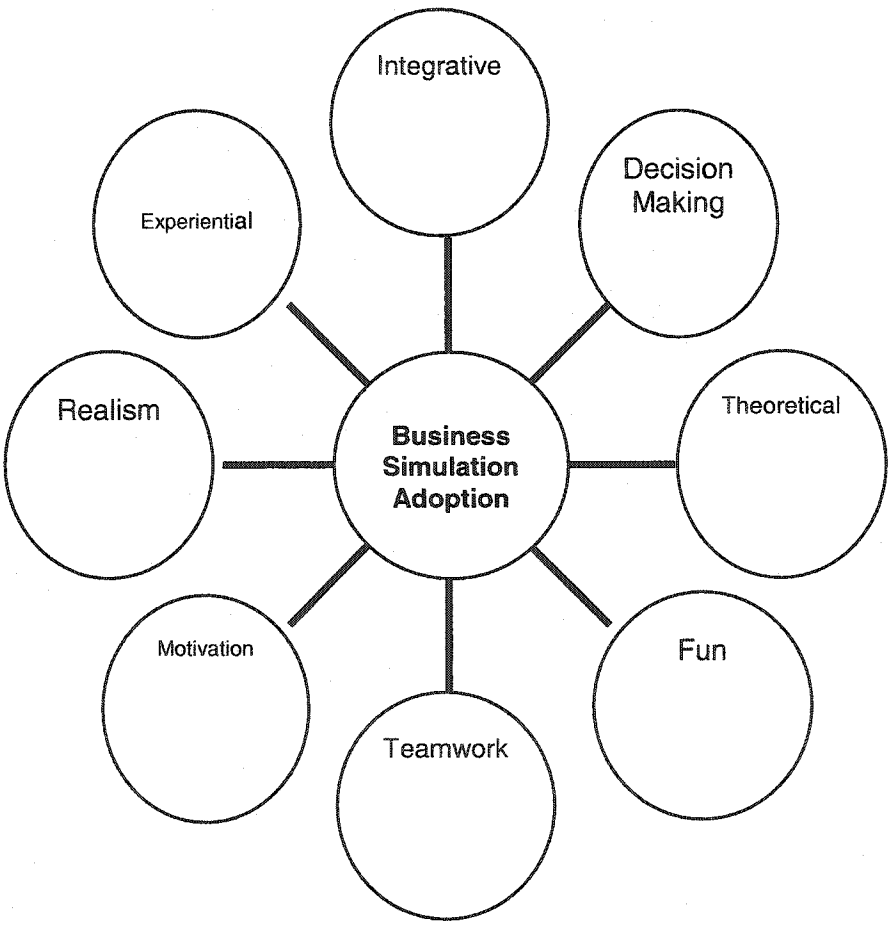
overwhelming 52% of those surveyed have chosen not to use simulations for the reasons depicted in the findings section of this thesis.

This result both validates the current survey findings and indicates that business game usage has increased in business faculties. Nevertheless, in comparison to recent growth in the spread of adoption it has slowed down in growth in comparison to the growth rate from 1987 to 1993. Further results from the survey indicate that business games are being used in approximately 12 unique courses in each of the disciplines of business. Simulation usage is highest in the business management and marketing areas. The comparison of adoption in which business games are being used is consistent with the findings reported by Biggs (1979) and updated by Faria (1990). Faria's 1990 survey of business school instructors indicated that 16.9 percent of those responding are currently simulation game users this has increased according to the survey to 30.6%. Projecting this percentage of growth shows that it has almost doubled since 1987 (Faria, 1990).

It was surprising that the number of former users was as high as 17.23% (187/1085), which may indicate that the growth pace of the number of titles is not keeping up with a) the demands of the students and instructors b) laggard in comparison with modern technology (i.e. dos based game in a graphical and internet driven environment) c) does not meet the teaching objectives (as measured by question 14) and d) quantity of simulation products is unregulated in terms of standards or as teaching tools. This subject need further discussion and research as well as governing association involvement to form a regulating and a licensing body for what is deemed an effectively good simulation title.

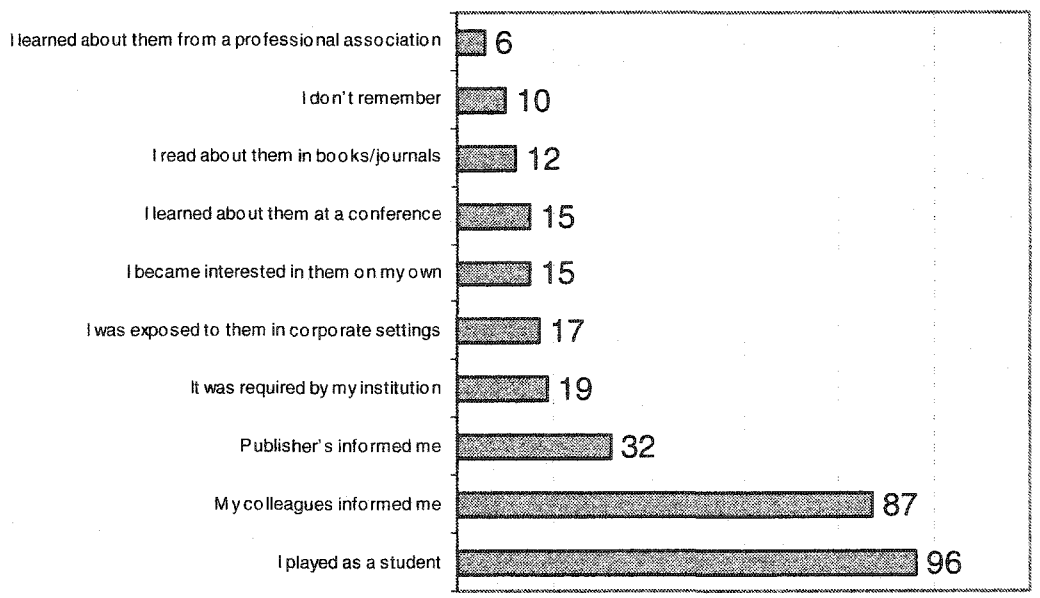
Another element that was uncovered is the course grading weight allocated to simulation gaming. The findings were that those users who implement simulations into their course devote a mean grading weight of 30.89% while former users 25.94%. This indicates that a simulation may be considered as important to the constituency of the course as the final exams or major projects.

Diagram 4: Reasons and Advantages of Simulation Adoption



Reasons and attitudes for simulation adoption for both the new and the experienced game administrator had a wide variety of reasons and ideas. The most prominent for newbies, the reasons one first adopted are depicted in Diagram 4. This is parallel to the reasons instructors choose a title and the advantages of simulations. It is important to note that 9% of users and 7 % of former users were required to use game simulations as course curriculum or department mandate. It would be interesting to collect information about their feelings towards usage. Further to that, it is supported that the division of lectures, cases, and business games was divided with simulation gaming component representing 30% of the final grade (Standard Deviation=10). It was also found that the main reason for first adoption was that they played a simulation game as a student or through word of mouth from a colleague.

Fig 5.1. Reasons for First Adoption by Users



**Numbers indicate respondent counts from the user group (N=564)*

The reasons given were identified as significant reasons reported for advantage. Theoretical application was found to be a significant reason reported as an advantage for the students and teachers. No direct research has been conducted on how game players deal with the generally abstract nature of a simulation or how they relate to the abstract theory employed in the games. A face validity study by Wolfe and Jackson (1989) found that game players felt the relatively concrete or mechanistic production function in The Business Management Laboratory (BML) was more realistic than its more abstract demand function, although "admittedly it is both more difficult to model an oligopolist's demand function or to detect if it is not modeled correctly". Business simulations' strength reported by the educators in this survey is that they provide good application of theory and this finding verifies the existing research.

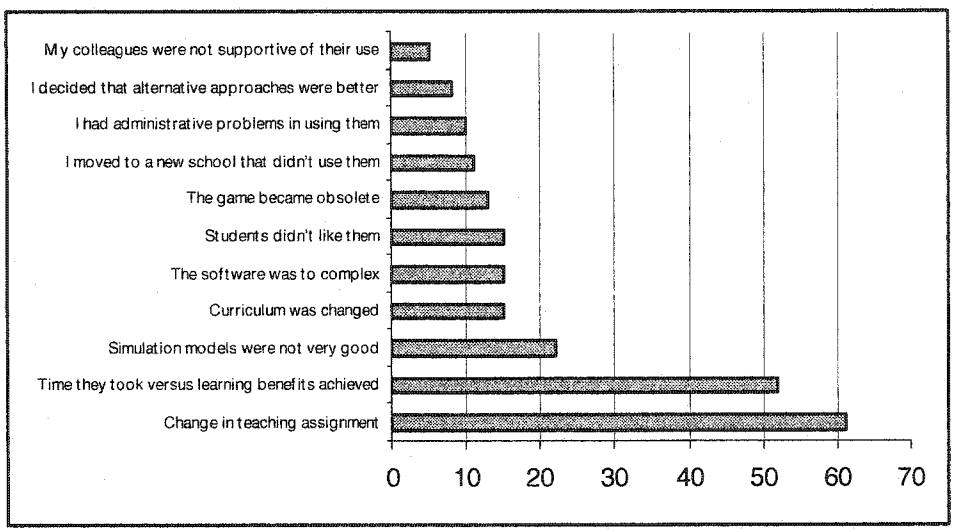
Experiential learning is the concept most strongly related to adoption of business simulation games. In business simulation games, educators should advocate, "The conduct of the learning experience involves maintaining and controlling the design. It will include such actions as altering the original timetable and activities and acting to sustain a favourable learning environment" (Wolfe and Byrne 1975). This should be a guiding principle for game usage in class curricula. The survey of this thesis verifies experiential learning as being the prominent reason for adopting coincides with principles for associations such as ABSEL (Appendix 6).

