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From the Editor

Lilly M. Lancaster
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Editor's Note: *It is a pleasure to present Palmetto Business and Economic Review 2010. It is our thirteenth year of publication. The journal has improved in many ways over the years. I look forward to more improvements in the future.*

Concerning the *2010 Palmetto Business and Economic Review*, our acceptance rate is the lowest ever, at 40%. We have a variety of topics presented by faculty from a diverse group of universities. I was particularly interested in reading Emma Jane Riddle's case concerning AbitiBowater. The international dimension of the case is intriguing and emphasizes the challenges faced by firms operating in multiple countries.

It was also refreshing to read Ellen Walk's and Andy Litteral's application of an operations research technique to university enrollment management. Given the challenges faced in university administration and funding issues, business school faculty may have many opportunities to support the mission of the university in new and exciting ways. Ellen's and Andy's research is sure to be one of those applications. Of course, you will find your own personal favorites as you read the 2010 issue.

As we continually improve the journal, we will be adding additional reviewers for 2011. If you are interested in becoming a reviewer, please e-mail me at llancaster@uscupstate. edu. Also, as we look into the future, our journal will be available online only starting in 2011. In addition to saving printing costs, we will be able to have a shorter timeline for publication. An electronic journal also saves natural resources and promotes our commitment to sustainability.

The technology staff at Upstate is working with me to create an electronic submission process for the journal which we hope will be operational in the early fall. We will post information about this process on our website when it is available.

As you may have noticed, we have a new cover design as we celebrate our move to downtown Spartanburg and our new physical facility. We are fortunate to have this new work environment. Please, if you find yourself in the Spartanburg area, stop in for a tour of The George.

Best wishes to you for a productive academic year.

ABITIBIBOWATER DEALS WITH BANKRUPTCY AND FILES A NAFTA CLAIM

Emma Jane Riddle
Winthrop University

ABSTRACT

This paper is a case study of AbitibiBowater (AB), a major producer of paper and forest products. The company has experienced declining demand, intense foreign competition, and fluctuating currency values. When AB closed an unprofitable mill in Newfoundland, the provincial government seized several AB assets and prohibited the company from seeking compensation in court. AB, which is incorporated in Delaware, has attempted to secure compensation for the seized assets by filing a NAFTA Notice of Arbitration against the Canadian government. The case presents strategic and legal issues that are relevant to courses in international business and international management.

INTRODUCTION

AbitibiBowater (AB) is a major producer of newsprint, coated and specialty paper, market pulp, and wood products. The company was created in October, 2007, by a "merger of equals" between Canadian paper giant Abitibi-Consolidated and Bowater, a paper manufacturer headquartered in South Carolina. The company is incorporated in Delaware and has its operating headquarters in Montreal. AB immediately faced enormous financial challenges, which were aggravated by poor market conditions and the strength of the Canadian dollar. In December, 2008, the company announced plans to permanently close its Grand Falls-Windsor (GFW) pulp and paper mill, which is located in the Canadian province of Newfoundland and Labrador (Moore, 2008a). The closure terminated the employment of about 750 workers. Less than two weeks after the closure was announced, the legislature of Newfoundland and Labrador passed Bill 75, which authorized the provincial government to expropriate a number of assets related to the GFW plant, including three hydroelectric plants, several dams, water rights, timber rights, and timber leases (Moore, 2008a). After an unsuccessful attempt to negotiate compensation issues with the provincial government, AB filed a Notice of Intent to Submit a Claim to Arbitration under the North American Free Trade Agreement (NAFTA) (AbitibiBowater, 2009c). The company later filed a request for arbitration under the NAFTA agreement (AbitibiBowater, 2010).

This paper presents a case study of the events described above. The case study raises issues related to the global business environment, strategy, international law, and NAFTA. It would be an appropriate case for senior-level undergraduate and MBA courses in International Business and International Management.

CASE STUDY

AbitibiBowater

AB was created in October, 2007, by a "merger of equals" between Canadian paper giant Abitibi-Consolidated and Bowater, a paper manufacturer headquartered in South Carolina. The combined company is incorporated in Delaware and has its operating headquarters in Montreal, Canada. In 2008, AB operated fifteen pulp and paper mills in Canada, seven in the United States, and one each in England and South Korea (AbitibiBowater, 2009b). The company also had fourteen hydroelectric plants

and eight cogeneration plants that process waste biomass into power; these plants provide much of the electric power needed for the company's manufacturing (AbitibiBowater, 2008c).

Paper is made from wood fiber, which can be obtained from pulp wood or from recycled paper. To ensure a steady supply of pulp wood, AB has leased timber rights on 44.7 million acres of public land in Canada; the company also owns 1.3 million acres of timber land in Canada and the southeastern United States. (AbitibiBowater, 2009b). The company also purchases timber from loggers and timber brokers. About 38% of the wood fiber in AB's paper products comes from recycled paper.

In 2007, AB reported revenues of 3.9 billion U.S. dollars, an operating loss of 400 million dollars, and a net loss of 490 million dollars (AbitibiBowater, 2008c). The company's 2007 sales were distributed as follows: newsprint – 41%; coated and specialty papers – 35%; market pulp – 16%; and wood products – 8%. The North American market accounts for more than half of AB's sales, but the company sells its products in more than ninety countries around the world.

AB faced challenges from the start. Declining demand for newsprint and commercial printing papers had left the company, and the industry, with excess capacity. One month after the Abitibi-Bowater merger, the company announced plans to reduce its paper-making capacity by approximately one million metric tons per year (AbitibiBowater, 2007). Several paper mills in Canada and one mill in Texas would be closed; the GFW facility was not included in this round of plant closings. As the company had hoped, eliminating unneeded capacity enabled AB to raise prices (AbitibiBowater, 2008c).

The capacity reduction was part of an ambitious action plan to improve the company's financial situation (AbitibiBowater, 2007). The company also expected to reduce operating costs by 375 million dollars per year, a target that it met in one year (AbitibiBowater, 2008a). The cost reduction plan included renegotiating union contracts in Canada and making benefits for salaried workers in various countries more consistent. To raise cash and reduce its debt, the company announced plans to sell 500 million dollars worth of assets, including selected timber lands. A substantial amount of the company's debt was scheduled to mature in 2008. To meet debt payments and improve cash flow, AB restructured its debt and suspended dividends to shareholders (AbitibiBowater, 2007, 2008b).

These measures did not solve the problem of declining demand for newsprint and coated paper. In December 2008, AB announced plans to reduce its papermaking capacity by an additional million metric tons per year (AbitibiBowater, 2008a). When those reductions were completed, AB had reduced its capacity by about one-third, to approximately 4.1 metric tons, since the merger of Abitibi-Consolidated and Bowater (Yakabuski, 2008a).

The Canadian Paper Industry and the Grand Falls-Windsor Facility

The Canadian paper industry began in the early 1900's. Canada was attractive to paper manufacturers because it had large tracts of government-owned timber land. There were also numerous rivers that would provide water for paper manufacturing and were suitable for generating hydroelectric power. Since Canada did not have adequate capital to develop its natural resources, provincial governments often attracted foreign firms by granting incentives, such as water and timber rights (Yakabuski, 2008b).

The GFW pulp and paper mill was built in 1909 by the Anglo-Newfoundland Development Company, which was owned by a British family, the Harmsworths. The Harmsworths also owned the London *Daily Mail* newspaper and built the

plant to ensure a steady supply of low-cost newsprint (Yakabuski, 2008b). Before building the plant, Anglo-Newfoundland leased large tracts of public land from the provincial government and obtained the right to harvest timber from those lands. The provincial government granted Anglo-Newfoundland the right to use water from a local river for manufacturing, and the right to build and operate dams and a hydroelectric power plant on the river. In addition to the pulp and paper mill, Anglo-Newfoundland built a hydroelectric plant and dams. The company also set up logging operations to supply raw material for the mill. To attract workers and provide housing for them, Anglo-Newfoundland built the town of Grand Falls, which has since grown to a community of 13,500 residents.

In recent years, the GFW plant had two paper production lines (AbitibiBowater, 2009b), which are called paper machines. According to a union official, Gary Healey, the newer of the two machines was installed in 1968 (Yakabuski, 2008a). The GFW facility had a capacity of about 200,000 metric tons of newsprint per year (AbitibiBowater, 2009b). In contrast, AB's two largest plants, which are located in South Carolina and Tennessee, each have a capacity of about 900,000 metric tons of paper per year. Jean-Philippe Cote, a spokesman for AB, said that the GFW plant was "the most expensive [paper] mill to run in North America" (Moore, 2008a). Mr. Cote cited labor costs and transportation costs as particular problems.

Newsprint was the only product line that GFW could produce (AbitibiBowater, 2009b). Canadian newsprint producers must compete with manufacturers in Asia and South America. These overseas competitors usually have more modern technology, larger facilities, and lower labor costs than Canadian plants. Consequently, North America's share of global newsprint production dropped from 44% in 1996 to 31% in 2006, while Asia's share increased from 19% to 30% (Atlantic Provinces Economic Council, 2008). With the availability of online news, newspaper readership has dropped sharply in Europe and North America. As a result of these developments, shipments of newsprint from North American plants dropped by 40% between 2000 and 2007 (Atlantic Provinces Economic Council, 2008). Consequently, a number of Canadian paper mills have been shut down.

Fluctuations in currency exchange rates have also created problems for Canadian paper producers (Atlantic Provinces Economic Council, 2008). In world markets, products are usually priced in a major currency, such as the U.S. dollar, the euro, the British pound, or the Japanese yen. Canadian paper producers pay for their inputs in Canadian dollars, but their exports are priced in U.S. dollars. The value of one U.S. dollar fell from $1.57 Canadian on January 1, 2002, to $0.98 Canadian on January 1, 2008 – a decrease of 57%. (Currency exchange rates were obtained from www.oanda.com.) Canadian paper producers could not raise their prices enough to compensate for the declining value of the U.S. dollar. The companies were caught in a "cost-price squeeze," where costs rose or remained stable, while revenues dropped.

To deal with these problems, AB's predecessor company, Abitibi, followed a strategy of acquisition, consolidation, and cost cutting. This strategy was designed to increase efficiency and pricing power. The merger between Abitibi and Bowater was another step in Abitibi's consolidation strategy.

A Plant Closure, An Expropriation, and a Bankruptcy

As stated earlier, AB's cost reduction plan included renegotiating its labor contracts in Canada. The company was determined to reduce costs and vowed not to continue operating the plant at a loss (Moore, 2008b; Roberts, 2008). There were two rounds of negotiations between the company and the Communications, Energy, and Paperworkers Union, which represented workers at GFW and related logging operations (Moore, 2008b). When the first round of

negotiations ended in failure, AB revised its proposal and tried again. The company has not revealed the details of its proposals to the public. However, there was a widespread belief among workers that the company's "renewal plan" would result in the loss of 150 jobs in the mill and at least 20 in the logging division (Roberts, 2008). A leaked AB memo suggested turning logging operations over to a contractor, implementing new logging methods, and changing the seniority rights of equipment operators. In September, 2008, union members voted overwhelmingly against the company's second and final proposal (Moore, 2008b).

Gary Healey, the union official, was critical of the company's decision to focus on cost reduction and its refusal to invest in improvements at the mill. He said that at least $20 million Canadian was needed to make the mill more functional, and that a $225 million investment in new technology would be required to make the mill competitive (Roberts, 2008). Jean-Philippe Cote, the company spokesman, disagreed. He said, "Investment alone won't fix the…cost structure and the labor structure of that mill. Without that, the mill will never be competitive." (Roberts, 2008)

On December 4, 2008, AB announced that the GFW mill would permanently close by the end of March, 2009 (Yakabuski, 2008a). About 400 mill workers and 350 loggers would lose their jobs; Grand Falls would lose its largest employer. On Friday, December 12, Kathy Dunderdale, Newfoundland's Minister of Natural Resources, sent a written message to AB's headquarters, demanding that the company "surrender forthwith entitlement to [all] resources" (Moore, 2008a). According to Jean-Philippe Cote, the message arrived after working hours on Friday and demanded a response by noon on Monday. Cote said that the company sent a reply, which suggested the creation of a working group to address issues related to the closing of the GFW plant.

On Tuesday, December 16, the House of Assembly, or legislature, of Newfoundland and Labrador province passed the Abitibi Consolidated Rights and Assets Act, commonly called Bill 75. Bill 75 expropriated (seized) all of AB's hydroelectric plants, dams, water rights, timber leases, and timber rights in the province (Moore, 2008a); the company owned three hydroelectric plants and several dams (AbitibiBowater, 2008c). The new owner of the seized assets is Nalcor, a recently created corporation that is owned by the provincial government (Brautigam, 2008). Bill 75 allowed AB to seek compensation from the provincial government for its hydroelectric plants and dams, but not for its leases, water rights, and timber rights. The amount of any compensation was to be determined by Newfoundland Premier Danny Williams and his Cabinet. Bill 75 forbids AB from bringing lawsuits in the provincial courts to recover the seized assets or contest the amount of compensation (AbitibiBowater, 2009b). The province did <u>not</u> seize the GFW paper mill.

Williams justified the legislation by saying that AB had broken a "covenant" with the province when it decided to close the plant (Moore, 2008a). According to him, the company's water and timber rights were dependent on operating logging and papermaking facilities in the province; to support his position, he quoted excerpts from a 1905 lease and a 1903 letter written by the president of the Anglo-Newfoundland Development Corporation. He later told reporters, "We are not giving away these hydro assets and these timber assets to a company that is no longer doing business in the province" (Brautigam, 2008). Williams also said that the company would be allowed to use the seized assets until the plant closed.

David Paterson, President and CEO of AB, was critical of the province's action. "We are surprised by this course of action, especially given that this unprecedented expropriation of property rights and assets does not address the announced closure of the Grand Falls mill and the needs of its 750 employees" (Abitibi

considers, 2008). Paterson pledged to protect the interests of shareholders, debt holders, employees, and other company stakeholders.

According to AB's initial estimate, the value of the seized assets was more than 300 million Canadian dollars (AbitibiBowater, 2009b). The company and the provincial government began negotiations about a severance package for the laid-off loggers and compensation for the seized dams and hydroelectric plants (Gibbens, 2009). On March 23, 2009, Newfoundland's Natural Resources Minister, Kathy Dunderdale, told the provincial legislature that the company had withdrawn from the talks. She did not give any details about the negotiations or the unresolved issues. A company spokesman expressed surprise, saying that "we still hope to resolve this issue in a collaborative way" (Gibbens, 2009). Company officials in Newfoundland said that the government's offer was much too low. Industry analysts said that it would be hard for AB to get more than $165 million Canadian for its dams and power plants.

As AB tried to negotiate with Newfoundland, the company's financial difficulties continued to mount. These problems were reflected in the company's Annual Report for 2008, which reported sales of 6.77 billion U. S. dollars, an operating loss of 1.43 billion dollars, and a net loss of 2.23 billion dollars (Abitibi Bowater, 2009a). The net loss included a write-off of $256 million dollars for the value of the assets seized by the province of Newfoundland and Labrador. Another problem surfaced in March, 2009, as the company negotiated with major creditors in an attempt to restructure $1.8 billion in debt; those negotiations failed. On April 16, 2009, AB filed for protection from its creditors (bankruptcy) in both the United States and Canada. Under court supervision, the company continued to operate and began work on another restructuring plan.

Expropriation Law in Canada

In Canada, seizure of private property is governed by national and provincial law. Robert Leckey, an expert in constitutional law at McGill University in Montreal, stated that Canadian provinces have broad authority to expropriate business property (Moore, 2008a). Property owners are usually entitled to compensation, unless the expropriation legislation states that no compensation will be paid, or the legislature clearly did not intend to authorize compensation (Newcombe, 1999, pp. 155-156). Newcombe (1999, p. 168) states that Canadian governments usually do not pay compensation when they seize leases and rights associated with the use of natural resources located on public property. Leckey confirmed that provinces are not required to pay compensation for water rights, timber rights, and timber leases (Moore, 2008a).

Expropriation of business property without compensation seems to be rare in Canada. The author of this case could find only one other recent example. Adroit Resources is a Canadian company that explores potential oil fields, natural gas fields, and mineral deposits. In 1995, the province of British Columbia seized a group of mining leases from the company in order to use the leased land for a public park (Adroit Resources, 2009). After fourteen years of negotiations and court proceedings, the Supreme Court of British Columbia ordered the province to pay Adroit slightly more than 600,000 Canadian dollars, plus accumulated interest and the company's legal costs (Adroit Resources, 2009).

A Request for NAFTA Arbitration

After the expropriation, AB consistently said that it would take legal action to procure fair compensation for its assets if negotiations with the provincial government were unsuccessful. As stated earlier, Bill 75 barred the company from filing a lawsuit in the provincial courts of Newfoundland. Since AB is incorporated in Delaware and has operations in the United States, it is legally an American company.

However, U.S. courts do not have jurisdiction in disputes between American companies and governments of foreign countries or provinces. Therefore, AB's only legal option was to take advantage of provisions in the North American Free Trade Agreement (NAFTA) that protect foreign direct investment among NAFTA countries. Specifically, a foreign investor can request arbitration of its claim against the government of another NAFTA country. Arbitration is a procedure in which two disputing parties submit their dispute to an impartial person, called an arbitrator. The arbitrator reviews evidence submitted by the parties, listens to arguments from both sides, and makes a decision (Arbitration, 2002).

The definition of investment in the NAFTA Agreement includes water rights, timber rights, and timber leases. Therefore, property owners who qualify for NAFTA arbitration are entitled to compensation when those assets are seized (Newcombe, 1999, p. 168).

According to Chapter 11 of the NAFTA Agreement (1994), the NAFTA arbitration process requires several steps:

1. The investor and the government involved are encouraged, but not required, to attempt to settle their dispute through negotiations.
2. At least ninety days before a claim is submitted for arbitration, the investor must file a Notice of Intent to Submit a NAFTA claim.
3. Ninety days after the Notice of Intent has been filed, and no sooner that six months after the events that gave rise to the claim, the investor can file a NAFTA Notice of Arbitration, also known as a claim. The claim must be submitted within three years of the situation that led to the claim.
4. A panel of three arbitrators is appointed to consider the claim.
5. Both parties submit evidence to the arbitrators. The arbitrators hear arguments from both sides and reach a decision. The decision is based on international law and may not be the same decision that would have been reached in the investor's home country.
6. Both parties have the right to request that the decision be amended or cancelled. For instance, if the arbitrators decide that compensation should be awarded to an investor, either side could request a change in the amount of compensation. Depending on the details of the claim, the two sides have 90 – 120 days to make such requests. The decision does not become final until the time period for requesting modifications or cancellation has ended, and any requests have been decided.
7. When the decision becomes final, any compensation must be paid promptly. Compensation is limited to (a) actual monetary damages, plus applicable interest, and arbitration costs, or (b) restitution of property, or (c) a combination of (a) and (b). Punitive damages cannot be awarded.

The NAFTA agreement sets specific requirements for lawful expropriation of investment property (NAFTA, Article 11, 1994):

- The expropriation must serve a public purpose. "Public purpose" means that the expropriation must serve the public good or support a legitimate government objective. For instance, the seizure of land needed to build a public school, a highway, or a government building would serve a public purpose.
- The expropriation must be "non-discriminatory," which means that the investor must be treated in the same way as other domestic and foreign investors.
- The expropriation must be done "in accordance with due process of law." Due process means that government actions must be fair and consistent with established laws, regulations, and procedures (Due process, 1996). The government must give

the property owner adequate notice that the property will be seized. In addition, the property owner has the right to a hearing, conducted by an impartial judge or arbitrator, before property is seized.

- The investor must be compensated for the fair market value of the assets, and the compensation must be paid promptly.

If any of these requirements are not met, the investor may be able to get compensation by requesting arbitration under the NAFTA treaty. On April 23, 2009, AB filed a Notice of Intent to Submit a Claim to Arbitration under the North American Free Trade Agreement. The company's Notice of Intent document stated that: (1) the expropriation of its assets did not serve a public purpose (2) the expropriation was discriminatory and retaliatory (3) due process of law was not followed and (4) the company had not been offered fair compensation for its assets (AbitibiBowater, 2009c). Under the NAFTA Agreement, the government of Canada is responsible for ensuring that Canadian provinces abide by the agreement. Therefore, the Notice of Intent was filed against the government of Canada.

In some cases, a Notice of Intent may persuade a government to negotiate with the company involved, in order to avoid arbitration. It is not clear whether the Canadian government negotiated directly with AB. If so, the negotiations were apparently unsuccessful. On February 25, 2010, AB filed a NAFTA Notice of Arbitration. The company is seeking approximately $500 Canadian in compensation, plus costs (AbitibiBowater, 2010).

Case Questions

1. How has the global business environment contributed to AB's financial problems?

2. After the union rejected AB's final offer, did the company have any reasonable options for making the GFW plant profitable? Justify your answer.

3. Does AB has a valid claim under the NAFTA agreement? Why or why not?

4. In the long term, will this expropriation benefit Newfoundland's economy, or will it harm Newfoundland's economy? Justify your answer.

5. Does Chapter 11 of the NAFTA treaty provide adequate protection for investors from one NAFTA country that invest in other NAFTA countries? Justify your answer.

DISCUSSION

The Global Context for this Case

In the global business environment, expropriation is a growing problem. The resurgence of socialism in South America has resulted in numerous expropriations. Since 2007, Venezuela has pursued an aggressive nationalization program in several key industries, including oil and gas, steel, cement, telecommunications, electricity, and food production (Belsak, 2008; Ixer & Brady, 2005). Business property belonging to Chevron, Exxon Mobil, Conoco Phillips, Cargill, and Heinz has been seized; companies from Venezuela, Europe, and Mexico have also lost property (Belsak, 2008; Ixer & Brady, 2005; Luhnow & Gold, 2007). Venezuela has paid compensation for some of the expropriated assets. The expropriation movement is not limited to Venezuela. Ecuador seized Occidental Petroleum's operations there without compensation (A textbook case, 2006). The government of Bolivia forced foreign oil and gas producers to transfer control of their operations to Bolivia's national oil company (A textbook case, 2006). Outside Latin America, Russia used expropriation without compensation to re-nationalize its oil and gas industry.

Luthans and Doh (2009) state that expropriation is most common in certain industries, including extractive industries, agriculture, food production, utilities, and transportation. The expropriations mentioned in the preceding paragraph occurred either in industries mentioned by Luthans and Doh (2009), or in the steel and cement industries, which produce key building materials. Luthans and Doh (2009) also state that expropriation is most likely in countries that are poor, politically unstable, and suspicious of foreign companies. All four countries mentioned in the previous paragraph appear to fit at least part of this profile. In recent years, Venezuela, Ecuador, and Bolivia have moved from democracy and market economies to socialist regimes that have drawn strong support from indigenous people and others who believe that they did not benefit from capitalism. The leaders of all three countries have encouraged suspicion of foreign companies. Since the collapse of the Soviet Union in 1992, Russia has experienced political instability, high unemployment, and a lengthy revolt in Chechnya. Geopolitical considerations also contributed to Russia's decision to re-nationalize the production and distribution of fuels. Oil and gas revenues provide substantial funding to the government and political leverage in dealing with countries that depend on Russian fuels. For instance, Ukraine recently extended the lease on a Russian naval base in Ukraine, in return for lower gas prices.

The work of Luthans and Doh (2009) suggests that the expropriation of AB's assets was unusual because it occurred in Canada, a stable democracy with a market economy and a high standard of living. Both the AB and Adroit Resources expropriations involved seizures of rights to natural resources on public lands without compensation. That aspect of the case is consistent with global patterns of expropriation, as described by Luthans and Doh (2009).

Discussion of the Case

This case has been tested in Global Business and International Management courses. It is a good case for MBA students and a challenging one for undergraduates. It is advisable to cover global business strategy and political risk management before the case is assigned. While most of the NAFTA Agreement focuses on trade, this case can be used to make the point that NAFTA includes some protection for foreign direct investors.

The central issue of the case is not the fact that some of AB's assets were expropriated, but whether Newfoundland met the legal standards for expropriation in Chapter 11 of the NAFTA treaty. Some Canadian legal experts have stated that AB has a strong case for compensation. Bill Dymond, a senior fellow of the Centre for Trade Policy at Carleton University in Toronto, criticized the government of Newfoundland for expropriating AB's assets without due process and without paying fair compensation. According to Dymond, "There can be little doubt that AbitibiBowater has a compelling NAFTA case" (Dymond, 2009). Another prominent lawyer, Michael Robinson of the Fasken Martineau law firm, stated that AB's timber rights meet the definition of investment in the NAFTA agreement. He added, "If you have a license to cut timber, that has a value. Whatever license they have is an investment with value, and fair market value has to be paid if you take it away" (Moore, 2008c).

Brief sample answers to the case questions, written by the author, are given below.

1. AB has faced increasing global competition from Asian and South American paper mills, which have larger plants and more efficient technology. The availability of online news has caused newspaper readership to drop sharply in Europe and North America. AB's Canadian plants pay for inputs in Canadian dollars, but their exports are priced in U. S. dollars. Canadian paper producers could not raise their prices enough to compensate for the declining

value of the U.S. dollar and were caught in a "cost-price squeeze."

2. It is unlikely that AB could have made the GFW plant profitable without major concessions from labor. In 2008, the company suspended dividends to shareholders, which is usually an indication of financial distress. AB was heavily indebted and could not have invested in new technology at GFW. It is doubtful that the company could even have invested $20 million Canadian for the purpose of making the mill more functional. Even if AB had been financially sound, declining demand suggests that investing in new papermaking technology would be a poor use of capital.

   Some of the author's students suggested that AB should have sold the GFW mill to another company. It is not clear whether AB made an effort to find a buyer. This would probably have been difficult, since the new owner would also have faced declining demand, high costs, intense foreign competition, and the need to update obsolete technology.

3. There is enough information in the case to support the argument that AB has a valid NAFTA claim. The company's assets were seized on short notice, and the company was not allowed to contest the seizure in court. Allowing the company to negotiate with Premier Danny Williams and his Cabinet is probably not an adequate substitute for a court hearing, since Williams and his Minister of Natural Resources, Kathy Dunderdale, played key roles in the expropriation and are not impartial. These facts can be used to support the argument that due process was not followed. In addition, the company was not compensated for the seized assets. The NAFTA Agreement requires fair compensation. The author believes that this argument is an adequate answer to the question. Some of the author's students also addressed other issues, particularly discrimination and public purpose.

   Newfoundland's failure to pay compensation was probably not discriminatory. According to the case, Canadian provinces are not required to pay compensation for water rights, timber rights, and timber leases on public land. Provinces usually do not pay compensation for those assets. In a similar situation, a Canadian company, Adroit Resources, had to file a lawsuit to get compensation for mineral rights.

   The province of Newfoundland has a reasonable case that the expropriation served a public purpose. The province may be able to use the seized assets to attract new businesses. It might be cheaper for a potential new employer to purchase hydroelectric power or resource rights from the province than from AB. However, AB is likely to argue that the assets were seized in retaliation for the plant closing. AB may base its argument on the timing of the seizure, the lack of due process, and the denial of access to the court system. Even if the arbitration panel rules that the expropriation served a public purpose, the author believes that the panel will award AB compensation for the seized assets, for the reasons given in the first paragraph of this answer.

4. The expropriation of AB's assets may deter potential new employers that need water rights, timber rights, or other natural resources on public land. Those companies may decide not to do business in Newfoundland. Since Adroit Resources had a similar experience in British Columbia, some foreign

companies may decide not to do business in Canada. However, the expropriations may not affect location decisions by companies that do not need natural resources from public land. Newfoundland could reduce the long-term impact of the expropriation on its economy by developing and implementing a strategy to attract that type of company. In addition, the provincial legislature could enact a law to guarantee fair compensation and due process of law when natural resource leases and rights are expropriated.

5. The NAFTA Agreement establishes criteria that governments should meet when they expropriate business property. The NAFTA arbitration process provides legal recourse for a company that has not received fair treatment or fair compensation. The company has a right to a hearing before a panel of three arbitrators. Both the company and the government involved can appeal for cancellation or modification of the arbitrators' decision. If compensation is awarded, it must be paid promptly.

   The NAFTA arbitration process seems reasonable, and it is likely to help some companies that have no other legal recourse, and some that are dissatisfied with a court decision that was reached in a NAFTA country other than their own. However, NAFTA claims are decided under international law. In some cases, the verdict of the arbitrators may be less favorable to the company than the decision that would have been reached in the company's home country. When that happens, companies may believe that the arbitration process did not adequately protect their interests. Students' answers to this question may vary, but they should recognize the role of international law in arbitration decisions.

Today's business graduates should be prepared to meet the challenges of the global business environment. This case raises several issues that students need to consider. First, the business conditions that AB faced are not unique. The combination of declining demand, high costs in the home country, and intense foreign competition has also been faced by American companies in the steel, textile, and furniture industries. The first case question asks students to explain how the global business environment affected AB, and the second question confronts students with the difficulty of developing a viable strategy in a declining industry. Second, when companies make international facility location decisions, they should evaluate political and legal risks. In answering the fourth case question, students should consider the impact of the AB expropriation on the willingness of firms to locate in Newfoundland. Third, in a global economy, companies must deal with unfamiliar legal environments. The third and fifth case questions require students to evaluate legal issues in an international context.