The findings from the research questions regarding the reasons for adoption are congruent with those discussed in the literature review and validate the work of prior researchers and this work. In conclusion, the findings from this survey are in line with other investigators and the purposes of simulations remain the same and valid.

Former Usage and Non-Usage

Several factors identified in this study influence professors' decisions to cease use of simulation games in their classroom. Figure 5.2 below is a summary of the highest occurring reasons from the former group.

Figure 5.2. Reasons for Former Usage (numbers of respondents*)



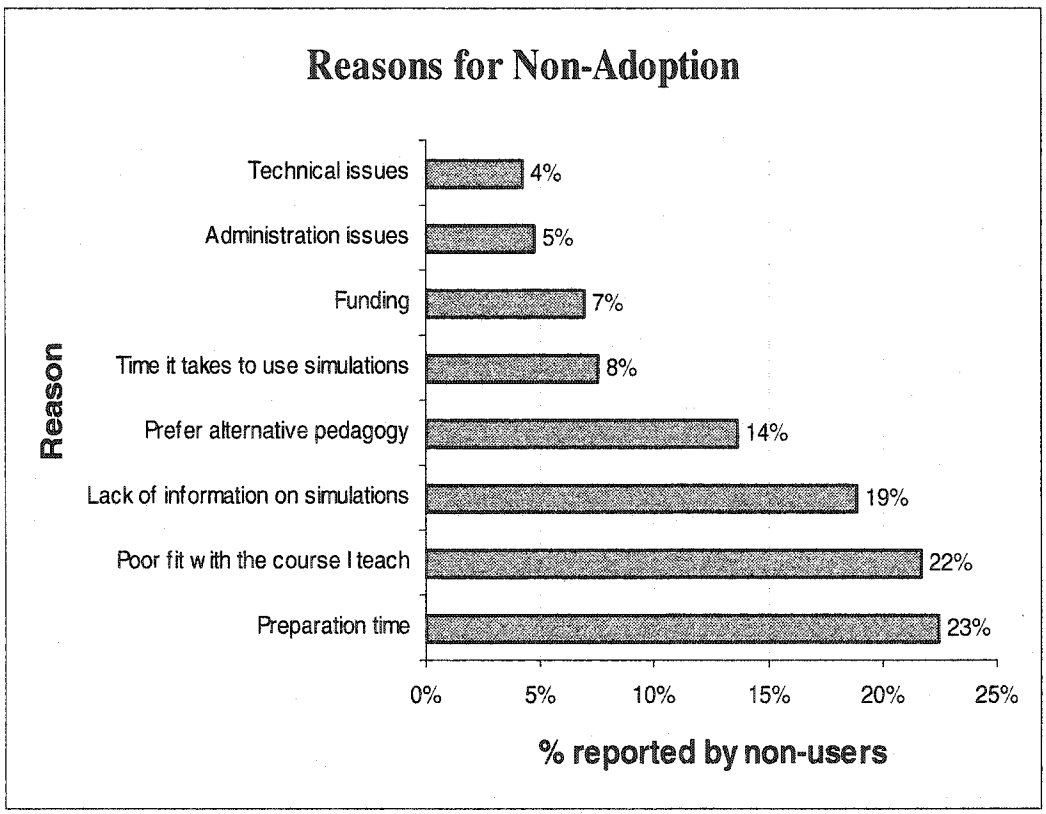
**Numbers indicate respondent counts from the former user group (N=187)*

Foremost it is noted that the most prominent reason for cessation of usage is the relocation, which included termination or role change. Because this is not a fault of the simulation, the reason of relocation was excluded as being of importance to this finding. However, the second two reasons are of significant importance to both simulation developers and this research as they indicate problems inherent in the simulations on a whole. Excluding responses such as department-lacked support, moved to new school or curriculum changes, the main reason for ceasing to use a simulation was an unsatisfactory condition with the simulation. This includes, that the simulation may be outdated (i.e. old

technology), or that the simulation models were inadequate, perhaps too simple on several platforms, or else not dynamic enough.

After examining the reasons for non-usage, a finer analysis involves the reasoning behind non-usage of an educator who has considered using simulations. Figure 5.3 below, shows the top findings.

Figure 5.3. Reasons for Non Adoption of Simulation (number of responses)*

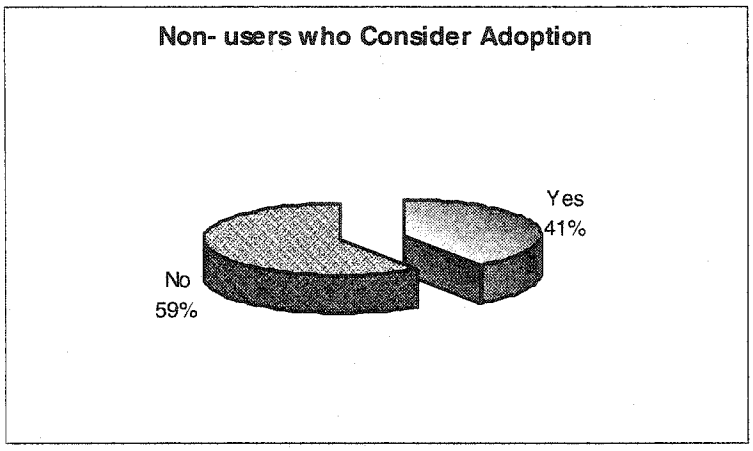


**Numbers indicate respondent counts from the non- user group (N=564)*

In the view of the non-using educators, it is clear there are several niches in which simulations are inappropriate. This indicates a number of areas in which applications can be designed because of their non-existence in that subject area or the inadequacy of the

titles currently available. Also, it seems that these gaps can not only be filled but are also supported by the non users group, 41% of whom responded yes as willing to adopt in the near future. Figure 5.4. This indicates a supportive willingness of non-users of potentially adopting in the near future.

Figure 5.4. Non-Users considering Adoption



The above findings that 41% of non-users have considered and 59% have not considered in combination with the fact that 41% of this group reported to have no familiarity with simulations indicates that there is a large group of university educators who are potential adopters in the near future.

The next item concerns the way that the message and communication channels about new simulation information are used. This survey study found conclusively that publishers are making an inadequate attempt to promote simulation titles. A push strategy depicted in Diagram 5 (below) is recommended in order to advance the state of simulations and the usage in academic education.

Diagram 5. Recommendations for increasing Simulation Awareness

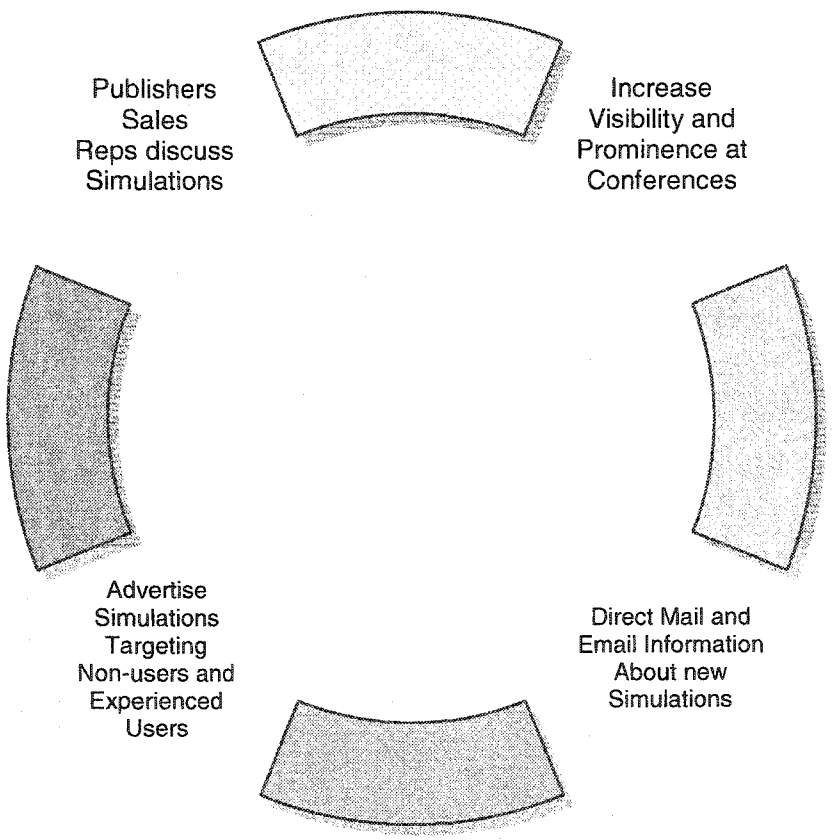
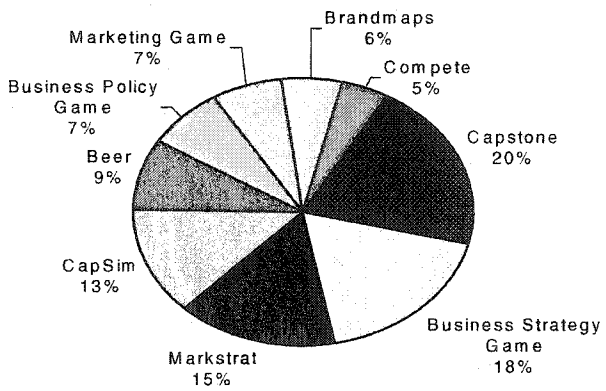