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ADOPTION OF SOCIAL MEDIA BY CORPORATIONS: A NEW ERA

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ABSTRACT

Corporations are continually embracing the new areas of social media, especially social networks. Employees utilize social media on a daily basis to communicate with others both internal and external to the corporation. Their usage has raised many concerns for the employer. This paper discusses the growing trend of social media along with its benefits, risks, and some legal concerns for the corporation.

INTRODUCTION

Social media are fast becoming a part of the corporate landscape, literally transforming the traditional business world. A survey of 400 companies conducted by Deloitte, LLP, confirmed that 94% of companies are planning to increase or at least maintain their current level of investments in tools used for social media and in online communities (Betts, 2009). These media include six major areas, namely social networking, blogs, podcasts, message boards, wikis, and online videos (Barnes & Mattson, 2008). Broad spectrums of industries from banking to manufacturing to retail are creating internal networks, protected by firewalls, to connect employees and to allow them to create their own profiles. This networking fosters collaboration across divisions and leads to increased innovation (Brandel, 2008). Additionally, use of external social media is also accelerating, especially for marketing and sales purposes. Examples of common sites for this activity include MySpace, Facebook, LinkedIn, Twitter, and YouTube.

This paper addresses social media in general, identifies the benefits and risks of their use, and discusses some issues that corporations may find helpful to minimize their legal exposure in allowing social media usage in their workplace.

BACKGROUND

According to one study, 60% of Americans interact through social media and of these, a whopping 93% want companies to be visible on social media sites. Also of this 60% of social media users, a majority (59%) already interact with companies regularly through social media. Furthermore, 85% of these users think that companies should utilize social media for interaction with customers. And interestingly 56% of users perceive that they are getting better customer service and have a stronger connection through this social media interaction with companies. Also, men are almost twice as likely to interact frequently through social media to companies as women are (Larrumbide, 2008).

Social media usage in companies is increasingly becoming at the heart of employee communication in this growing age of technology. Barnes and Mattson (2008) performed one of the first longitudinal studies about corporate use of social media. Their population was the fastest growing INC 500 companies in the United States private sector. Results indicated that 77% of the INC 500 companies utilized at least some type of social media tool. The most popular form was social networking with usage at 49% in 2008, an increase from 27% in 2007. Also, when asked in 2007 about the importance of social media to their business and marketing strategy, 26%

responded "very important." One year later that figure had risen to 44%, a healthy 18% increase (Barnes & Mattson, 2008).

The business model for social networks contrasts sharply with the traditional business model where customers and suppliers are two separate agents. Given the very nature of a social network, users perform both roles, that of supplier and that of consumer of content. For free social network sites, revenue is usually generated through advertisements (Jesdanun, 2008). If member subscriptions are required, this becomes the source of revenue for the site. Some suggest that as social networks grow larger and larger, they may attract spammers and other less desirable intruders (Lundquist, 2008). Certainly this is a concern. Nonetheless, the social network business model is thriving.

In today's turbulent environment, corporations are searching for ways to use social networking to enhance business operations. Internal social networking has been expanded to foster collaboration and communication among company employees. For example, Hot Topic, a 690 store retail chain, is launching an internal social site for employees to use to share ideas and data (Swartz, 2008).

However, the real issue corporations want to document is return on investment (ROI). Some are starting to report such data. For example, the Georgia Aquarium found an application of social media that increased its revenue $42,000. Specifically, the aquarium offered visitors a 25% to 40% discount on the admission price for those who followed it on Twitter or signed as fans on either Facebook or MySpace. And this return was for only a four-month promotion. The aquarium was able to track the promotion through a specially created URL, and thus ROI, an illusive figure for technology investment in the past, was documented (Pratt, 2009). Aquarium employees had changed the landscape for marketing and communicating with potential customers with this innovative thinking.

Social networking by companies in Europe has been documented also. Specifically, 65% of employees in Europe report that their everyday work life includes social networking. In contrast to the United States, more large companies than small and medium enterprises (SMEs) in Europe use social media tools. Large companies focus on internal social networks while SMEs use more external social networking tools. In general, two-thirds of employees in Europe feel that their companies are more transparent and more open because of the adoption of social networks. By country, Germany has the highest adoption rate and Great Britain the lowest (Taylor, 2008).

BENEFITS

The benefits of social networking are just beginning to be recognized with more to emerge as new applications are found. Companies constantly look for improvements in their business operations, and social networks have gained their attention especially as the economy began to falter more drastically over the last number of years. Internal social networks surfaced as a way to increase communication and to improve productivity particularly as travel amongst employees for collaboration became increasingly cost prohibitive. Thus, utilizing social networks has the potential to be a cost saver rather than a time waster (Lundquist, 2008).

Greater innovation was also fostered by collaboration across divisions within a company. Employees began to use social networks to discuss business issues, and they generated solutions that had a business impact. Deloitte, IBM, and Best Buy are three companies that have successfully used internal social networks to enhance and transform their respective businesses (Brandel, 2008).

Twitter has emerged recently as a slightly different type of social medium that shows benefit for many businesspeople. They "tweet"

(a new term that has been created for talk) about business topics. And surprisingly, a study shows that persons in the age range of 45 to 54 are slightly over one-third more likely to use Twitter than other age groups. Tweeting on Twitter is about following information rather than persons one knows. One may not know the person, but one follows the information and news from him or her because the things said are of interest. And so, on Twitter one can gain benefit either by tweeting or by listening (Finnie, 2009). Other benefits attributed to use of Twitter are improved project tracking, decreased volume of company e-mail, and continued ability of an employee to connect and collaborate, leading to improved awareness of knowledge and expertise among employees (Rapoza, 2009).

Healthcare professionals are now adopting social networks to disseminate and manage medical knowledge. For example, the social network site, Sermo, is used to bring doctors together to discuss patient cases peer to peer and to share universally their collective medical knowledge. Sermo is considered a dedicated site for healthcare professionals. To be listed as a member, the physician must be matched for identity against a list from the respective state licensing board. This validation is, of course, done rather instantly because of the online availability of this licensing information (Luo, 2007).

Small businesses benefit from using social networks in several ways. They can ask questions, seek advice, and gain valuable business contacts. For example, an online lingerie company visited a social network site to locate a reputable search engine optimization firm. Almost two dozen suggestions came within 24 hours. Specifically, the small business owner benefited by others sharing their experiences with optimization companies. Forming social networks provides an instant peer group for small businesses that traditionally do not have such support (Schwartz, 2008).

The value of social media for marketing has brought mixed results for small businesses. One study reported that 22% of owners earned profit while 19% lost money from their social media marketing efforts. And two separately reported examples regarding small business owners agree that to reap benefits from social media marketing an intensive, consistent investment of time is required to engage continually potential customers through social media (Needleman, 2010).

Other benefits of social networks include recruitment and career networking. The first area is on the employer side and the second more on the employee side. Thus, both contribute in a positive way (Sachoff, 2007).

In Europe, 74% of employees feel that social networks have benefits. Specifically eight items were reported as benefits. They include the following: (1) knowledge base of employee increased [38%] (2) availability of problem solutions [38%] (3) capture collective knowledge over the supply chain [36%] (4) increase of internal collaboration and stimulation of team building [32%] (5) better creativity [31%] (6) better cross functional team formation and interaction [29%] (7) timely access to all key persons needed [26%] and (8) innovation motivation [24%] (Taylor, 2008). These are clearly benefits that have documentation and so cannot be easily dismissed.

RISKS

The risks of social networks are certainly of concern to and at the same time a challenge for the employer. The main concerns of employers are centered around security, productivity, and bandwidth capacity (Sachoff, 2007).

Security encompasses several areas. Exposure to worms, spyware, and viruses are common malware hazards, especially since social networks have few restrictions regarding links

and content. Leaking of corporate secrets and disclosing of personal information are two more risks. And, the potential legal liability of a United States employer for acts like harassment or slander by its employees is another concern that could have costly consequences for the company (Perkins, 2008).

Despite the benefits to productivity possible with social networks and other social media, the opposite can occur also. Decline in employee productivity is possible without monitoring and/or company policies to rein in social network usage for personal reasons. In fact, a limit on business use of social networks is prudent to ensure that an employee's time is used efficiently and effectively (Perkins, 2008). By extension, this same caution exists for all social media.

Scammers have used social networks for luring customers of a particular brand of product to e-commerce sites that sell counterfeit products. They also entice them to either malware or phishing sites. In a one-year period spanning part of 2008 and 2009, phishing attacks soared 164% on social networking sites. Furthermore, in a survey of senior marketing executives, almost 20% of them reported being victims of online scams and phishing attacks aimed at hijacking their company's brand names. Other diversionary tactics used by scammers include cybersquatting, illegal use of a trademark, and illegal reproduction of digital media (Mitchell, 2009).

Large files such as pictures, music, or videos can affect bandwidth. If too many such files are downloaded and stored, the employer's infrastructure can be crippled. So limits on personal downloads should be addressed by the employer (Perkins, 2008). Even further, employees need education about file size to avoid causing a business download problems with bandwidth. One aspect to include in this knowledge base would be how to zip files for transfer and unzip them for reading.

Another emerging area of concern is the online reputation of a company. Postings on social media about product defects or the ranting of a disgruntled customer can negatively affect the company's reputation (Hoffman, 2008). It only takes seconds for a negative blog, a negative podcast, or unfavorable chatter on a social network site to cause substantial damage to the reputation of the company. But not all potential damage to a company's reputation comes from customers and others outside the company. Employees can become zealous in using social media and not realize the impact of what they are doing (Vijayan, 2009). Thus, continual monitoring and assessment of social media are important in order to be proactive in managing today's company reputation. Additionally, employee education and internal regulations regarding employee use of social media are positive steps in preserving the reputation of the company.

In a European study, 79% of employees linked social networks with a negative. The two main negatives that were identified are as follows: (1) employee distraction [49%] and (2) confidential information leaks by the company [45%]. Regarding return on investment (ROI) of internal social networks, 24% of employees were not sure this measurement was even possible (Taylor, 2008).

LEGAL CONCERNS

Use of social media can have legal consequences for a company. Corporate blogs can increase or decrease a company's liability depending upon how they are used. The following are a few examples to consider.

Statements that have potential to invade privacy of others need to be avoided. Also, the company should always scan posted statements to eliminate any content that could be considered defamation of character regarding a person or business. Using words like "alleged" or "may" could lessen company risk (Savell, 2007).

Blogs can be seen as advertisements. As such, all laws applicable to advertising, to consumer protection, and to unfair competition rules would then apply. Brand names and trademarks used in social media are other related areas of potential concern (Savell, 2007).

In general, employers are responsible for blogging that employees do within the scope of their job. The company for its protection should establish corporate policies regarding this area. In fact, legal counsel would be prudent to be proactive in reducing liability (Savell, 2007). And this caution is not just for those in marketing, communications, and customer support. The legal, information technology (IT), and other individuals involved with information security should be included in social media education to decrease liability of the company (Vijayan, 2009).

Providing external links and allowing third parties to post or comment on a company blog can result in corporate liability. Prudently the company should notify those who post that they, simply by posting, are attesting to their right to the content of the posting they make. This can lessen the company liability but not remove the possibility of being sued for plagiarized content. Also, immediate removal of the plagiarized content if posted can give the company some lessening of liability, although again, not complete protection from responsibility. Statements denying responsibility for content or products on sites to which the company links are essential. Having a "terms of use" section and properly worded disclaimers on social media sites also help minimize legal exposure (Savell, 2007). Finally, given the complex nature of this type of liability, retention of legal counsel may again be prudent.

In view of these legal concerns and more, the web security firm, ScanSafe, reports that one third of companies block employee access to social networking sites. In only one year this figure had risen 17% from the previous year (Sachoff, 2007). In a study by Forrester consulting, it was reported that 58.4% of the interviewed large firms had a policy against social network usage at work (Abeidoh, 2007). These percentages reinforce the increasing concerns of employers in this legal area.

Social media are also victims to breaches by hackers and identity thieves. Just recently, Twitter has had problems with hackers hijacking the accounts of high profile users and organizations. This violation of security showed that social media are very vulnerable, and so corporations must have strong security tools and practices in place to help deter problems and potential liability (Gaudin, 2009).

CONCLUSION

Use of social media has benefits and risks for a corporation. Given this age of technology, a corporation cannot ignore either. The goal, of course, is to gain the benefits while minimizing the risks. To do this, a company must become thoroughly informed about social media. Employees need to be educated about the legal ramifications that could result from their usage of social media. Then those individuals in the decision process can make assessment as to whether use of a certain social media outlet will benefit the company. After that decision, company policies and regulations for employee use of social media help to minimize the potential risks and liability. Managing issues relating to social media are in the future of all corporations, large and small, if not in the present.

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MORAL PHILOSOPHIES: A FRAMEWORK FOR GUIDING UNDERGRADUATE DECISION-MAKING IN BUSINESS ETHICS EDUCATION

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ABSTRACT

Debate among business faculty continues on pedagogical issues related to teaching ethics in business courses. This paper specifically focuses on an overview of various moral philosophies for incorporation into business education. This overview may increase faculty and student understanding of the philosophies and use for decision making when faced with ethical dilemmas.

INTRODUCTION

The basis for the current financial crisis can be attributed to many factors, stimulating discussion among economists, politicians, business and industry leaders, and citizens. Included among these factors are failure of government, a lengthy and expensive war, and poor business and consumer judgment, to name just a few. A growing number of scholars, economists, and religious leaders are pointing to a greater underlying influence: a lack of, or insufficient use of ethics in organizational practices (Fischenich, 2009; Friedman, 2008). Public confidence and trust have eroded in today's business world.

As trust in business and industry declines, corporations have moved toward developing ethics and social responsibility programs for employees. Simultaneously with this increasing focus in the corporate world, ethics education in business schools has garnered increasing attention and parallels the efforts of business and industry (Giacalone and Thompson, 2006; Waples, et al, 2009; Weber, 2006). The current business climate challenges business schools and universities to improve ethical decision-making skills among students and graduates (Perri, Callanan, Rotenberry and Oehlers, 2009).

The Association to Advance Collegiate Schools of Business (AACSB) launched a task force investigation on the state of ethics education in member business schools and affirmed the significance of ethics education. A 'renaissance' in teaching ethics in business classes was recommended to help prepare students in ethical decision-making in business careers.

At the same time, considerable debate exists among academicians regarding the appropriate pedagogical methodologies, content, and assessment criteria that are most effective in college classrooms (Baetz and Sharp, 2004; Cornelius, Wallace and Tassabehji, 2007; Weber, 2007). Simply put, there is a lack of consistency in any stipulations pertaining to how ethics instruction is designed and delivered (Waples, et. al, 2008). On one extreme are those individuals who hold a strong cynical attitude. They are reluctant to incorporate ethical thinking into business school curricula believing that a person develops morals and a moral compass in youth and enters the business world with predispositions toward a particular ethical behavior (Halbesleben et al., 2005). From this point of view any efforts to modify a person's ethics are ineffective (Perri et al., 2009). An over-crowded curricula and inappropriately qualified and/or indifferent faculty compound the resistance (Kelly, 2005). Adding to this, contemporary studies reveal little or no

correlation between ethics education and moral development of students (Loescher, 2004).

On the opposite side are those individuals who believe that ethics can and should be taught. This position states that a greater understanding of moral philosopies provides a reference from which students can make justifiable decisions when confronted with ethical dilemmas. Support can be found in a recent study indicating that students' level of moral reasoning was higher in those courses in which faculty discussed ethics versus a lower level in those courses in which faculty did not address ethics (Desplaces, Melchar, Beauvais and Bosco, 2007). With numerous studies supporting each side of the debate, it appears that ethics education is and will continue to be a justifiable area of education research.

Another debate among business faculty that goes beyond the ability to teach ethics is the question of whether or not to include a discussion of the moral philosophical foundations underlying ethical decision-making. The position of this paper is that business faculty should consider the inclusion of moral philosophies in the instructional content of ethics education as a preferable and integral component. The literature is still relatively young in empirical studies related to content of ethics education, and even within that literature, instructional content varies considerably (Sanyal, 2000; Schaupp and Lane, 1992). Given the current lack of standardization for ethics pedagogy and an imperative need for ethics training for faculty, this paper contributes to the dialogue on ethics content by offering a framework of moral philosophies for faculty and students.

The underlying notion of the 'principles approach' to ethical decision-making is the belief that business managers need to have a basis, a solid foundation, a reference point from which to make their decisions (Carroll and Buchholtz, 2006). One argument to justify the inclusion of philosophical foundations was addressed by Padgett (2008), "Leadership is not just knowing what you believe, but involves understanding why you believe it, being able to give a rational and critical justification and philosophical defense of one's beliefs and valuess" Put simply, a moral principle or philosophy is a 'guideline,' or reference point that aids in decision-making in regard to which ethical course of action to take (Carroll and Buchholtz, 1990).

When presenting moral philosophies, the goal for business faculty is not to 'indoctrinate' students into using one or another philosophy for use in ethical dilemmas, but rather, to give them more tools. Business educators themselves may not be well equipped with the background and knowledge to credibly present material on the various philosophical foundations available. Lack of time and money may prevent faculty from taking coursework in philosophy. Therefore this paper provides a succinct overall review two categories or dimensions of moral philosophies.

TELEOLOGY

The Teleological school of ethical thought states that a person can determine the moral rightness (or wrongness) of his/her decision/action based on the resulting consequences of that decision/action. Thus said, if the outcome is positive, then the decision was morally right. On the other, if the results of the decision/action are negative, it assumes that the decision/action was morally wrong. Those individuals utilizing the Teleological philosophy believe that in the end, it is the 'ratio' of positive to negative results of the decision/action. Within this foundation are more specific schools of thought: "Egoism," "Utilitarianism," and "Relativism" (Situational).

Egoism

Egoism contends that whenever a decision/action promotes an individual's or organization's best interest in the long run, it is

considered an ethical act. Those who follow this foundation believe in sacrificing in the short term in order to benefit with a long-term gain. In business, decisions and policies are commonly judged as being good if they prove to be significant in the long run future for the individual, the organization or business unit. The key word for 'egoism' is long-term benefit; therefore egoism is recognized among those decisions and behaviors in which one is simply looking out for themselves above all others. One criticism of this orientation is that business actions take place within the sphere of a larger society, and as a result many individuals and organizations are affected by one's decisions/actions, and are not taken into consideration by egoists. The consequences of an egoist's decision(s) are solely judged as good or bad on the best long-term results of the individual(s) or organization of concern. One final criticism of egoism is the conflict that occurs when two or more egoists are making decisions. A conflict of interest takes place and ultimately one or more decision-maker will need to make a sacrifice to the other(s). Egoists struggle with seeing another person's point of view, justifying the term "ego"ism. Although making sacrifices in the short run is an ideal of egoists, it is not ideal when another's long term benefit takes precedent over their self-serving interests.

Utilitarianism

As the predominant and most often used ethical theory, utilitarianism states that a decision concerning business conduct is considered appropriate if and only if the decision's consequences extends the greatest good to the greatest number of people. From a utilitarian's ethical philosophy, the best interest of everyone concerned is considered the right and ethical consequence when making a decision. The classic thought that "the end justifies the means" is a utilitarian expression (Murphy and Laczniak, 2006). This foundation guides a course of action as being good when it provides more positive results more than any other option. Self-interest is put aside in favor of the 'general good' as the guiding standard under utilitarianism. Beyond owners, managers, and employees, external stakeholders in the larger society are considered, including customers, the community, shareholders, and suppliers. The difficulty with this ethical foundation is that there exists a difficulty in coming to a consensus on satisfactory rules and/or exceptions to the rules of what is "the greatest good" for the best interest of others.

Relativism / Situational

Those who rely on the relativist approach justify its use by the belief that ethical practices vary among different cultures; that what is considered correct in one culture is seen as wrong in another culture (Murphy and Laczniak, 2006). This philosophy, more commonly known as 'cultural relativism, ' is strongly considered when engaging in international business environments. An even more pronounced position of this theory is 'moral relativism' that advocates a decision being right or wrong depending on what is adamantly adhered to in a specific culture. This decision-making situation for business executives is the most challenging in the global marketplace (Murphy and Laczniak, 2006). When the legal environment of another country or culture differs from those in the United States, business managers run a very high risk of breaking the law, such as in the case of bribery that is prohibited under the Foreign Corrupt Practices Act.

DEONTOLOGY

The Deontological philosophy argues that there is more than consequences to consider when making ethical decisions. The Greek word 'deon' means 'duty' and thus decisions under this philosophy are judged as being good or right by the decision itself and not regarding any consequences of the decision; these decisions stem from one's fundamental obligations to society, that it is one's 'duty' to behave in universally acceptable ways. Similar to the

Teleological orientation, there are several specific theories associated with deontology: Kant's Categorical Imperative, Ross's Prima Facie Duties, and Rawl's Principle of Maximum Justice and Rights.

Kant's Categorical Imperative

The philosopher, Immanual Kant, contended that morality could be categorized into categorical imperatives – that in all situations for all people, there is defined behavior that is everyone's duty to follow. Three proposed rules are included in Kant's moral theory: (1) Make a decision or engage in behavior that is universally acceptable: theft is universally viewed as wrong (2) Always treat people as an end and never as a means: manipulating consumers is a means and not considered human beings, as an end, in order to achieve firm goals and (3) Always behave as if you were both sovereign and servant at the same time: respect for all stakeholders as members of a moral community is an ideal that is universally accepted).

Ross's Prima Facie Duties

William David Ross put forth the philosophy that those 'duties' of humankind towards others are to be followed, except in certain circumstances when they may not apply. A 'prima facie duty' is one that at first sight is the mandatory action to take when all else is equal and there are no other existing conflicting duties. More precisely, the six (6) prima facie duties are: (1) Fidelity: it is our duty to tell the truth, keep promises and contracts to others (2) Gratitude: it is a duty to demonstrate thankfulness and appreciation (3) Justice: our duty is to distribute pleasure, recognition, and rewards according to the merits of those concerned (4) Beneficence: it is our duty to be socially responsible, to drive it within our organizations, and to improve the situations of people who need help (5) Self-Improvement: we have a duty to make every effort to use our talents to their fullest potential; and 6) Non-Injury: it is our duty not to cause harm to others (Chonko, 1995).

Principle of Maximum Justice

John Rawls proposed the moral theory that the principles of 'liberty' and 'difference' should never be violated in our decisions and actions. The 'liberty' principle guides us by the belief that every person has equal rights to the most basic liberties. The 'difference' principle states that when making a decision or engaging in an action, that an action should never be taken that continues to disadvantage those people in society who are the least well off; the greatest benefit is to be received by the most disadvantaged people where social and economic inequalities exist; and it is unethical to exploit one group for the benefit of self/others (Murphy and Laczniak, 2006).

Principle of Rights

From this philosophical view, human rights cannot be overlooked. One's rights can only be dominated by another basic right. Moral rights are not always dependent upon legality in order to be considered legitimate; rather they are rights that should not be violated for any issue at hand. For example, people have the right to life, liberty, and the pursuit of happiness according to the United States Declaration of Independence. Today, human rights and the right to property are also often included.

COMBINATION OF TELEOLOGY AND DEONTOLOGY

Principle of Caring

The view of the 'care' perspective focuses on decisions that are consistent with stakeholder theory. In business, there is more attention on organizational responsibilities and care for

customers and employees. Quality and profit are not the criterion for success of firms that embrace the care principle. Many successful 'caring' enterprises are those in which employees feel empowered and part of a team, holistically working together toward achieving common goals. This approach to decision-making is a relatively contemporary platform.

Virtue Ethics

Receiving renewed interest and support due to the current overwhelming use of 'relativism' is the theory of ethics known as virtue ethics. In contrast to society's rampant relativist approach that inhibits the ability for one to come to a moral agreement on ethical dilemmas,' virtue ethicists is a renaissance of the Greek ideal that everything in our lives is to be guided by a quest for goodness and virtue (Murphy and Laczniak, 2006). The fundamental difference from other moral philosophies is that virtue ethics focuses on the individual making the decision rather than the decision itself, the consequences of the decision, the duty, or any of the rules or principles. The focus is not on what the public thinks of an individual or an organization, but instead zeroes in on becoming the ideal ethical person or organization through following a certain value statement or credo. Aristotle's writings are the underlying influence of virtue ethics. Some of the key elements that reflect this philosophy are the practice of good habits that can be taught, learned, and fostered within an organization. To a virtues ethicist, a person or company can never be too ethical. Additional Aristotelian virtues that business executives and scholars have enumerated include: (1) truthfulness/honesty/integrity (2) justice/fairness (3) trust/dependability (4) generosity/charity (5) respect for human dignity/consideration (6) humanity/kindness (7) empathy/care (8) civility/courtesy/respect/good manners (9) gratitude/appreciation and (10) self-control/discipline in our decision-making and actions. Seeking a balanced engagement of each virtue is also emphasized. For example, too much truthfulness about one's actions is considered boastfulness and not 'balanced.'

The Golden Rule / Rule Deontology

This code commands us to treat others in the same way that we desire others to treat us. Without exception, we want everyone to treat us fairly, therefore we should treat consumers and all stakeholders fairly in all of our business decisions and refrain from decisions and actions that we don't want performed against us. Conformity or non-conformity to this general moral principle determines ethicalness and overrides all other ethical orientations when making decisions (Ferrill, Fraedrich, and Ferrell, 2008).

SUMMARY

Business professionals face ethical issues every day. Decisions regarding those problems need to be made. Yet, most business professionals have little or no education or training in either ethical decision-making or the ethical philosophies. This is also the case for business students who will be future business professionals. As business schools address the inclusion of ethics education in their curricula, this paper offers a brief, useable reference and guide for discussion in business courses for both faculty and students in decision-making.

The aforementioned moral philosophies for use in guiding one's decisions when faced with an ethical dilemma are not comprehensive. It would take a series of philosophy courses to cover all of the philosophies in their entirety. Furthermore, not all of the philosophies are pertinent to business situations. The philosophies presented in this paper are limited to those frequently regarded as most helpful for business. The two pertinent categories are Teleology and Deontology. A third category is a combination of the two. Teleological theories concentrate on the consequences or results of the actions produced by the decision, and include Egoism, Utilitarianism, and Relativism.

Underlying the Deontological philosophies is the argument that decisions should be made on 'duties' that human beings have towards each other and not consequences. Included in the deontological paradigm are Kant's Categorical Imperative, Ross's Prima Facie Duties, and the Principles of Justice and Rights. Those philosophies that are some combination of Teleology and Deontology are the Principle of Caring, Virtue Ethics, and The Golden Rule.

Although the use of one, single moral philosophy consistently by itself in business may be difficult, a basic understanding of each philosophy assists decision-makers in seeing the critical issues. If current business managers appear to have little or no understanding of the philosophies, the same can be said of current and future business students – tomorrow's business managers and decision-makers. Through the use of case study analysis of ethical dilemmas and the application of the principles presented in this paper, business students may develop an ability to automatically refer to these principles in decision-making.

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LESSONS LEARNED FROM UNIVERSITY DATA BREACHES

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ABSTRACT

This paper gives an analysis of reported data breaches at universities and colleges in the United States. Categories of breached data are introduced and analyzed based on breach incidents and related records. Analysis of breach data are made based on category, year of reported breach and the state where the breach occurred. Based on the totals for each category, breached records ranged from 140,993 to 5,343,329, the number of incidents ranged from 6 to 110, and 29% of the universities have had multiple incidents. The results reveal specific patterns of vulnerability at universities and lessons that could help reduce the vulnerability.

INTRODUCTION

The Federal Trade Commission (FTC) 2011 Congressional Budget Justification Summary states that identify theft was the top consumer complaint for nine straight years as of 2008 (FTC, 2010). The Consumer Sentinel Network Data Book January – December 2009 reveals that identify theft remained the top consumer complaint in 2009 (FTC 2010-2). Thus, identity theft has been the top consumer complaint for ten consecutive years. In 2009, over 1.3 million fraud and identify theft complaints were recorded in the Consumer Sentinel, a database developed and maintained by the FTC (2010-2). In recent years, efforts have been made to reduce cyber crime activity, that is, crimes involving computers. The United States Computer Emergency Readiness Team (US-CERT) (CERT, 2008) offers response support and defense against cyber attacks through cyber security alerts, bulletins and tips about current security concerns, vulnerabilities and exploits. They focus on making both the public and industry aware of security issues through publications, posters, pamphlets and monthly and quarterly reports about cyber crime. The Department of Justice's Computer Crime and Intellectual Property Section (CCIPS) is dedicated to combating cyber and intellectual property crimes worldwide (nd).

Computer security researchers are continuously trying to improve data security with a large variety of techniques. Hazay and Lindell (2008) use standard smartcard infrastructure to build efficient secure protocols, with emphasis on maintaining the privacy of sensitive data, for commercial, governmental and security agencies. Dynamic taint-analysis (Newsome and Song, 2005; Sabelfeld and Myers 2003) identifies suspicious data as tainted, and tracks the processing of the tainted data to monitor its use in a system. Chin and Wagner (2009) apply character-level taint tracking to securing web content. Enhanced and improved techniques, based on dynamic taint-analysis, have been used to enforce security during software execution. Chang, Streiff and Lin (2008) developed a system that uses dynamic data flow analysis to enforce security policies in a program, after identifying locations in the program where security violations might be possible. Xu, Bhatkar and Sekar (2006) provide an effective

security attack detection technique that tracks suspicious data through programs, in multiple languages for different types of applications, at the granularity of bytes. This method examines the origin of each byte of data that is used in security-sensitive operations. Juneja (2009) investigates the use of honeypots to detect malicious attacks earlier than traditional antivirus software. Honeypots act as decoys to prevent malicious software from harming a system.