Figure 5.5. Currently used Simulation Titles



The survey data indicates that Capstone is the most commonly used title because it received the most responses. It should be noted that multiple responses were allowed in this survey but for future studies, the design should be modified perhaps to make the top titles available for selection in response the survey items concerning simulation title reporting. Capstone is a good example of an ideal educational simulation. Investigation into its runtime shows that it has all of the main characteristics that educators feel are advantages or reasons for adopting a simulation game. However, Capstone is a general business simulation and not specific to a niche discipline, such as marketing. A simulation game such as Compete for upper level Marketing classes or Intopia for International management classes are more targeted to the educational needs of their respective disciplines and may have a higher percentage in that specific area but be a small percentage in with respect to the entire survey sample. Further research can be explored into the other titles to investigate the possession of the qualities of a simulation that are deemed critical for adoption by the educators in the survey.

Discussion

Over 50 years have passed since the advent of the first business simulation games. At the first stage of the teaching innovations new simulations developed slowly between 1-2 yearly, (Faria 1987). This has increased rapidly over the last half century now yielding dozens of new titles yearly in a multitude of educational arenas from academic science and business education to a vital training tool of the learning enterprise of today. Accompanying the simulation development is the acceptance and heightened awareness of the potentials of implementing simulations into learning. There is much research in this area as simulations diverge into new arenas and as many papers and journal articles concerning simulations in education have been published. There has been little exploratory research about the current state involving educators globally.

Adoption

In this thesis, the original research question posed was "at what stage of simulation game adoption are academic educators?" The answer judging from the collected data is that simulation usage in business education is in the late majority stage. This conclusion includes former users and non-users. Since the frequency of current simulation using adopters was 31%, the adoption stage of business educators is placed into that of the late majority (see pg 65). This late majority group has only recently adopted and has been using business simulation games in their class curricula between one to nine years. These educators are 'pessimistic about their ability to gain any value from technology investments and undertake them only under duress- typically because the remaining alternative is to let the rest of the world pass them by (Burgelman,

Maidique and Wheelwright 2002). These conservatives represent an untapped opportunity for simulation marketers while serving challenge to simulation vendors. The key to winning the business of this group of educators for profit is to simplify and develop the simulation games to the point where they work well and are educationally effective.

Concluding Remarks and Recommendations

Simulation games in their wide spectrum of sophistication and advancement; ranging in their efficacy towards education, are very effective tools for learning, be it academic, primary school or organizational. Applications should be developed with a clear definition of what learning priorities and measurements will be necessary for this application to become an effective educational simulation. Many concerns about the profile of the simulation-using teacher and non-using teacher have been uncovered and proven false. One such issue is that the number of years business experience would have a positive relationship with the adoption of simulation games. The logic behind this issue is that since simulations reinforce 'real life', experiential learning, then an educator who has been in the real world for longer will be more inclined to use simulations in their teaching. However, the survey results show this to be false and that there is no relationship between the work experience and adoption. Another issue is that many educators would adopt simulation games in a curiosity of novel teaching methods. It was found in the survey collection of reasons for adopting that there was an insignificantly low reporting of reasons with this rational. The next fallacy about business simulation non-users was that non-users were generally ignorant or ill informed about the

advantages and benefits of educational simulations. This was also dismissed by the findings that the non-users reported similar reasons for the benefits of games that were reported by the other two groups. This indicated that the non-user group was indeed aware of the benefits and advantages for both the students and teachers. Lastly, it is clear in the study that the reason for non-adoption of game titles is due to deficits in many disciplines. Either titles are not catering to the discipline or there is inadequacy of a simulation game for that area. The reasons the researchers have found for adoption of simulation games reinforces the findings of similar surveys discussed in the literature review.

Business simulation games should not be the only teaching method. They are of not effective if they do not integrate classroom lectures, exams, and evaluation methods. Although winning is important in any games, students should be constantly reminded that the primary objective of playing the simulation game is learning. In fact, the loser of the game has learned more since they gain lessons from the outcomes of the game. Well-developed simulation games should be included and incorporated into class discussions and lectures. If not, students may view simulation games as non-caring time-fillers by the teachers thus treating them as irrelevant. Accordingly, students should be given an outline of the theoretical subject before playing the simulation game and a debriefing of the problems and learning throughout the course of the game, and not only at the beginning or end.

In academia, there should be the introduction of these simulations into the undergraduate classrooms so that students are introduced to the problems faced in the "real" world. This means not only for the environment but also for all the other streams

of study. The output of any university and college is its graduating students. Those students who have a more holistic education that incorporates real world and current experiential learning will be a better recruitment to the hiring organization and thus making the academic college one of a higher stature than those institutions who do not expose their students to reality through simulation games. The utilization of Business Simulations whether for educational or organizational learning is an asset both for the quality and reality of training providing and its resource savings. In academics, the educators who have gained from the benefits of these educational games should spread the word to colleagues. Simulations should continue to be developed, deployed, and supported whether it is in the classroom, online, in the learning corporation, or for academic research.

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Appendix 1. Simulation Web Survey Response invitation

The following letter was the initial email letter to our mailing group of 14796 inviting them to participate in the survey.

Bill Wellington
A. J. Faria
Department of Marketing
Odette School of Business
University of Windsor
Windsor, Ontario N9B 3P4

February 10, 2003

Dear Professor,

We are undertaking a survey of current business simulation game usage. We would like to get some feedback from current game users, past users, and nonusers. The results of our survey will be presented to the Association for Business Simulation and Experiential Learning and later published in the Journal of Simulation and Gaming. These findings will update materials presented at this conference ten and twenty years ago. We would truly appreciate your time to complete the following questionnaire. In addition to yourself, if you have other colleagues who you think might have an interest in this survey, please feel free to forward this email on to them.

First of all, we would like to gather some non-identifiable classification information about you. Following this, we would like to determine whether you are a current simulation game user, a past user who has stopped using business games, or someone who has never used a business simulation game. This classification will determine which questionnaire you are directed to. If you have any questions of us, or if you would rather receive and fill out a hard copy of this survey questionnaire, please contact either:

Dr. A. J. Faria (ad9@uwindsor.ca)
Telephone: (519)253-3000, ext. 3101
Fax: (519)973-7073

Dr. Bill Wellington (r87@uwindsor.ca)
Telephone: (519)253-3000, ext. 3151
Fax: (519)973-7073

Now, if you consent to taking part in this study and we could have a few minutes of your time, please proceed to the next page, the classification information using the link below. You will be asked to enter a user i.d. and a password which are: user name = "games" and password = "simulation". These will not be identified with you at all. This process is necessary because the website you are using is an open site and we need to be able to screen out respondents who are not part of our survey population. After the classification information, you might be asked as few as four questions or as many as seventeen - but it won't take you very long to help us out. We would, of course, be happy to share our findings with any respondents who contact us directly. In all cases, your responses will be completely anonymous.

Once again: User Name is: games
Password is: simulation

Please click on this link to proceed: http://www.uwindsor.ca/games

Appendix 2. Simulation Web Survey Response invitation

The following letter was the second deployment to our mailing group of 14796 inviting them to participate in the survey.

Drs. Anthony Faria and William Wellington
Department of Marketing
Odette School of Business
University of Windsor
Windsor, Ontario N9B 3P4

Dear Business Educator,

We recently contacted you about a survey of current business simulation game usage that we are undertaking. If you have already responded, thank you, and please ignore this contact.

If you have not yet had an opportunity to respond we would really appreciate your input.

We would like to get some feedback from all business educators whether you are nonusers, current game users or past users of business simulation games. The results of our survey will be presented to the Association for Business Simulation and Experiential Learning and later published in the Journal of Simulation and Gaming. These findings will update materials presented at this conference ten and twenty years ago. We would truly appreciate your time to complete the following questionnaire.