In spite of the vast research in computer security and the many agencies and initiatives dedicated to preventing cyber crimes and security breaches, frequent data breaches still occur. Dr. Eugene Schultz, Principal Computer Engineer, University of California-Berkeley Lab and editor-in-chief of Computers & Security has said that universities are among the least secure places in the universe relative to computers (Foster, 2004). In this paper, we analyze the affect of computer data breaches on universities and colleges.

DATA

We obtained our data for this study from the chronology of data breaches maintained by The Privacy Rights Clearinghouse (nd). The Privacy Rights Clearinghouse provides services to consumers and policymakers including a hotline to report abuses and a referral service for victims. The data breaches recorded by the clearinghouse have been reported from a variety of enterprises; however, we focus on breaches that have been reported by or about colleges and universities for a five-year period, from January 2005 to December 2009. The dates used by the Clearinghouse and in this research refer to the date the incident was first made public. The breach may, and, in many cases, did occur months earlier.

Analysis of the data revealed five categories of data breaches for 165 universities: *Stolen*, *Hacker*, *Insider*, *Exposed* and *Missing*. The *Stolen* category includes stolen hardware such as desktop computer, laptop, server, flash drive, and hard drive. The *Hacker* category covers unauthorized remote computer break-ins. *Insider* involves misuse of access/authority of computer usage by an employee or former employee. The *Exposed* category involves unprotected data that may be publicly accessible and includes records exposed in e-mail, regular mail, online and through disposal. The *Missing* category includes missing disks, files, hard drives, flash drives, tapes, laptops, computers and servers. The breached data consisted of personal information, such as social security numbers, about current and former employees and students, alumni, patients and other individuals who used university services.

Chart 1. Total Records Breached per Category from 2008-2009

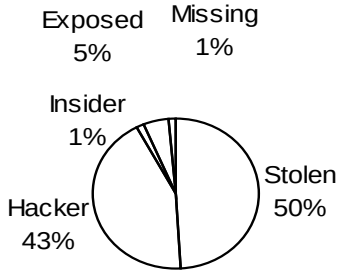
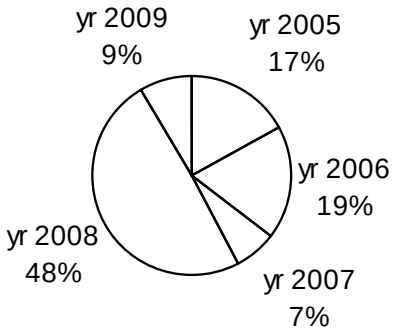


Chart 2. Total Records Breached per Year from 2005-2009



ANALYSES OF BREACHED RECORDS

Breach Records Overview

A total of 10,871,515 records were breached in 290 incidents. Chart 1 shows the percentage of total records breached in each category from 2005-2009. Over five years, over 50% of the breached records at universities are in the *Stolen* category, followed by 43% in the *Hacker* category. The *Exposed* category had the next highest percentage of breached records, 5%, a difference of 38 percentage points from the *Hacker* category. Both the *Insider* and the *Missing* categories accounted for 1% of the breached records. The low percentage of breached records in the *Insider* and *Missing* categories could be indicative of internal policy. Perhaps, an insider is less likely to steal a large number of records in order to not be noticed. Alert employees can decrease the number of records breached in the *Exposed* and *Missing* categories.

Chart 2 shows the percentage of records breached by year. Forty-eight percent of the records were breached in 2008, followed by a distant 19% in 2006. Between 2005 and 2006, there was a 2% increase in the number of breached records, from 17% to 19%. In 2007, the percentage of records breached decreased to 7%. Then, in 2008, there was a 41% increase in the number of breached records, followed by a 39% decrease in 2009 (9%). We note that 2008 also had the highest percentage of breach incidents.

TABLE 1 NUMBER OF RECORDS BREACHED FROM 2005-2009

	2005	2006	2007	2008	2009	2005-2009 TOTAL
TYPE						
STOLEN	315,451	177,818	135,113	4,633,170	81,777	**5,343,329**
HACKER	1,300,163	1,760,180	371,650	532,286	720,589	**4,684,868**
INSIDER	150,000	4,719	0	4,614	261	**159,594**
EXPOSED	35,212	48,106	199,874	133,326	126,213	**542,731**
MISSING	37,000	26,816	25,735	51,442	0	**140,993**
TOTAL	**1,837,826**	**2,017,639**	**732,372**	**5,354,838**	**928,840**	**10,871,515**

DETAILS OF BREACHED RECORDS

Table 1 shows the detail of the nearly eleven million records breached from 2005 to 2009 at universities. Personal information of thousands of students, faculty, staff and patients has been obtained and possibly used by unauthorized persons. Here, we make observations about the number of records breached per category, for each year.

We look first at the two breach categories where the majority of records were breached, *Stolen* and *Hacker*. In the *Stolen* category, from 2005 to 2007, the total records breached decreased from 315,451 to 135,113. However, in 2008, there was a steep spike in the number of compromised records, 4,633,170. This spike was due to two incidents at different university medical centers in which over 4 million records were breached. When we do not consider these two stolen incidents for this year, only 333,170 records were breached. However, this number is still an increase over the number of records breached in 2005, 2006, or 2007. The number of records stolen during 2009 was 81,777.

An observation of the *Hacker* category reveals that over 3 million records were breached from 2005 to 2006, the two years with the highest number of *Hacker* incidents. In 2005, 1,300,163 were compromised, where the greatest number of records breached in a single incident was 270,000. In 2006, 1,760,180 were compromised, where the greatest number of records breached in a single incident was 800,000. In 2007, there was a sharp decrease in the number of records (371,650) breached due to hacking. Then, in 2008, there was an increase to 532,286, with a single incident at a university dental school accounting for 330,000 of those records. In 2009, 720,589 records were breached. The total number of records breached in the *Stolen* and *Hacker* categories from 2005-2009 is 10,028,197, which is 92.24% of all the breached records.

From 2005 to 2007, there were steady and sharp decreases in breached records in the *Insider* category. A single insider incident for 2005 caused the breach of 150,000 records. Then in 2006, a single incident for the year resulted in 4,719 breached records, followed by zero insider breached records in 2007. However, in 2008, three insider incidents caused the breach of 4,614 records. In 2009, a single insider incident breached 261 records.

The number of records in the *Exposed* category increased each year from 2005-2007. In this category, the largest amount of records exposed was in 2007, 199,874. This is the only year in which the records in the *Exposed* category surpassed the records in the *Stolen* category. From 2007 to 2009, the number of exposed records substantially declined.

We also analyzed how the majority of the records were exposed. From 2005 to 2007, the majority of the records in the *Exposed* category were exposed on-line, 34,012, 30,031 and 164,754, respectively. In 2008, two types of exposures were responsible for the majority of the records: online (57,174 records) and regular mail (55,000 records). In 2009, 100,000 records were exposed in storage.

In the *Missing* category, the number of breached records decreased from 37,000 to 25,735 during the first three years. Then, in 2008, the number of breached records almost doubled that of 2007. In 2005, a missing laptop resulted in the breach of all 37,000 records. In 2006, files containing 21,000 records went missing. In 2007, a missing computer (8,000 records) and a missing flash drive (16,000 records) contributed to this year's loss. In 2008, most of the missing data was on flash drives (24,990 records) and tape (21,000 records). No breaches in the *Missing* category occurred in 2009.

TABLE 2. PERCENTAGE OF RECORDS BREACHED PER CATEGORY FOR EACH YEAR					
	2005	**2006**	**2007**	**2008**	**2009**
TYPE					
STOLEN	17.16	08.81	18.45	86.52	08.80
HACKER	70.74	87.24	50.75	09.94	77.58
INSIDER	08.16	00.23	00.00	00.09	00.03
EXPOSED	01.92	02.38	27.29	02.49	13.59
MISSING	02.01	01.33	03.51	00.96	00.00

TABLE 3. PERCENTAGE OF RECORDS BREACHED EACH YEAR FOR A GIVEN CATEGORY					
	2005	**2006**	**2007**	**2008**	**2009**
TYPE					
STOLEN	05.90	03.33	02.53	86.71	01.53
HACKER	27.75	37.57	07.93	11.36	15.38
INSIDER	93.99	02.96	00.00	2.89	00.16
EXPOSED	06.49	08.86	36.83	24.57	23.26
MISSING	26.24	19.02	18.25	36.49	00.00

Table 2 shows the percentage of all records compromised in each category per year. This table is derived from Table 1. For each column, the value is obtained by dividing the corresponding number of records by the total for that column in Table 1. This table helps us to see the distribution of breached records for each year. From Table 2, over 50% of the records compromised in four or the five years were due to breaches in the *Hacker* category. Conversely, the *Insider* and *Missing* categories have the lowest percentages of breached records for four of the five years.

Table 3 shows the percentage of records breached within a given category for each year of the study. To derive this table, we focus on one category at a time, that is, a single row, in Table 1. To obtain the values, divide the records breached for a given year by the total for that category. For the *Stolen* category, we divide 315,451 by 5,343,329 to get the percentage of stolen records for 2005. This table allows us to observe patterns within each category and patterns between categories. The largest percentage of *Stolen* (86.71) and *Missing* (36.49) records occurred in 2008. The largest percentage of *Hacker* records breached during a year is 37.57, which occurred in 2006. The *Insider* category had 0.00 percent records compromised in 2007, and 93.99 percent in 2005. For the *Exposed* category, 36.83 is the highest percentage of records breached (2007). From 2005 to 2007, we see the percentage points decrease for *Stolen* and *Insider* categories, while the *Exposed* category percentages increase for these years. In 2007, the *Exposed* category's highest percentage, 36.83, occurs, while in that same year, the *Insider* and *Hacker* categories have their lowest percentage of records.

ANALYSES OF BREACH INCIDENTS

Breach Incidents Overview

There were 290 breach incidents at universities between 2005 and 2009. Chart 3 shows the percentage of breach incidents for each category. We see that the majority of the incidents, 38% or 110 occur in the *Hacker* category, followed by

Exposed (29%) and *Stolen* (25%). The large percent of *Hacker* incidents is not surprising since these are aggressive, impersonal and remote occurrences, and perhaps more difficult to control due to a variety of attacks and uncertainty about the nature or source of the attack. However, it is surprising that the *Exposed* category has the second largest percent of incidents because it implies a lack of, or lack of enforcement of, university security protocols for protecting data. *Insider* and *Missing* breach incidents have the lowest percentages. The low percentage of incidents in these two areas is probably due to the direct implications to employees. A dishonest employee, in order to reduce the possibility of detection, is likely to be very selective before participating in a breach incident. Missing computer hardware can usually be tied to the employee who is responsible for it, so, in order to avoid negative consequences, the employee is likely to protect it diligently.

Chart 4 shows the percentages of breach incidents by year. This chart shows that 2005 and 2006 had the lowest percentages, 19% each. However, there is an increase by three percentage points in 2007 and then another increase by two percentage points in 2008. There is a decrease by eight percentage points in 2009.

Chart 3. Total Breach Incidents per Category from 2005-2009

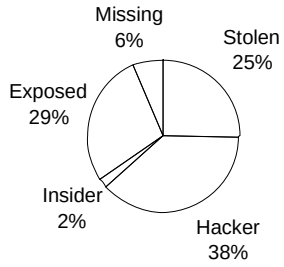
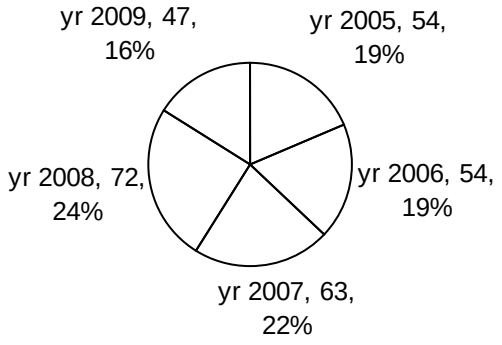


Chart 4. Total Incidents per Year from 2005-2009



Breach Incidents in Detail

Table 4 shows the number of incidents that occurred in each category for each year. In 2005 and 2006, the number of breach incidents was equivalent, 54. In 2007, the number of incidents increased by nine. Again, in 2008, there was an increase in the number of incidents, from 63 to 72. During 2009, there were 47 incidents, a significant decrease in the number of incidents from the previous year.

From 2005 to 2008, the number of incidents increased in the *Stolen* and *Exposed* categories. In the *Missing* category, the number of incidents increased or remained the same from 2005 to 2008. In 2009, there were no breaches in this category. The number of breach incidents decreased in the *Hacker* category until 2009, where the number of incidents increased by eight. For the *Insider* category, there was one incident in 2005, 2006 and 2009, none in 2007 and 3 in 2008. When there is a steady decline in incidents over the years in a particular category (*Hacker*), and then, there is an increase in the next year, this could be indicative of universities becoming less diligent with their breach defense.

Table 5 shows the percentage of incidents in each category for a given year. It is derived from Table 4. The values in each column in Table 4 are divided by the total for that column. We can see when categories have the same percentage of records for a year: *Stolen* and *Hacker* categories have 25.40 for 2007 and *Missing* and *Insider* have 1.85 for 2005. The *Hacker* category has over 70% of the incidents in 2007, however, in the other years the incidents are not so heavily concentrated in a single category. In 2007 and 2008, the percentage of *Exposed* breach incidents were greater than those in the *Hacker* and *Stolen* categories. The *Insider* category has the overall lowest percentages for breach incidents.

Table 6 shows the percentage of breach incidents within a given category for each year of the study. To derive this table, we focus on one category at a time, that is, a single row in Table 4 and divide the breach incidents for a given year by the total for that category. We see that the larger percentages for *Stolen*, *Exposed* and *Missing* categories occur in 2007 and 2008. The larger percentages for the *Hacker* category occur in 2005 and 2009. The *Insider* category has its largest percentage in 2008. For 2006, the percentage distributions for all categories are relatively close, from 15.66 to 27.78. The percentages are also quite close for 2009, except for the 0 percent in the *Missing* category.