First of all, we would like to gather some non-identifiable classification information about you. Following this, we would like to determine whether you are a current simulation game user, a past user who has stopped using business games, or someone who has never used a business simulation game. This classification will determine which questionnaire you are directed to. If you have any questions of us, or if you would rather receive and fill out a hard copy of this survey questionnaire, please contact either:

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Once again:

User Name is: games
Password is: simulation

Please click on this link to proceed: http://www.uwindsor.ca/games

Appendix 3. Simulation Web Survey Response invitation

The following letter was the final deployment to our mailing group of 14796 inviting them to participate in the survey.

Drs. Anthony Faria and William Wellington
Department of Marketing
Odette School of Business
University of Windsor
Windsor, Ontario N9B 3P4

Dear Business Educator,

We have contacted you a couple of times about a survey of current business simulation game usage that we are undertaking. We would like to get some feedback from all business educators whether you are nonusers, current game users or past users.

If you have already responded, thank you again, and please ignore this final contact.

If you have not yet responded we want to make one final request for your valuable input.

The results of our survey will be presented to the Association for Business Simulation and Experiential Learning and later published in the Journal of Simulation and Gaming. These findings will update materials presented at this conference ten and twenty years ago. We would truly appreciate your time to complete the following questionnaire.

First of all, we would like to gather some non-identifiable classification information about you. Following this, we would like to determine whether you are a current simulation game user, a past user who has stopped using business games, or someone who has never used a business simulation game. This classification will determine which questionnaire you are directed to. If you have any questions of us, or if you would rather receive and fill out a hard copy of this survey questionnaire, please contact either:

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Telephone: (519)253-3000, ext. 3151
Fax: (519)973-7073

Now, if you consent to taking part in this study and we could have a few minutes of your time, please proceed to the next page, the classification information using the link below. You will be asked to enter a user i.d. and a password which are: user name = "games" and password = "simulation". These will not be identified with you at all. This process is necessary because the website you are using is an open site and we need to be able to screen out respondents who are not part of our survey population. After the classification information, you might be asked as few as four questions or as many as seventeen - but it won't take you very long to help us out. We would, of course, be happy to share our findings with any respondents who contact us directly. In all cases, your responses will be completely anonymous.

Once again:

User Name is: games
Password is: simulation

Please click on this link to proceed: http://www.uwindsor.ca/games

Appendix 4. Business Simulation Game Survey

Thank you for agreeing to respond to our web survey on simulation game usage.

As a reminder, your responses will be completely anonymous so you may freely express your thoughts and feelings.

The survey begins below with a request for some non-identifiable classification information about you. It is very important that you answer Question #7, the last classification question. Question #7 will ask you to place yourself into one of three categories which will be used to direct you to a specific questionnaire on your simulation game usage:

1) You are a current simulation game user.
2) You are a past user who has stopped using business games.
3) You are someone who has never used a business simulation game.

1. In what discipline area do you teach (accounting, marketing, etc.)? If you teach in more than one area, what area do you consider to be your prime discipline area?

- ☐ Accounting
- ☐ Finance
- ☐ Management
- ☐ Management Science
- ☐ Marketing
- ☐ Policy
- ☐ Other (please name), please name ____

2. How many years have you been teaching?

____ years

3. What is your current teaching rank ?

- ☐ Full professor
- ☐ Associate professor
- ☐ Assistant professor
- ☐ Lecturer/Instructor

☐ Graduate assistant

☐ Other (name), please specify: ☐

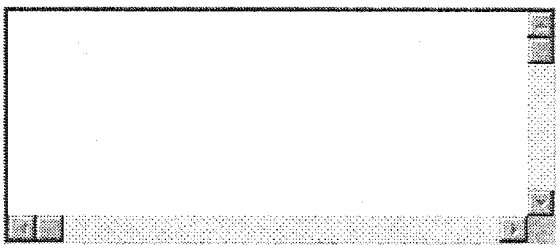
4. What is your highest degree earned?

☐ Doctorate

☐ MBA

☐ Other, please specify: ☐

5. What courses do you teach most often (give course titles)?



6. How many years of non-academic business/work experience do you have?

☐ years

7. Are you:

☐ A current simulation game user someone using a business game in at least one course taught each year)?

☐ A former simulation game user (have used a business game in the past but have stopped)?

☐ Someone who has never used a business simulation game?

Note: you must answer question 7 before clicking the continue button.

Appendix 4a. Survey for Users

Business Simulation Game Survey: Part 2

You have selected the survey for a person who is currently using a business simulation game.

This section is to be completed ONLY by those who are currently using a business game.

1. For approximately how many years have you been using a business simulation game?

_____ years

2. Could you list the two, three or four *most important* reasons why you *first* adopted a business simulation game to use in your class?

3. Have you ever switched from one simulation game to another?

- ☐ Yes
- ☐ No

4. What were the reasons causing you to switch to the new game?

5. What percent of your course grade is devoted to the simulation game (If you are using a business game in more than one course, pick a course that best represents your typical simulation game usage)?

_____ percent

6. In a typical course in which you use a business game, approximately what percent of your course time is devoted to:

Lectures:
0
%

Cases:
0
%

Business game:
0
%

Other:
0
%

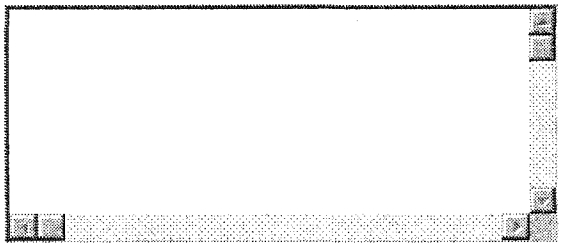
- please specify:

Total percent:
0
%

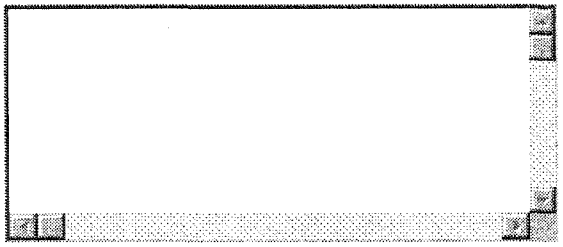
7. What are the primary teaching/learning advantages of a business game *over* other teaching methods:

for the student?

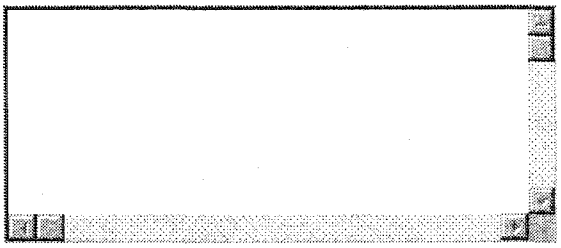
for the teacher?



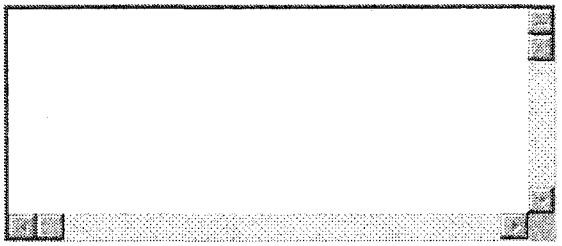
8. Please name the business simulation game(s) you are currently using.



9. What are the primary reasons for using this business simulation game or games?



10. Do you have specific teaching/learning objectives that you wish to accomplish from the use of a business simulation game? If so, could you list several of these objectives?

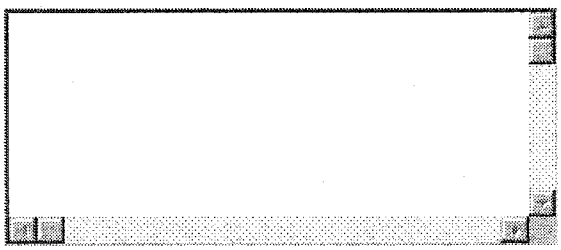


11. On a scale of one to ten, with one representing complete accomplishment, how well do you feel that you are accomplishing the objectives you have stated above through your business game?

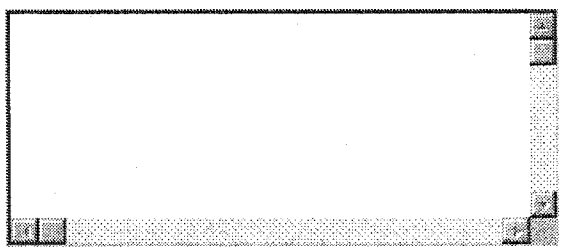
- ☐ 1 Objectives are completely accomplished
- ☐ 2

- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 Objectives are completely unaccomplished

12. How did you first become aware of business simulation games?



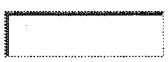
13. When searching for new simulation games, where do you look?



14. Is it easy to find information on new business games?

☐ Yes ☐ No

15. How many different simulation games (not new editions) have you used over the years?



16. On a scale of one to ten, with one representing not likely at all, what is the likelihood that you will *stop* using business games?