TABLE 4. NUMBER OF INCIDENTS PER YEAR

TYPE	2005	2006	2007	2008	2009	TOTAL
STOLEN	9	15	16	21	12	**73**
HACKER	38	20	16	14	22	**110**
INSIDER	1	1	0	3	1	**6**
EXPOSED	5	13	25	28	12	**83**
MISSING	1	5	6	6	0	**18**
TOTAL	**54**	**54**	**63**	**72**	**47**	**290**

TABLE 5. PERCENTAGE OF INCIDENTS IN EACH CATEGORY FOR A GIVEN YEAR

TYPE	2005	2006	2007	2008	2009
STOLEN	16.67	27.78	25.40	29.17	25.53
HACKER	70.37	37.04	25.40	19.44	46.81
INSIDER	1.85	1.85	0.00	4.17	2.13
EXPOSED	9.26	24.07	39.68	38.89	25.53
MISSING	1.85	9.26	9.52	8.33	0.00

TABLE 6. PERCENTAGE OF INCIDENTS IN EACH YEAR FOR A GIVEN CATEGORY					
TYPE	**2005**	**2006**	**2007**	**2008**	**2009**
STOLEN	12.33	20.55	21.92	28.77	16.44
HACKER	34.55	18.18	14.55	12.73	20.00
INSIDER	16.67	16.67	00.00	50.00	16.67
EXPOSED	06.02	15.66	30.12	33.73	14.46
MISSING	05.56	27.78	33.33	33.33	00.00

TABLE 7. Universities with 5 or more Breach Incidents from 2005-2009						
Univ. Id.	**2005**	**2006**	**2007**	**2008**	**2009**	**TOTAL**
CA 1	4	1	0	0	0	**5**
CA 2	6	1	4	2	4	**17**
CO 1	3	2	1	0	1	**7**
FL 1	0	0	1	3	3	**7**
IA 1	0	2	2	2	0	**6**
IN 1	1	2	3	0	1	**7**
MO 1	0	1	4	0	0	**5**
OH 1	2	0	1	2	1	**6**
OH 2	0	3	0	2	0	**5**
PA 1	0	0	0	1	4	**5**
TX 1	0	0	2	3	0	**5**
TX 2	0	3	0	3	0	**6**
TOTAL	**16**	**15**	**18**	**18**	**14**	**81**

REPEAT INCIDENTS AT UNIVERSITIES

Forty-eight universities experienced two or more breach incidents from 2005 to 2009. Table 7 shows universities that had five or more incidents during this period.

The first column is the university identification code: state name followed by a sequence number for the university in that state. For each university, multiple incidents occurred within at least one of the years. In 2005, CA1, CA2 and CO1 had their largest number of incidents. CA1 had no incidents in the last three years, and CO1 had no incidents in the last two years. However, CA2 had incidents in all five years, for a high of 17. TX1 had no incidents in the first two years, but had a high of three incidents in 2008. FL 1 had an equal number of incidents, three, in 2008 and 2009. OH2 and TX2 had no incidents in 2005, 2007 and 2009, but they each had a high of three incidents in a year. The largest number of repeat breach incidents occurred in 2007 and 2008, 18.

We observed the timeline and nature of the breach incidents for these universities. For CA1, there were four hacking incidents in 2005, one reported in March and the other three reported in July and August. CA2 had five hacker incidents and one stolen laptop reported within the first seven months of 2005. In 2007, CA2 also had missing files, a stolen computer and two hacker incidents from April to June. MO1 had two exposed online incidents and one stolen incident reported on the same day in November of 2007. A few weeks earlier, in October, a hacker incident was reported at MO1. FL1 had two exposed incidents reported in May and June of 2008, and then a hacker incident later that year, in November, that resulted in 330,000 breached records from the dental school. IN1 had exposed online incidents reported in April, July

and September in 2007. IA1 reported one hacker incident in each year from 2006 to 2008. PA1's first reported breach incident, a stolen laptop, occurred in 2008. The other four incidents, caused by hackers, occurred in 2009. TX1 had one hacker incident and two exposed online incidents reported in 2008. TX2 had two exposed online incidents in July 2008 and one exposed mail incident reported in April of that year. For OH1, four of the six incidents from 2005 to 2009 were in the *Exposed* category. OH2 had three hacker incidents reported between April 24 and May 4 of 2008, which resulted in the breach of more than 362,000 records.

CONCLUSIONS AND LESSONS LEARNED

In this study, we analyzed data breaches at universities for a five-year period. We analyzed breach records, incidents, and schools with repeat incidents. We compared data in five breach categories: *Stolen*, *Hacker*, *Insider*, *Exposed* and *Missing.*

Nearly 11 million records have been breached at universities from 46 states and Washington DC in the five-year period. The *Stolen* category had the largest number of records compromised, 5,343,329, and the *Missing* category had the smallest number of breached records, 140,993. *Hacker*, *Exposed* and *Stolen* had the largest number of incidents of breached data, 110, 83, and 73 respectively. The two categories that involve aggressive intent, *Stolen* and *Hacker*, were in the top three of most incidents and most breached records. The *Hacker* category had the largest number of records compromised for four of the five years and the highest number of incidents for three of the five years.

The data reveals that universities remain extremely vulnerable to breached records. The number of incidents of breached data has not been steadily decreasing. Nearly a third of the universities with breached data have had repeat incidents, and twelve have had at least five reported incidents in the five years. On a positive note, the data shows that the lowest percentage of incidents is Insider incidents. This is noteworthy because according to the e-Crime Watch Survey, *Insider* attacks are the most costly (CERT 2010). However, the non-malicious combined with the malicious breaches by current and former employees, (*Insider*, *Missing*, and *Exposed*) accounts for nearly forty percent of the breach incidents, 107 of 290.

Are we not learning from experience? Even allowing for the increased knowledge of those with malicious intent, the fact that the second highest number of incidents is in the *Exposed* category highlights the need for continued vigilance. Records breached through exposure are most often attributable to mistakes, negligence and a lack of, or lack of enforcement of, policies, by both the user and information technology (IT) staff.

In this environment of shrinking budgets, universities must recognize the importance of computer security and the need for continued vigilance. Universities must continually educate faculty, staff, and students. Most universities have policies that outline acceptable and unacceptable behavior regarding the use of campus computer resources. These policies are most often web based and the user is on his or her honor to read and comply. Even if users do read the entire list of policies, which are often many pages long, universities should offer refresher training. In addition, responsible information technology behavior needs to be conveyed in multiple ways and done so repeatedly. One method used to present information repeatedly is to have a portion of the policy appear on the monitor when a user logs in to some computers. Unfortunately, users can easily and usually do bypass this information without reading. Universities could instead present web-based training that requires interaction by the user or a test to show successful completion. In addition to focused training, some computer security training could

be presented in required general education courses.

In addition to informing users of password guidelines, the need for security software, such as antivirus, firewalls, spyware, and popup blockers, training should include general security awareness training. Training that highlights the danger and prevalence of identity theft could help reduce the number of data breach incidents. Heightened awareness could prevent users from throwing away papers that contain sensitive information, or remind users to destroy data on the drives before disposal, reducing the number of *Exposure* incidents. Encrypting files that contain sensitive information would reduce the risk of identity theft if a flash drive, CD/DVD, or laptop was stolen.

Faculty and staff need computer security training and tools to help keep data secure. Faculty and staff have access to much information that could facilitate identity theft. Available tools make creating a webpage easy, but creating a secure webpage requires additional expertise. Training should include the danger of placing personal information online and the need to be cautious with your personal information and the information of others. Beyond the standard security software, faculty and staff need access to and training on special encryption software and software that can permanently erase a file. Encryption software is available in Windows, but these files cannot be transmitted, for example, through e-mail as encrypted files. Also the software may not protect the files if the computer is physically compromised. In addition, files that are deleted can be undeleted unless they are overwritten using special software.

Universities also need IT staff with specialized security knowledge. Not only was the *Hacker* category in the top three of both incidents and records, many of the universities that had repeat incidents had repeat *Hacker* incidents. Universities need staff who can go beyond installing the standard hardware and software to select, install, and monitor security devices. The types of expertise needed include network security, information security management, incident response, and computer forensics. IT staff should also keep abreast of the research in computer security.

Unfortunately, the target in computer security is constantly moving. Cybercriminals, those that use computers to commit a crime, are constantly seeking ways to overcome the latest security feature. Instructions are available on the Internet to amateurs on how to hack, create viruses, or perform other cyber crimes. With today's powerful computers, cybercriminals have more resources available to use in attempting an attack. These challenges emphasize the need for continued focus on computer security. Universities must have both a defensive and aggressive posture.

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THE APPLICATION OF LITTLE'S LAW TO ENROLLMENT MANAGEMENT: IMPROVING STUDENT PERSISTENCE IN PART-TIME DEGREE PROGRAMS

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ABSTRACT

Little's Law is applied to enrollment management in part-time degree programs. Using institutional data by program, on number of graduates per year, as well as number of credits taken and number of active students per semester, the calculated average time to graduation is compared to the average flow time predicted by Little's Law. Despite significant variability among students who enter with varying transfer credits and take varying credits per semester, Little's Law provides a simple model for measuring program growth trends, student productivity, and persistence to graduation. Implications for marketing, admissions, advising, course scheduling, and curriculum design are discussed.

INTRODUCTION

"Enrollment Management" often refers to recruiting and marketing to attract the appropriate students to academic programs. However, the challenge does not stop here. Universities with capacity constraints or excess capacity in specific schools or individual degree programs have enrollment management issues extending beyond recruitment and admissions. At the dean's level, the problem is to match the student demand for specific schools and majors with the supply of available faculty and seats in courses.

In traditional, full-time undergraduate and graduate programs, enrollments and progression to graduation are predictable, so the challenge is to match capacity (number of faculty, number of course sections offered, and number of seats available) to the projected demand. In contrast, in university schools of continuing and professional studies, students in part-time undergraduate and graduate degree programs enroll and progress toward graduation at much more variable rates.

There is a need to measure academic persistence and the intensity with which students take courses part-time, despite extreme variability among students in their paths to degree completion. Employers and governmental institutions wish to increase the number of work force participants with bachelors and graduate degrees, strengthening local and regional economies. In a recent publication of the University Continuing Education Association, "The New Face of Higher Education: Lifelong Learning Trends" (2009), it is noted that most states give much less consideration to adult students and the need for lifelong learning, than to traditional-age students. Furthermore, this report contends that economic development would be better served with grant programs for part-time students and improved strategies for transferring between two-year and four-year institutions. Sander (2008) discusses the Kentucky Adult Learner Initiative, and the California Postsecondary Education Commission (2006) reports on performance measures in an accountability framework for higher education in California.

Typical methods for measuring graduation rates do not take into account the more complex patterns of student retention and persistence for

a majority of college students, according to Capaldi, Lombardy, and Yellen (2006). Because the methods calculate the percentage of first-time, full-time students beginning undergraduate programs in the fall term, the federal government's reporting methods exclude part-time students and students who begin college in the spring or summer terms. In addition, transfer students appear as failures in their first institution, but do not appear at all in the statistics for subsequent institutions. Since a majority of undergraduate students do not graduate within four years, there appears to be a need for new metrics.

The national magnitude of the numbers of adult part-time students is notable. In "Adult Learning in Focus: National and State-by-State Data" (2008), research indicates that in 2004, adults made up about 43% of total enrollment at community colleges, full- and part-time. Between 1970 and 2002, adult part-time enrollment at all institutions increased from 7% to 12%, while at community colleges this increased from 17% to 26%. In addition to the economic benefits, this survey cites support for a relationship between educational attainment and civic involvement such as having the cognitive ability to process complex political and social issues, voting, and volunteering in the community. The survey, with state-by-state statistics, also reports significant gaps in data collection for adult students (defined by most studies as those 25 years of age and older), as well as insufficient data for younger postsecondary students with one or more characteristics such as attending part-time, financial independence, and working full-time while enrolled.

Universities are interested in students' persistence and degree attainment as an internal measure of program effectiveness. Practices in recruiting and admissions, as well as in student advising and efforts to integrate part-time students into the academic community, can be enhanced to support persistence and attainment more effectively. A school's capacity (the supply of course sections and number of seats per section) can be adjusted to match demand in a flexible manner, subject to the budget for faculty salary expenses. In some schools, demand proportionally influences tuition revenues in the school budget, so increasing part-time students' academic persistence (i.e., number of credits taken per semester) helps the students as well as the school. So matching supply and demand in academic operations is a key to managing enrollments in a cost-effective manner, and success or failure can be measured in standard budget reports.

Several of the sources cited in this section highlight the need for simple metrics that can be updated each semester to monitor changes in enrollments and student progress toward graduation. This also allows management decisions to be made in a timely manner in response. A simple and easy-to-understand model for any process is Little's Law. This operations research classic (Little, 1961) describes the relationship between work-in-process inventory in a system to the flow rate of finished product exiting the system and the flow time from entry to exit. The relationship can be expressed as:

Average Inventory = Average Flow Rate * Average Flow Time

Little's Law has been used to describe diverse operations including assembly lines and supply chains, batch processes, queuing and job shop processes in Cachon and Terwiesch (2006) and numerous other sources. Although many applications of Little's Law are found in production and customer service problems, the law has general applicability to any process with units of work in process in a pipeline.

However, no use of this model has been found in an education environment, such as in enrollment management. In this paper, this relationship between inventory, flow rate, and flow time is applied to describe the enrollment and persistence processes in part-time university

degree programs, from the time students enter to the time of graduation.

Using Little's Law, simple metrics can be developed depicting student behavior during their degree programs, not just upon entering at admission and exiting at graduation. This analysis enables more precise management decision-making, for example:

- As a revenue model, what impact do different tuition rates per credit hour, by program, have on the budget?
- Should an academic program be eliminated, how many students will be impacted, and how long will it take for the affected students to graduate?
- Should admission policies be changed, and what is the subsequent impact on enrollments?
- When and where do full-time faculty need to be added to enable the delivery of new programs?
- What impact does increased advising efforts have on student productivity?
- Which enrollments are increasing for traditional undergraduate students, certificate and graduate students?
- How can many more (or fewer) class sections are needed, based on changing enrollments?
- How can part-time students earn additional credits each year to shorten flow time?
- How can seasonality in enrollments be managed for better use of university resources and student time?
- How can four year universities prepare for increased enrollments from transfer programs at local community colleges?

LITERATURE REVIEW

The seminal article that proved the relationship between the average arrival rate to a system, the average time spent in the system, and average number in the system appeared in *Operations Research*, over 45 years ago, Little (1961). This result does not depend on the underlying probability distributions of the arrivals or the order in which items are serviced. Since that time, there have been many, many applications in a variety of settings. General discussions of the application of Little's Law and theory of constraints to Six Sigma and lean initiatives in operations and quality management appear in Gerst (2004), and Godfrey and Bandy (2005). Tu, Chao, Chang, and You (2005) used Little's Law in an electronic wafer foundry to determine backup capacity to overcome bottlenecks in the production process. In the residential construction industry larger homebuilders sometimes view their production system as an assembly line process. It is in this context that Bashford, Walsh, and Sawhney (2005) examine the relationship specified by Little's Law to account for characteristics of construction projects that affect project performance and the resulting financial performance of the company. An important extension of Little's Law for situations where the long term, steady state relationships between average flow time and inventory do not hold but, instead the investigation of observed results over finite time periods (such as the sequences of semesters examined in this paper) are of interest, can be found in Kanet (2004).

We found no record of the application of Little's Law to enrollment management. Nonetheless, educational research on student retention and academic persistence is interesting and pertinent to the problem of managing student enrollments from admission to graduation. A survey on terms and definitions for college student retention, as well as predictors of student retention, can be found in Bean (2003).