- ☐ 1 Not likely
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 Very likely

17. Please check "yes" or "no" to the following:

Publishers sales reps often talk about simulations.

☐ Yes ☐ No

I have seen an ad for a business simulation game within the past year.

☐ Yes ☐ No

Business simulation games are prominently displayed by publishers at conferences.

☐ Yes ☐ No

If I wanted to adopt a new business simulation game, I would readily know where to look for information.

☐ Yes ☐ No

Colleagues often advocate the use of business games.

☐ Yes ☐ No

I have received direct mail or e-mail information on business simulation games within the past year.

☐ Yes ☐ No

I am familiar with ABSEL.

☐ Yes ☐ No

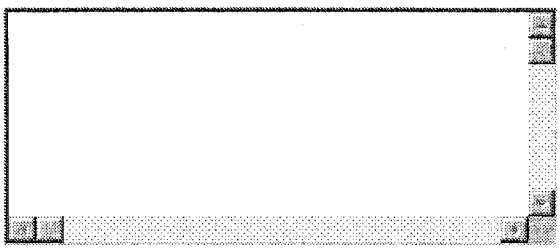
Appendix 4b. Survey for Former Users of Simulations

Business Simulation Game Survey: Part 2

You have selected the survey for a person who is a former user of a business simulation game.

This section is to be completed ONLY by those who have previously used a business game but have now stopped.

1. Can you identify the two, three or four most important reasons why you first adopted a business simulation game to be used in one of your courses?



2. In a typical class in which you had used a business game, what percentage of the course grade was devoted to the simulation?

3. In a typical course in which you had used a business game, approximately what percent of your course time is devoted to:

Lectures:
0
%

Cases:
0
%

Business game:
0
%

Other:
0

%

- please specify:

0

%

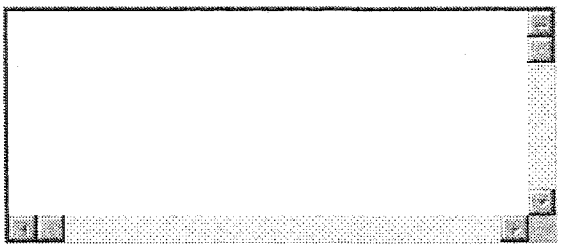
4. Over how many years did you use a business game in at least one of the courses that you taught?

5. What advantages or benefits, if any, do you feel that business simulation games offer?

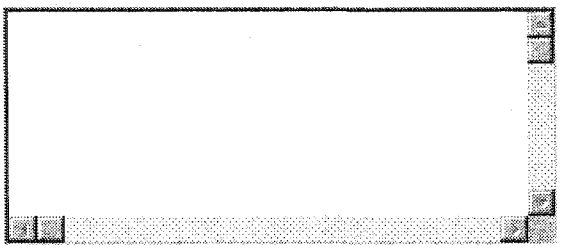
for the student?

for the teacher?

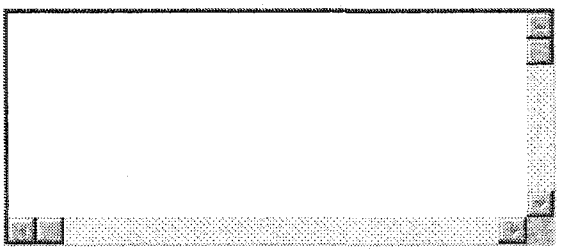
6. Why did you stop using business games (could you please provide the one, two, or three most important reasons)?



7. Are there any circumstances under which you can see yourself once again using a business simulation game in one of your classes?



8. Could you briefly explain what would be necessary to get you to use a business game again?



9. Please check "yes" or "no" to the following:

Publishers sales reps often talk about simulations.

☐ Yes ☐ No

I have seen an ad for a business simulation game within the past year.

☐ Yes ☐ No

Business simulation games are prominently displayed by publishers at conferences.

☐ Yes ☐ No

If I wanted to adopt a new business simulation game, I would readily know where to look

for information.

☐ Yes ☐ No

Colleagues often advocate the use of business games.

☐ Yes ☐ No

I have received direct mail or e-mail information on business simulation games within the past year.

☐ Yes ☐ No

I am familiar with ABSEL.

☐ Yes ☐ No

Appendix 4c. Survey for Non Simulation/ Game Users

Business Simulation Game Survey: Part 2

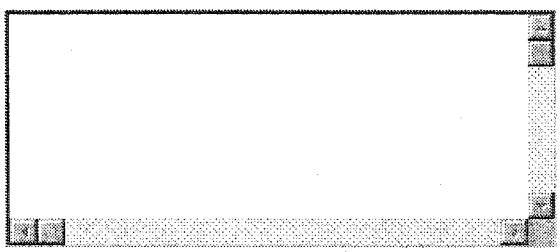
You have selected the survey for a person who has never used a business simulation game.

This section is to be completed ONLY by respondents who have never used a business simulation game.

1. How familiar are you with business simulation games (check one)?

- ☐ Very familiar
- ☐ Somewhat familiar
- ☐ Not very familiar
- ☐ Not familiar at all

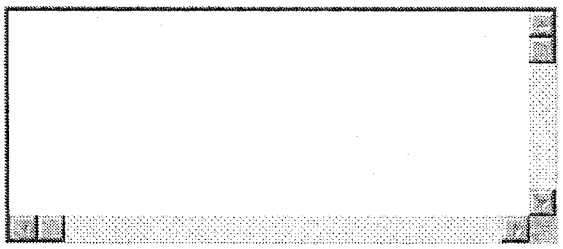
2.Can you name one, two or three business simulation games that you are familiar with?



3. Have you ever considered using a business simulation game in one of your classes?

- ☐ Yes
- ☐ No

4. If you have considered using a business simulation game but have not, what has stopped you?

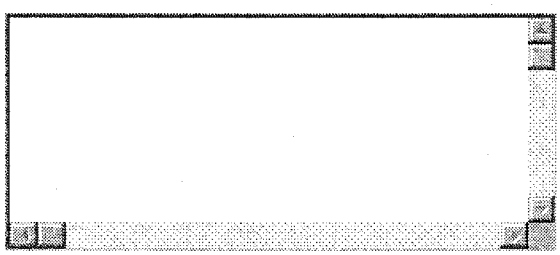


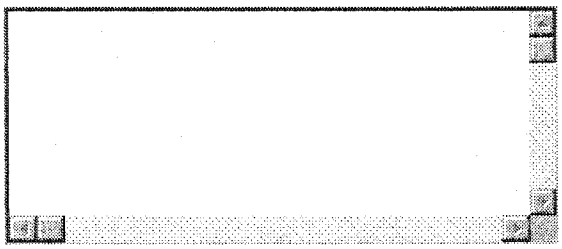
5. On a scale of one to ten, with one being very likely and ten not likely at all, what are the chances that you might use a business game in the next year or two?

- ☐ 1 Very likely
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10 Not very likely

6. What advantages or benefits, if any, might be offered by business simulation games over other teaching methods?

For the student:



For the teacher: 

7. Please check "yes" or "no" to the following:

Publishers sales reps often talk about simulations.

☐ Yes ☐ No

I have seen an ad for a business simulation game within the past year.

☐ Yes ☐ No

Business simulation games are prominently displayed by publishers at conferences.

☐ Yes ☐ No

If I wanted to adopt a new business simulation game, I would readily know where to look for information.

☐ Yes ☐ No

Colleagues often advocate the use of business games.

☐ Yes ☐ No

I have received direct mail or e-mail information on business simulation games within the past year.

☐ Yes ☐ No

I am familiar with ABSEL.

☐ Yes ☐ No

Appendix 4D. Thank you for Survey Response Submission Note

THANK YOU FOR TAKING PART IN OUR SURVEY ON CURRENT BUSINESS SIMULATION GAME USAGE. WE TRULY APPRECIATE THE TIME YOU TOOK TO COMPLETE THE QUESTIONNAIRE.

The results of the survey will be presented to the Association for Business Simulation and Experiential Learning (ABSEL) and later published in the journal of Simulation and Gaming. If you would like information about ABSEL and its upcoming meetings, check out the ABSEL website (www.absel.org).

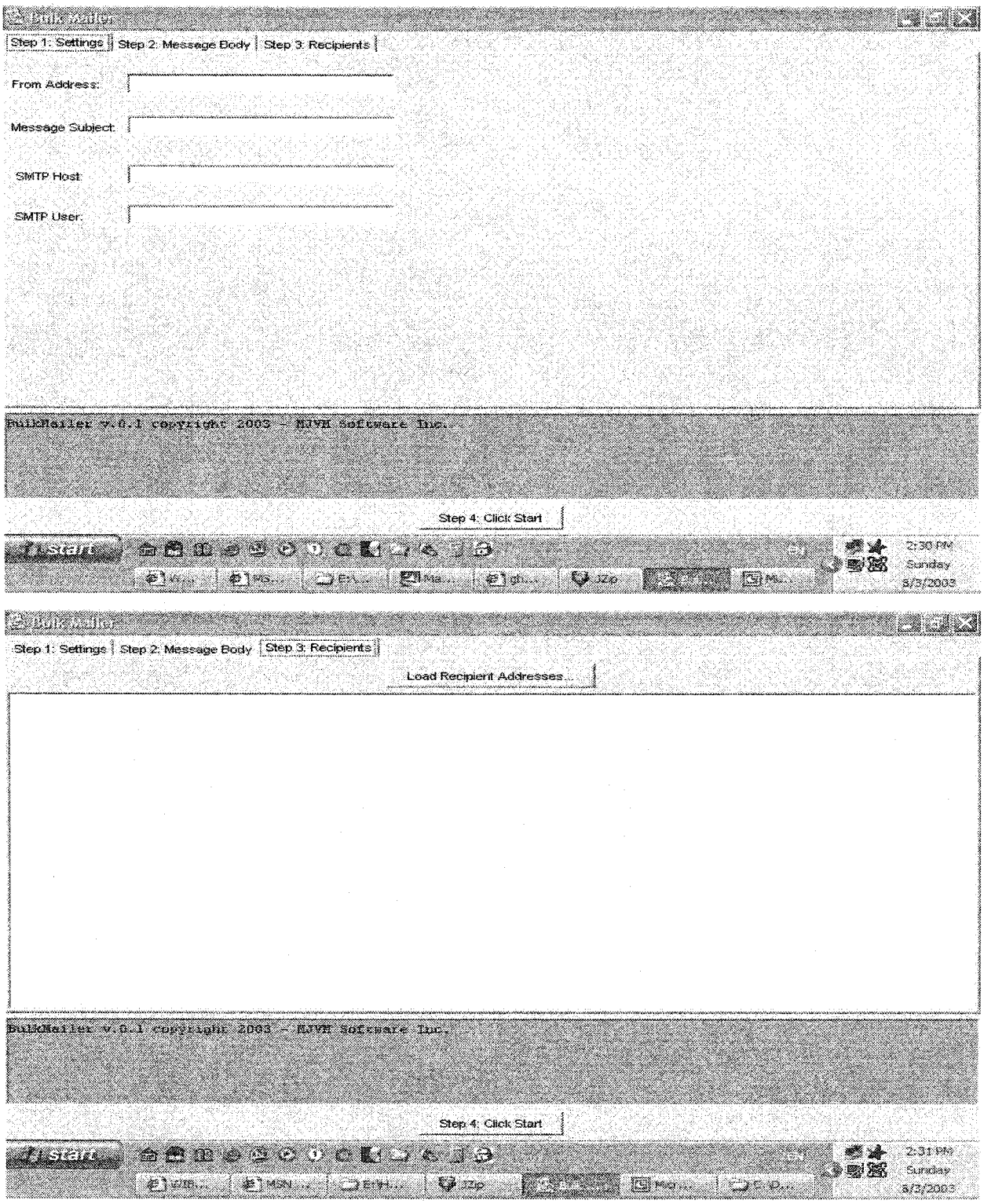
After completing this survey, if you have any questions of us, or if you would like to make a comment about this survey questionnaire or its administration, please contact either:

Dr. A. J. Faria (ad9@uwindsor.ca)
Telephone: (519)253-3000, ext. 3101
Fax: (519)973-7073

Dr. Bill Wellington (r87@uwindsor.ca)
Telephone: (519)253-3000, ext. 3151
Fax: (519)973-7073

ONCE AGAIN, THANK YOU FOR YOUR PARTICIPATION

Appendix 5. Fastmail$_{TM}$ Screenshots



Appendix 6. ABSEL

The **Association for Business Simulation and Experiential Learning** was started in 1974 with the sponsorship of a conference on business gaming and experiential learning by J. Bernard Keys and Howard Leftwich of Oklahoma Christian College in Oklahoma City. ABSEL has developed into a professional association whose membership consists predominantly of business faculty. Currently there are approximately 150-200 members. ABSEL organizational goals are as follows:

1. The expansion of the use of simulations and other experiential learning techniques for business education in both current and evolving applications.

2. The provision of a forum for those currently using or developing simulations and experiential learning techniques and tools for business education.

3. The provision of an outlet for the generation of empirical studies in business gaming and experiential exercises.

4. The maintenance of a viable organization that employs a challenging yet supportive presentational style.

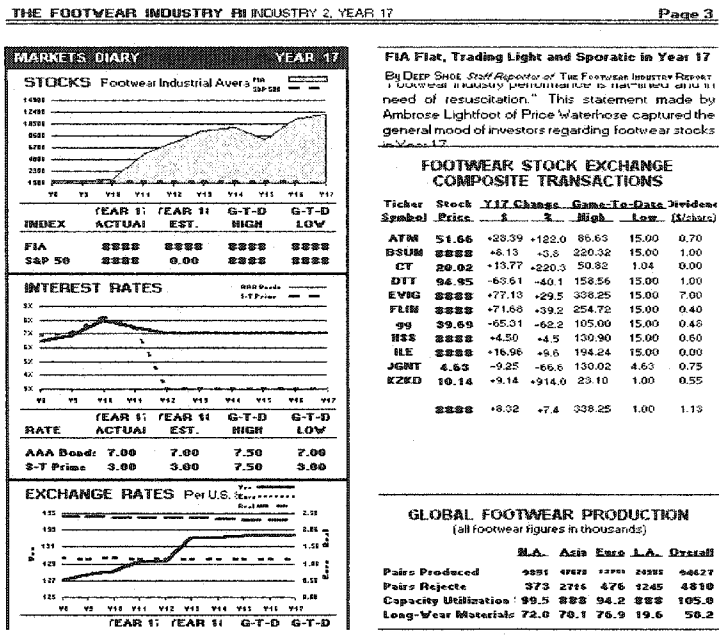
Appendix 7. Experiential Learning computer simulation applications in Business

Games and simulation List (from Association for Business Simulation and Experiential Learning, ABSEL 2003)

AIRLINE: A Business Simulation
Beefeater Restaurants Microworld
Professional Services Microworld
Alacrity Team Simulation Exercise
Micro Business Publications
Business Policy Game, The - An International Strategy Simulation
BusSim: An Integrated Business Instruction System
Capstone: The Business and Financial Strategy Simulation
CEO: A Business Simulation for Policy and Strategic Management
Collective Bargaining Simulated
COMPETE: A Dynamic Marketing Simulation
The Global Business Game
Corporation: A Global Business Simulation
DEAL: An Entrepreneurship Gaming Simulation
Entrepreneur: A Business Simulation in Retailing
GEO: An International-Business Gaming Simulation
The Human Resources Management Simulation
INFOGAME: Game for Research and Education in Information Systems
INTOPIA: International Operations Simulation/Mark 2000
MAGEUR: A General Business Game
MANAGEMENT 500: A Business Simulation for Production and Operations Management
Management Accounting Simulation, The
Manager: A Simulation Game
Marketer: A Simulation Game
Marketplace: a web based business simulation game with several levels of difficulty.
Multinational Management Game, The
Threshold Competitor: A Management Simulation

Appendix 8. Screenshots of Simulation Applications

Capstone™ (McGraw-Hill Irwin 2002)



THE FOOTWEAR INDUSTRY IN INDUSTRY 2, YEAR 17 — Page 3

MARKETS DIARY — YEAR 17

STOCKS Footwear Industrial Averages

INDEX	YEAR 16 ACTUAL	YEAR 17 EST.	G-T-D HIGH	G-T-D LOW
FIA	$$$$	$$$$	$$$$	$$$$
S&P 50	$$$$	0.00	$$$$	$$$$

INTEREST RATES

RATE	YEAR 16 ACTUAL	YEAR 17 EST.	G-T-D HIGH	G-T-D LOW
AAA Bond	7.00	7.00	7.50	7.00
3-T Prime	3.00	3.00	7.50	3.00

EXCHANGE RATES Per U.S. $

FIA Flat, Trading Light and Sporatic in Year 17

By Deep Shoe *Staff Reporter of* The Footwear Industry Report

need of resuscitation." This statement made by Ambrose Lightfoot of Price Waterhose captured the general mood of investors regarding footwear stocks in Year 17.