Much of the current research in enrollment management research focuses upon marketing techniques. Bassin and Sellner (1997) present a step by step method to forecast the enrollments of college students who are well prepared as defined by a certain criteria. Bruning (2002) looked at enrollment management in the context of retention of existing students. His work showed that the attitudes held by the students regarding the public relationships of the

university were important determinants in whether or not a student returned for the next year. Imenda and Kongolo (2002) examined the factors that explained a South African university's ability to sustain and raise its student enrollment levels against declining national enrollment in its category.

Peter, Cataldi, and Carroll (2005) studied the extent to which undergraduates attend multiple institutions as well as the relationship between multiple institution attendance and persistence, attainment, and time to degree. Their datasets included 1) students who enrolled in postsecondary education for the first time in 1995-1996, and 2) students who received bachelor's degrees in 1999-2000 regardless of when they began postsecondary education. This multivariate analysis takes into consideration the myriad factors causing the underlying variability that is considered to be a given in part-time bachelors degree programs in four-year institutions.

Sara Goldrick-Rab (2007), in a Community College Research Center working paper, describes student characteristics, as well as state and institutional practices and policies, that interact to promote or impede student persistence toward degree completion. These characteristics include choice of courses and attendance patterns, as well as financial aid and transfer policies.

Capaldi, Lombardy, and Yellen (2006) describe the "tracking program" at the University of Florida, including process metrics that impact the eventual graduation rate for undergraduates, such as improved advising, simplification of curricular options, and earlier choice of majors. As a result of this tracking system, teaching schedules were modified to ensure a sufficient number of seats in required courses as needed by students, instead of allowing faculty to teach courses when they wanted to teach them. Also there was a dramatic drop in add/drop activity ("churning") at the beginning of each semester, indicating a better match between supply and demand for courses.

In "Adult Learning in Focus: National and State-by-State Data" (2008), research by the Council for Adult and Experiential Learning, in partnership with the National Center for Higher Education Management Systems, a case is made for improved metrics for measuring success of adult learners. State policymakers are interested in an educated workforce to support the economic needs of families, to attract new kinds of business, and to contribute to tax revenues and economic competitiveness in their region. However, federal and state policy remains focused on the productivity of traditional students in attaining each educational level. This report cites gaps in data collection for adult students (defined by most studies as those 25 and older) and for younger postsecondary students with one or more characteristics like those 25 and older (e.g., attend part-time, financially independent of their parents, work full-time while enrolled). The number of credits taken is suggested as a measure of efficiency in postsecondary education in lieu of graduation rates and time to degree. This is one metric used in the long-term study presented below, among others, to monitor part-time adult students' productivity and persistence to degree.

METHODOLOGY

This data collection proceeded in two phases. First, during an undergraduate operations management class project in fall 2006, students applied Little's Law to analyze demand in the University of Richmond School of Continuing Studies' degree programs over a multi-year period, fall 2002 – fall 2006. A decision support system extracting enrollment data from the university database into Excel was used by administrators and the students to analyze flow rates, inventory of active majors, and flow times through degree programs, by degree program in each department.

Based on the initial analysis of data, the enrollment processes were determined to be seasonal, and quite different in the summer. Fall-spring enrollments were analyzed as one process, and summer enrollments were treated as a separate process. The data from the first phase thus served as the historical baseline.

In the second phase of data collection extending from spring 2007 to fall 2009, department chairs began to implement management decisions to improve student productivity and persistence to graduation in these part-time degree programs. Enrollment data during the second phase from spring 2007 to fall 2009 was and continues to be tracked to see the effect of these management decisions:

- In fall 2007, there was a curriculum change in all undergraduate degree programs to simplify student choices, eliminating some small degree programs and funneling these students into the larger bachelors programs.
- In fall 2007, requirements in the general education and the major were streamlined for all undergraduate degree programs in the University of Richmond School of Continuing Studies to increase clarity and the feasibility of these degrees for prospective transfer students.
- In fall 2007, selected certificate programs for post-bachelors students were shortened from 30-36 credits to 21 credits.
- Because of a tendency in the school to have too many course sections with low enrollments, the number of courses scheduled each semester was reduced, and a projected fall-spring-summer course rotation was publicized to all students, in an attempt to simplify choices.
- Marketing initiatives to prospective students became more quantitative in nature, as marketing staff began tracking the progress of prospective students being admitted by degree program each semester. Department chairs were in a better position to determine the target number of new students to replace graduates, and to assess actual admission numbers year-to-date versus targets.

In the Department of Information Systems, additional efforts were made during the period from spring 2007 to fall 2009 to improve productivity and persistence. All advising, curriculum, and scheduling modifications were intended to increase the number of credits taken by Information Systems majors each semester.

- Most students in the major developed an individual course plan for the remaining semesters to graduation, providing the department chairman valuable information about course preferences and desired rate of progress through the degree program.
- Students were encouraged to plan and take more credits in summer terms.
- In Fall 2009, additional curriculum revisions were piloted, including more four-credit courses to replace selected three-credit courses, allowing working students to be more productive each semester with a manageable part-time course load.
- Relationships with specific community college programs were expanded to facilitate and encourage transfer into the bachelor's degree programs in information systems.

Metrics Used for Adult Student Productivity and Persistence: Using Little's Law, the three variables of interest are: the **inventory** of units that are resident in a process, the **flow rate** at which these units travel through a process, and the **flow time** it takes a unit to proceed from start to finish in a process. In this study, the following metrics were used for measuring student productivity and persistence from fall 2002 to fall 2009:

Inventory: The number of active students in each degree program by semester was determined.

Flow Rate:

a) One flow rate metric for "product exiting the process" was the number of graduates per year, by degree program in each department.

b) A second flow rate metric was number of credits taken per semester, measuring how productive students in a particular degree program were over time. (This second metric correlated directly with tuition revenues, as well.)
c) A third flow rate metric was number of credits taken **per student** per semester. This was simply the number of credits taken divided by inventory of active students, in each degree program.

Flow Time: For each individual student, the flow time was calculated as the number of years between the term of admission and the term of graduation. The variability in students' flow times was calculated with a histogram and cumulative distribution table showing what percentage of these part-time students graduate within two, three, four or more years of entering a degree program. Student flow times varied widely, depending on transfer credits and number of credits taken per semester.

Excel Analysis: For graduation flow rates and flow times, a database administrator retrieved the relevant fields of source data, from the university database into Excel, including degree program, major department, admit term and graduation term for each graduating student in this time period. For the number of credits taken as well as the inventory of active students, anonymous data about each course completed by each student each semester were retrieved, including fields used for classification such as degree program and major department. This was an opportunity for the undergraduate operations management students to analyze a large amount of realistic data, and to experience Excel functions like filters, lookup tables, sorts, subtotals, IF statements, and histograms.

The calculation of flow time to graduation was determined to be more complicated due to the way admit terms were entered in the university database. Care was taken in calculating flow time to determine when a student started taking courses in a degree program. In some continuing education programs, adult students can take classes as non-degree-seeking students, so admit term does not necessarily indicate when the student started taking courses, but rather when a student was admitted and under what catalog. This analysis was done after the first phase of data collection only. During the second phase of data collection, flow time was chosen to be the variable predicted by the other two variables that were easier to measure, inventory and flow rate.

RESULTS

The bachelor's, certificate, and graduate degree programs in the University of Richmond School of Continuing Studies are part-time programs for working adults. Students generally take an average of a little more than two undergraduate courses per semester, or one graduate course per semester. As a representative department showing the full analysis, results are reported for the bachelor's and certificate degree programs in Information Systems only. The bachelor's degree is 120 credits, of which at least 60 credits have to be taken at the University of Richmond. The certificate in Information Systems is comprised of a 21-credit set of undergraduate courses taken by students who already have a bachelor's degree and wish to switch careers or to take prerequisites for graduate study.

The Department of Information Systems experienced non-stationary enrollments from 2002 to 2005, due to a national downward/flat trend in computer science and information systems in most universities during this period following the dot.com bust and recession. From fall 2005 to fall 2009, enrollments were essentially stable, until another recession began in 2008. Sample results for the bachelor's degree program in the Information Systems department are summarized below.

The department also had seasonal enrollments in the fall, spring and summer. Fewer students were active in the summer semester, some wanting to take a break, some balking at the

compressed terms, some lacking financial aid for the summer, and some preferring to spend time with children on summer vacation.

Based on initial analysis of data from fall 2002 to spring 2007, data from fall and spring were separated from summer data, as the enrollment processes were different.

Inventory of Active Students

Figure 1 illustrates the number of active students in the Information Systems degree programs by semester. This reflects the drop in enrollments nationwide experienced in information systems as well as computer science during this period. Because adult students are in the pipeline longer, however, this moderates the effect on enrollments. Also, individuals changing careers enrolled in the certificate program have increased in numbers since spring 2008, possibly due to demand in the workplace and to the shortened program.

Flow Rate in Number of Graduates Per Year

In Table 1, the number of graduates per year is listed for the Information Systems degree programs. For part-time working adult students this is preferred to a graduation rate used for traditional undergraduate programs because there is no entering cohort, yet the final measure of success, degree attainment, is tracked in this way.

Flow Rate in Total Number of Credits Taken Per Term

Figure 2 illustrates the total number of credits taken by students in a degree program partly reflects the number of active students and the aggregate productivity of these students. When viewed by degree program in each department, it indicates the relative contribution and scope of each degree program in a school. Larger degree programs, or growing degree programs, can be monitored as critical success factors; struggling degree programs can be re-evaluated, and resources can be re-allocated to more effective uses.

Figure 1. Inventory of Active Students by Term Fall and Spring Terms
Information Systems Major

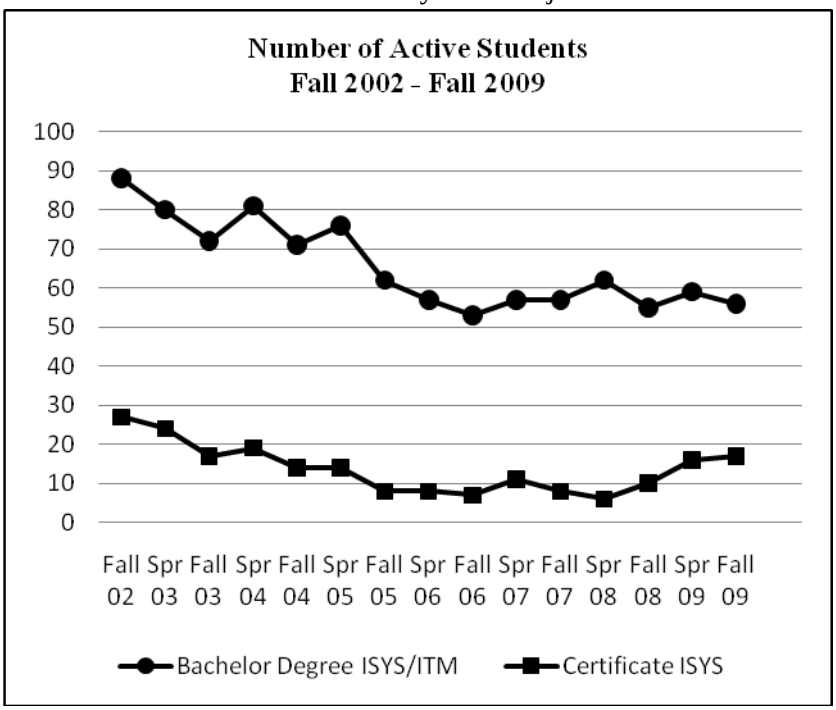
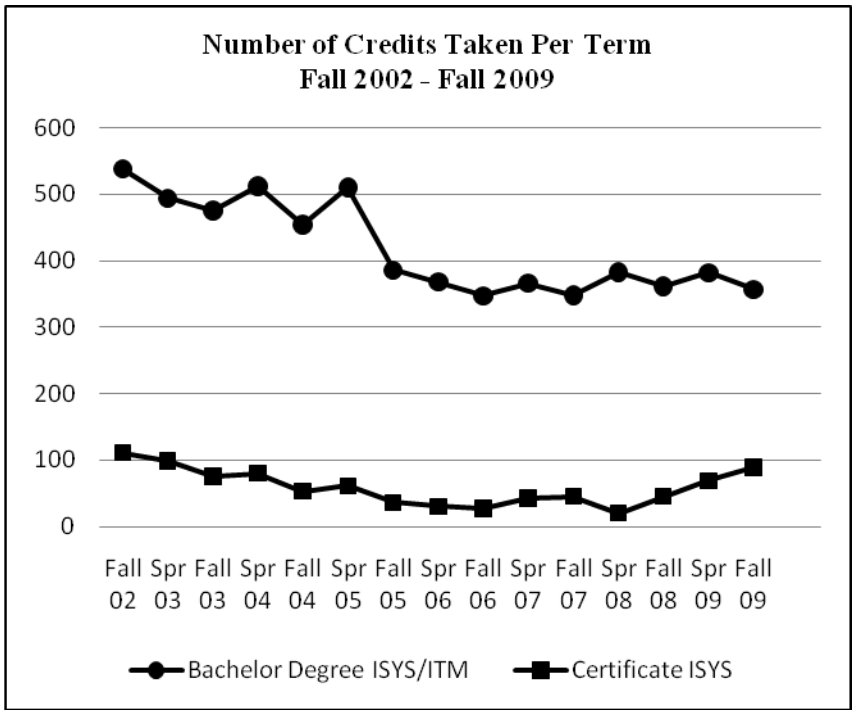


Table 1. Flow Rate - Number of Graduates Per Year
Information Systems Major

Includes December, May, and August Graduates Each Academic Year

	Bachelors	Certificate
2002	13	7
2003	15	9
2004	19	2
2005	15	4
2006	19	3
2007	14	3
2008	6	5
2009	12	3