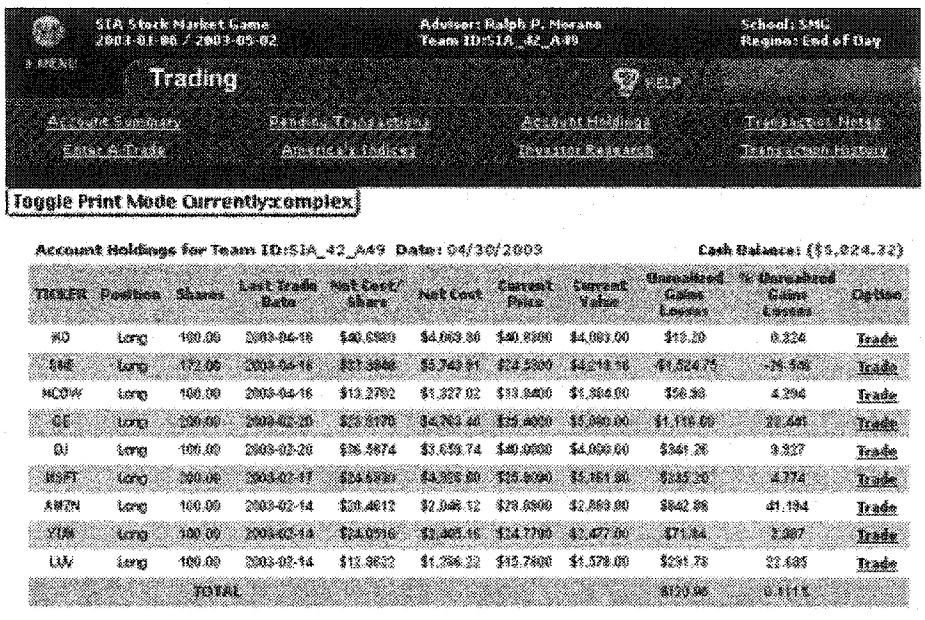
FOOTWEAR STOCK EXCHANGE COMPOSITE TRANSACTIONS

Ticker Symbol	Stock Price	Y17 Change $	Y17 Change %	Game-To-Date High	Game-To-Date Low	Dividend ($/share)
ATM	$1.66	+28.39	+122.0	86.63	15.00	0.70
BSUM	$$$$	+6.13	+3.8	220.32	15.00	1.00
CT	20.02	+13.77	+220.3	50.82	1.04	0.00
DTT	94.95	-63.61	-40.1	158.56	15.00	1.00
EVNG	$$$$	+77.13	+29.5	338.25	15.00	7.00
FLIN	$$$$	+71.68	+39.2	254.72	15.00	0.40
gg	39.69	-65.31	-62.2	105.00	15.00	0.46
HSS	$$$$	+4.50	+4.5	130.90	15.00	0.60
ILE	$$$$	+16.96	+9.6	194.24	15.00	0.00
JGNT	4.63	-9.25	-66.6	130.02	4.63	0.75
KZKD	10.14	+9.14	+914.0	23.10	1.00	0.55
	$$$$	+8.02	+7.4	338.25	1.00	1.13

GLOBAL FOOTWEAR PRODUCTION
(all footwear figures in thousands)

	N.A.	Asia	Euro	L.A.	Overall
Pairs Produced	$$$$	$$$$	$$$$	$$$$	$$$$
Pairs Rejects	373	2716	476	1245	4810
Capacity Utilization	99.5	$$$	94.2	$$$	105.0
Long-Wear Materials	72.0	70.1	76.9	19.6	50.2

The Stock Market Game™ (Securities Industry Foundation for Economic Education)



SIA Stock Market Game — Advisor: Ralph P. Norama — School: SMG

2003-01-06 / 2003-05-02 — Team ID:SIA_42_A49 — Regime: End of Day

Trading — HELP

Account Summary | Portfolio Transactions | Account Holdings | Transaction History

Enter A Trade | American Indices | Investor Research | Team Cash History

Toggle Print Mode Currently:complex

Account Holdings for Team ID:SIA_42_A49 Date: 04/30/2003 — **Cash Balance: ($1,824.32)**

TICKER	Position	Shares	Last Trade Date	Net Cost/ Share	Net Cost	Current Price	Current Value	Unrealized Gains Losses	% Unrealized Gains Losses	Option
MO	Long	100.00	2003-04-18	$40.6900	$4,069.00	$40.8900	$4,089.00	$19.20	0.324	Trade
[illegible]	Long	172.00	2003-04-16	$27.3946	$5,743.91	$24.5500	$4,219.16	-$1,524.75	-26.54%	Trade
MCDW	Long	100.00	2003-04-16	$13.2782	$1,327.82	$13.8400	$1,384.00	$56.38	4.294	Trade
GE	Long	200.00	2003-02-20	$25.0170	$4,703.40	$25.4000	$5,080.00	$1,116.60	22.481	Trade
DI	Long	100.00	2003-02-20	$36.5874	$3,659.74	$40.0000	$4,000.00	$340.26	9.327	Trade
[illegible]	Long	200.00	2003-02-17	$24.6900	$4,938.00	$25.8000	$5,160.00	$345.20	4.774	Trade
AMZN	Long	100.00	2003-02-14	$30.4012	$2,946.12	$28.0900	$2,809.00	$842.88	41.194	Trade
YUM	Long	100.00	2003-02-14	$24.0716	$2,405.16	$24.7700	$2,477.00	$71.84	2.987	Trade
LUV	Long	100.00	2003-02-14	$13.9652	$1,396.22	$15.7800	$1,578.00	$281.78	22.685	Trade
		TOTAL						$120.96	0.411%	

Current values are calculated using the previous trading day's closing prices.

Appendix 9. MANOVA: Reasons for adopting: Users, former users and non-users

Multivariate Tests[c]

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	1.000	333269.0[a]	21.000	1062.000	.000
	Wilks' Lambda	.000	333269.0[a]	21.000	1062.000	.000
	Hotelling's Trace	6590.065	333269.0[a]	21.000	1062.000	.000
	Roy's Largest Root	6590.065	333269.0[a]	21.000	1062.000	.000
A7CLASSI	Pillai's Trace	.775	32.017	42.000	2126.000	.000
	Wilks' Lambda	.249	50.775[a]	42.000	2124.000	.000
	Hotelling's Trace	2.920	73.771	42.000	2122.000	.000
	Roy's Largest Root	2.887	146.138[b]	21.000	1063.000	.000

a. Exact statistic

b. The statistic is an upper bound on F that yields a lower bound on the significance level.

c. Design: Intercept+A7CLASSI

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	B2Integrate	23.139[a]	2	11.570	119.595	.000
	B2DecisExpe	51.721[b]	2	25.861	220.985	.000
	B2Interactive	4.110[c]	2	2.055	40.916	.000
	B2ApplyTheory	31.684[d]	2	15.842	148.068	.000
	B2Involving	5.088[e]	2	2.544	44.925	.000
	B2FUN	3.053[f]	2	1.526	36.994	.000
	B2Teamwrk	5.087[g]	2	2.543	45.564	.000
	B2Required	1.915[h]	2	.958	26.312	.000
	B2Mentorrecom	.415[i]	2	.208	11.691	.000
	B2Compete	2.137[j]	2	1.068	27.579	.000
	B2Strateg	.851[k]	2	.426	16.825	.000
	B2InterestMotivate	3.686[l]	2	1.843	37.629	.000
	B2VarietyChange	.913[m]	2	.456	17.479	.000
	B2Easefficient	.232[n]	2	.116	9.246	.000
	B2BetCaseLect	.209[o]	2	.105	11.660	.000
	B2ControlDec	.026[p]	2	.013	2.794	.062
	B2GLOBAL	.031[q]	2	.015	3.339	.036
	B2Quantit	.249[r]	2	.124	9.256	.000
	B2ComputeLiteracy	.065[s]	2	.032	5.948	.003
	B2Authoredit	.069[t]	2	.034	5.393	.005
	B2Playedasstudent	.082[u]	2	.041	5.027	.007
Intercept	B2Integrate	2931.042	1	2931.042	30298.114	.000
	B2DecisExpe	2614.614	1	2614.614	22342.541	.000
	B2Interactive	3282.902	1	3282.902	65359.829	.000
	B2ApplyTheory	2806.197	1	2806.197	26227.886	.000
	B2Involving	3230.768	1	3230.768	57057.333	.000
	B2FUN	3343.106	1	3343.106	91025.776	.000
	B2Teamwrk	3244.852	1	3244.852	58130.763	.000
	B2Required	3359.183	1	3359.183	92295.209	.000
	B2Mentorrecom	3458.649	1	3458.649	194746.1	.000
	B2Compete	3337.941	1	3337.941	86170.010	.000
	B2Strateg	3413.353	1	3413.353	134920.3	.000
	B2InterestMotivate	3284.376	1	3284.376	67056.043	.000
	B2VarietyChange	3412.602	1	3412.602	130670.9	.000
	B2Easefficient	3488.089	1	3488.089	277770.6	.000
	B2BetCaseLect	3510.564	1	3510.564	391639.4	.000
	B2ControlDec	3522.726	1	3522.726	769802.5	.000
	B2GLOBAL	3525.512	1	3525.512	771183.1	.000
	B2Quantit	3473.486	1	3473.486	258413.5	.000
	B2ComputeLiteracy	3513.612	1	3513.612	644150.0	.000
	B2Authoredit	3518.415	1	3518.415	552834.8	.000
	B2Playedasstudent	3505.766	1	3505.766	428945.2	.000
A7CLASSI	B2Integrate	23.139	2	11.570	119.595	.000
	B2DecisExpe	51.721	2	25.861	220.985	.000
	B2Interactive	4.110	2	2.055	40.916	.000
	B2ApplyTheory	31.684	2	15.842	148.068	.000
	B2Involving	5.088	2	2.544	44.925	.000
	B2FUN	3.053	2	1.526	36.994	.000
	B2Teamwrk	5.087	2	2.543	45.564	.000
	B2Required	1.915	2	.958	26.312	.000
	B2Mentorrecom	.415	2	.208	11.691	.000
	B2Compete	2.137	2	1.068	27.579	.000
	B2Strateg	.851	2	.426	16.825	.000
	B2InterestMotivate	3.686	2	1.843	37.629	.000
	B2VarietyChange	.913	2	.456	17.479	.000
	B2Easefficient	.232	2	.116	9.246	.000
	B2BetCaseLect	.209	2	.105	11.660	.000
	B2ControlDec	.026	2	.013	2.794	.062
	B2GLOBAL	.031	2	.015	3.339	.036
	B2Quantit	.249	2	.124	9.256	.000
	B2ComputeLiteracy	.065	2	.032	5.948	.003
	B2Authoredit	.069	2	.034	5.393	.005
	B2Playedasstudent	.082	2	.041	5.027	.007
Error	B2Integrate	104.673	1082	.097		
	B2DecisExpe	126.620	1082	.117		
	B2Interactive	54.347	1082	.050		
	B2ApplyTheory	115.766	1082	.107		
	B2Involving	61.266	1082	.057		
	B2FUN	44.643	1082	.041		
	B2Teamwrk	60.397	1082	.056		
	B2Required	39.381	1082	.036		
	B2Mentorrecom	19.216	1082	.018		
	B2Compete	41.913	1082	.039		
	B2Strateg	27.374	1082	.025		
	B2InterestMotivate	52.996	1082	.049		
	B2VarietyChange	28.258	1082	.026		
	B2Easefficient	13.587	1082	.013		
	B2BetCaseLect	9.699	1082	.009		
	B2ControlDec	4.951	1082	.005		
	B2GLOBAL	4.946	1082	.005		
	B2Quantit	14.544	1082	.013		
	B2ComputeLiteracy	5.902	1082	.005		
	B2Authoredit	6.586	1082	.006		
	B2Playedasstudent	8.843	1082	.008		
Total	B2Integrate	3896.000	1085			
	B2DecisExpe	3665.000	1085			
	B2Interactive	4154.000	1085			
	B2ApplyTheory	3812.000	1085			
	B2Involving	4127.000	1085			
	B2FUN	4190.000	1085			
	B2Teamwrk	4130.000	1085			
	B2Required	4211.000	1085			
	B2Mentorrecom	4280.000	1085			
	B2Compete	4202.000	1085			
	B2Strateg	4253.000	1085			
	B2InterestMotivate	4160.000	1085			
	B2VarietyChange	4250.000	1085			
	B2Easefficient	4298.000	1085			
	B2BetCaseLect	4310.000	1085			
	B2ControlDec	4325.000	1085			
	B2GLOBAL	4325.000	1085			
	[redacted]	[redacted]	[redacted]			
	B2ComputeLiteracy	4322.000	1085			
	B2Authoredit	4319.000	1085			
	B2Playedasstudent	4313.000	1085			
Corrected Total	B2Integrate	127.812	1084			

Appendix 10. Data Analysis Coding Protocol

The surveys were grouped into users (1) whose section items were coded B, (2) former users whose items was coded C and (3) non-users whose section was coded D. Items coded A were overall demographic characteristics i.e. Discipline, degree. Listed are only the items that were used in this thesis.

Survey Item Coding Protocol

The first letter defines A=All groups Demographics, B= Users, C=Former Users and D=Non-Users

A1=Discipline 1-6; 7= other

A2= number of years teaching

A3= Teaching rank; 1-5; 6=other

A4=highest degree; 1-2; 3=other

A6=number of years teaching

A7= CATEGORY 1-3; 1=user, 2=former, 3=non-user

B7=why adopted?; open ended for content analysis

B3= did you switch?; 1= yes, 0=no

B4=reason(s) for switch; open ended for content analysis

D2=B8 for nonusers

D4=C6 why did you stop (same as b7 but inverse); open ended

D6=b7 for non users

B17=7 questions concerning yes/no to how did you find out about simulations

B18=name of simulations which they are using; open ended

Appendix 11. Profile of Respondents

a) Ranks of Respondents

	% User (N=327)	% Former User (N=183)	% Nonuser (N=553)	% Total (N=1062)
Full Professor	30.1 (98)	40.4 (74)	20.8 (115)	27.0 (287)
Associate Professor	29.4 (96)	27.9 (51)	21.2 (117)	24.9 (264)
Assistant Professor	23.9 (78)	16.4 (30)	35.1 (194)	28.4 (302)
Lecturer/Instructor	11.0 (36)	12.0 (22)	16.3 (90)	13.9 (148)
Graduate Assistant	2.1 (7)	0.0 (0)	2.5 (14)	2.0 (21)
Other	3.4 (11)	3.3 (6)	4.2 (23)	3.8 (40)

b) Highest Degree Earned

	% User (N=330)	% Former User (N=184)	% Nonuser (N=561)	% Total (N=1075)
Ph.D./DBA	79.7 (263)	87.0 (160)	75.8 (425)	78.9 (848)
MBA	13.0 (43)	9.2 (17)	11.2 (63)	11.4 (123)
Other	7.3 (24)	3.8 (7)	13.0 (73)	9.7 (104)

Appendix 12. MANOVA: Teaching and Work Experience across group

Descriptive Statistics

	A7CLAS	Mean	td. Deviatio	N
A2YRSTC	1	15.75	9.862	326
	2	19.48	9.918	180
	3	12.95	9.371	547
	Total	14.94	9.907	1053
A6YRSW	1	10.31	8.594	326
	2	8.99	7.880	180
	3	8.96	9.220	547
	Total	9.39	8.825	1053

Multivariate Tests

Effect		Value	F	ypothesis d	Error df	Sig.
Intercep	Pillai's Trace	.793	015.105[a]	2.000	049.000	.000
	Wilks' Lambd	.207	015.105[a]	2.000	049.000	.000
	Hotelling's Tra	3.842	015.105[a]	2.000	049.000	.000
	Roy's Largest	3.842	015.105[a]	2.000	049.000	.000
A7CLAS	Pillai's Trace	.067	18.211	4.000	100.000	.000
	Wilks' Lambd	.933	18.439[a]	4.000	098.000	.000
	Hotelling's Tra	.071	18.666	4.000	096.000	.000
	Roy's Largest	.067	35.021[b]	2.000	050.000	.000

a. Exact statistic

b. The statistic is an upper bound on F that yields a lower bound on

c. Design: Intercept+A7CLASSI

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	A2YRSTCH	6092.655[a]	2	3046.327	32.921	.000
	A6YRSWRK	405.178[b]	2	202.589	2.609	.074
Intercept	A2YRSTCH	222205.707	1	222205.707	2401.295	.000
	A6YRSWRK	76424.763	1	76424.763	984.282	.000
A7CLASSI	A2YRSTCH	6092.655	2	3046.327	32.921	.000
	A6YRSWRK	405.178	2	202.589	2.609	.074
Error	A2YRSTCH	97162.582	1050	92.536		
	A6YRSWRK	81527.418	1050	77.645		
Total	A2YRSTCH	338174.500	1053			
	A6YRSWRK	174680.750	1053			
Corrected Total	A2YRSTCH	103255.237	1052			
	A6YRSWRK	81932.596	1052			

a. R Squared = .059 (Adjusted R Squared = .057)

b. R Squared = .005 (Adjusted R Squared = .003)

Appendix 13. Late Majority vs. Early Majority Reasons for Adopting

a) Late Majority

Test Statistics

	2Integrat	2DecisExp	32ApplyT heory	2Involvin	B2FUN	2Teamwr	2Require	2Compet	2Strated	32Interes Motivate	32Played sstudent
Chi-Squa	18.359	7.118	8.007	86.438	86.438	77.654	86.438	126.281	22.673	95.693	137.418
df	1	1	1	1	1	1	1	1	1	1	1
Asymp. S	.000	.008	.005	.000	.000	.000	.000	.000	.000	.000	.000

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 76.5.

b) Early Majority

Test Statistics

	B2Interactive	B2ApplyT heory	B2Involving	B2FUN	B2Teamwrk	B2Required	B2Compete	B2Strateg
Chi-Square	36.000	6.250	25.000	30.250	36.000	45.563	25.000	52.563
df	1	1	1	1	1	1	1	1
Asymp. Sig	.000	.012	.000	.000	.000	.000	.000	.000

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 32.0.

VITA AUCTORIS

Himadri Prasad Ghosh is an advocate for Healthcare reform and an avid computer and simulation buff. First graduating from McMaster University in the Faculty of Science with a Bachelor of Science, Life Sciences, he continued his education at the University of Windsor, Odette School of Business Master of Business Administration. Himadri intends to pursuit a career in Health care management and Business Simulation management consulting.