Figure 2. Flow Rate – Number of Credits Taken Per Term
Information Systems Major



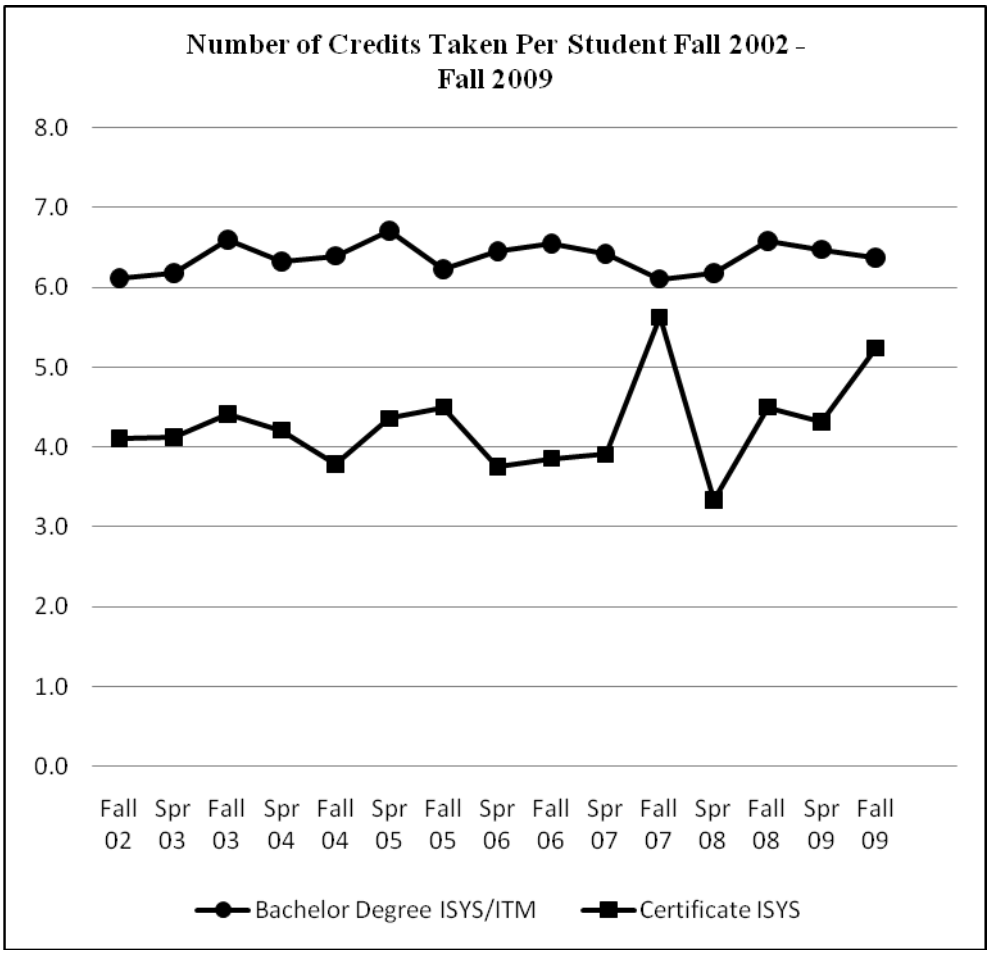
Flow Rate in Average Number of Credits Taken Per Student Per Term

Figure 3 illustrates the average individual student productivity and progress of these majors toward degree completion. This metric can have implications for student advising and communications. The lower number of credits taken per certificate student is a reflection of the higher-level jobs these students hold, and is influenced by the smaller number of active students. It is too early to tell what impact the new four-credit courses (begun in Fall 2009) will have on this metric.

Comparison with the Summer Enrollment Process

Summer enrollments were also tracked during this period. Table 2 shows the different patterns of student productivity and persistence in the summer, compared to fall and spring. With the existing course rotation, intensive scheduling, and term dates, it has been difficult to increase participation of more students in the summer, even though this clearly is a way to shorten time to degree. (After advising and scheduling efforts in Information Systems, the same students took heavier workloads in the summer.)

Figure 3. Flow Rate - Number of Credits Taken Per Student Fall and Spring Terms
Information Systems Major



Flow Times to Graduation

Graduates exiting the Information Systems bachelor's degree program from spring 2002 – spring 2006 (the first phase of data collection) reflected admissions starting about five years previously, as indicated in the cumulative distribution of flow times (Table 3) and the histogram shown in Figure 4.

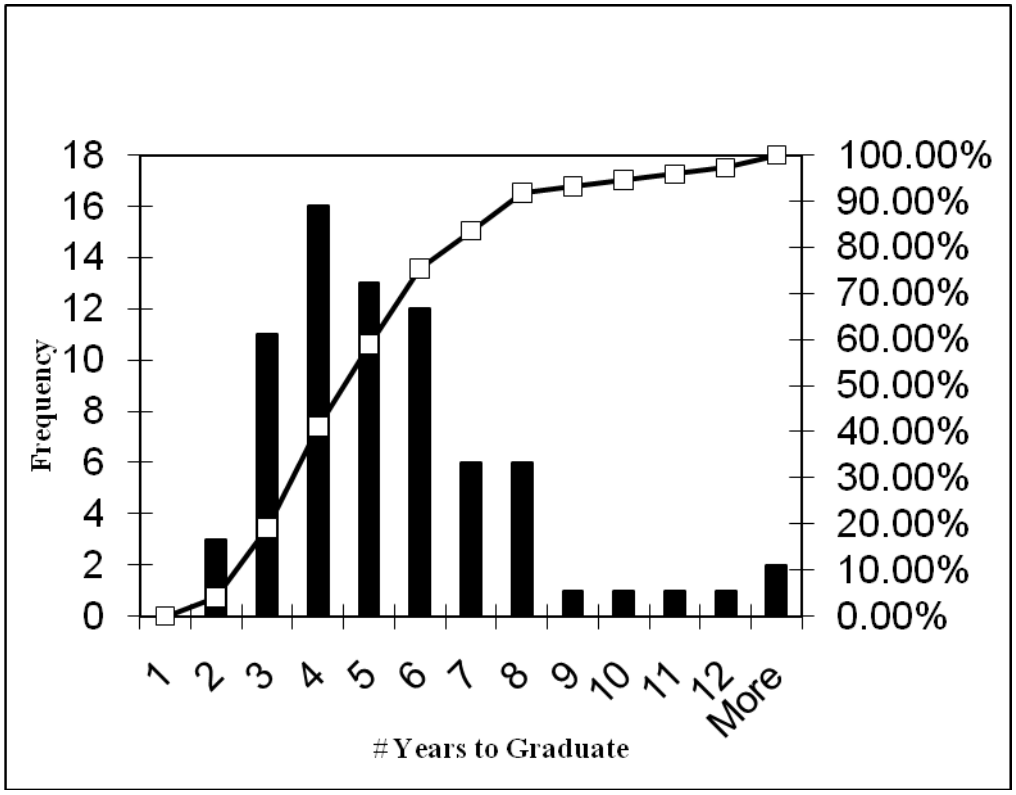
Table 2. Inventory and Flow Rate Measures in Summer Terms
Information Systems Major

	Number of Active Students		Number of Credits Taken	
	Bachelor's	Certificate	Bachelor's	Certificate
Summer 2003	34	5	147	14
Summer 2004	38	5	200	25
Summer 2005	32	1	151	1
Summer 2006	20	1	98	1
Summer 2007	31	2	156	6
Summer 2008	34	2	192	9
Summer 2009	31	10	216	39

Table 3. Student Flow Times to Graduation 2002 - 2006
Bachelor's Degree - Information Systems Major

# Years to Graduate	Frequency	Cumulative %
1	**0**	**0.0%**
2	**3**	**4.1%**
3	**11**	**19.2%**
4	**16**	**41.1%**
5	**13**	**58.9%**
6	**12**	**75.3%**
7	**6**	**83.6%**
8	**6**	**91.8%**
9	**1**	**93.2%**
10	**1**	**94.5%**
11	**1**	**95.9%**
12	**1**	**97.3%**
13	**0**	**97.3%**
14	**0**	**97.3%**
15	**2**	**100.0%**

Figure 4. Student Flow Times to Graduation 2002-2006
Bachelors Degree - Information Systems



When flow times were analyzed (Table 4) for graduates in the years 2002-2006, we found the predicted average flow time to graduation using Little's Law to be somewhat lower than the actual average flow time, but closer to the actual median flow time to graduation for this degree program. As discussed previously, this is a tedious analysis, so each year the transcripts of Information Systems graduates are analyzed briefly to estimate the average flow time of the graduating class. In 2009, students graduating with a bachelor's degree in Information Systems had an average flow time of about 4.5 years, which was expected given the stability in number of active majors and number of credits taken per semester, as well as similar behavior in the number of credits transferred into the bachelor's degree from previous institutions.

Table 4. Actual Versus Predicted 2002-2006
Average Inventory, Flow Rate, and Flow Time
Bachelor's Degree- Informational Systems Major

	ACTUAL	PREDICTED (LITTLE'S LAW)
Average Inventory of Active Students *	69.7	
Average Flow Rate, Graduates per Year (May & August	16.2	
Average Flow Time to Graduation, Years	**5.2**	**4.3**

DISCUSSION

This analysis can be replicated by administrators utilizing institutional enrollment data and spreadsheet analysis. When deans and department chairs become knowledgeable about the number of active students (inventory in Little's Law), number of graduates per year and number of credits taken per semester (flow rate), and the estimated flow time to graduation, improved decisions can be made. The metrics in this paper are vital for continuous program assessment:

(1) To maintain enrollment levels, the number of annual admits must replace the number of annual graduates—understanding this flow rate metric allows concrete recruiting and admission goals to be set if increased (or decreased) enrollment is desired.
(2) In some degree programs, when there is a capacity constraint on enrollment, the number of active students in the program as well as the number of graduates per year must be tracked.
(3) Graduation rates and flow times to graduation are needed for continued program assessments.
(4) In part-time degree programs, these flow rates are directly tied to tuition revenues. Expanding this analysis for all degree programs facilitates development of alternative revenue models and supports effective budget management.

This analytical approach continues to be used for managerial decision-making in the following ways in the University of Richmond School of Continuing Studies, especially in the Department of Information Systems. An additional staff member has been hired to work with community college program directors to facilitate marketing efforts. Understanding the aggregate demand from part-time students resulted in improved course scheduling, matching the supply of seats with the demand. Capacity utilization of available seats improved; by reducing the number of low-enrollment sections, the number of students per section increased moderately. Student course planning and tracking completion of degree requirements will soon be available online for students using the university registration database. Curriculum revisions to remove unintended road blocks to degree completion were implemented, and selected four-credit courses are likely to help students improve flow rates and flow times to graduation in the future. Efforts promoting use of the summer to earn credit will continue. Enrollments were increasing as of fall 2007, due to external industry conditions, and as the economy improves these metrics will be watched closely. This analytical technique will continue to be used to track the effect of all of these factors on student productivity in degree programs, and signal when changes to capacity and other managerial actions may be needed.

DIRECTIONS FOR FUTURE RESEARCH

There are several questions to be investigated in future research. First, this analysis can be replicated with existing historical data for other undergraduate and graduate degree programs at the University of Richmond in the School of Continuing Studies, such as:

- the graduate certificate and master's degrees in education,
- the undergraduate, graduate certificate, and master's degrees in human resource management
- the bachelor's and certificate degree in paralegal studies
- the part-time and full-time undergraduate degrees in liberal arts

It would be interesting to compare the undergraduate applied/professional degree programs on the whole (information systems, human resource management, and paralegal studies) to the undergraduate liberal arts programs, to see whether there are differences in student flow rates and flow times to graduation. It is known that a majority of the undergraduate students in the School of Continuing Studies

complete primarily their junior and senior years here, using these programs for degree completion, but there are some differences between the professional programs and the more general liberal arts programs.

Second, the use of four-credit courses in Information Systems, begun in fall 2009, has the potential to increase the number of credits that part-time students can take while balancing work and personal demands. Updates to this data as of the end of the spring 2010 term will be completed in the near future. Preliminary estimates indicate that the number of credits per student increased in spring 2010 in the bachelor's degree program in Information Systems. This increase was observed for certificate students in Fall 2009.

Third, the use of online courses in the Information Systems program will be reduced starting fall 2010. Currently several general education courses can be taken online, but only a few Information Systems electives can be taken online. While online courses clearly have helped students in Information Systems to take more courses per semester, reducing travel time to campus as well as night conflicts between courses students might need in the same semester, the use of four-credit courses on campus will be used more in the immediate future to help students take more credits per semester. There is adequate classroom capacity on campus now in the evenings to run this degree program at its present size, with room for growth.

Fourth, an increased use of scholarship aid to promote access and productivity in the future may have an impact on persistence and time to degree completion in the University of Richmond's School of Continuing Studies. Currently, part-time students are eligible for student loans when they enroll for six credit hours. Students are eligible for the Virginia Tuition Assistance Grant when they enroll for twelve credit hours or more (this is grant aid from the State of Virginia to students who attend private universities full-time). The variable cost for tuition does not change in the University of Richmond's School of Continuing Studies. There is a flat per credit hour tuition regardless of how many credit hours the student takes. Between six and twelve credit hours, there is no financial advantage for students to take a few more credit hours per semester, to reduce their flow time. (The incentive for the student is earlier degree completion, however, which may result in increased salary and job promotion.) Scholarship aid may fill this gap, to improve persistence and time to degree.

Finally, it should be noted that changes in the economy, for better or for worse, will impact persistence and time to degree in the future. Different degree programs and majors move in different directions depending on the economy, and on the loss or gain of organizations in industry or government agencies employing these students. An improved economy may make it possible for unemployed students to afford to take more courses, yet students may become busier on the job when this occurs. The use of Little's Law and the metrics in this paper allow administrators to see what is going on in degree programs with readily available data in a timely manner for decision-making.

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DO ON-LINE STUDENTS CHEAT?

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ABSTRACT

On-line education is a reality, although it is still resisted by many university faculty members. The primary issue appears to be student cheating. Most of the evidence to date has been anecdotal. We performed a statistical study to determine if cheating actually takes place, and if it has any effect on grades. Although the statistical results are inconclusive, it appears that on-line students either don't cheat, or cheat no more than traditional in-class students. In any event, if they do cheat, they are not doing it well as it has no discernable effect on their grades.

INTRODUCTION

Higher education in the United States is going through a fundamental transformation. While the desirability of this change can be questioned, it is not easily reversible. This transformation is the gradual replacement of traditional, classroom-based, face-to-face education with on-line, web-based education that is facilitated through supporting software programs such as Blackboard. On-line classes can range from traditional in-class courses which use the web as an additional teaching and communications medium to those in which students and the instructor communicate exclusively on-line without ever meeting in person (Ells, 1999).

STAKEHOLDERS IN ON-LINE EDUCATION

There are numerous stakeholders in the move to on-line education. These stakeholders include: (1) proprietary schools (2) university administrations wanting to reach a larger student population (3) students who want the flexibility of time and place and (4) faculty who are moving into on-line education for a variety of reasons.

University administrations, for example, often offer financial incentives to faculty members who will develop and teach on-line courses. Faculty attitudes are often one of inevitability: "Since we *have to* move to on-line education sooner or later, we may as well make the best of it." As one colleague remarked, "This is like the Internet. It is a high-speed train coming at us. There is no stopping it. Either we jump on it or we'll be run over by it." Others are impressed by its leading edge, high-tech glamour. They see themselves as trailblazers in an otherwise inert, resistant-to-change academic environment.

Much of this information supports the contention of Giridharadas (2009) who describes on-line education as changing higher education from a sellers' market to a buyers' market. Students will not be inhibited by geography in making decisions about where to study and earn degrees. Giridharadas (2009) also raises the possibility of large numbers of faculty positions disappearing—similar to the theater pianists disappearing in the 1920s when recorded music became possible. This possibility does not enhance the willingness of faculty to embrace on-line education.

THE CHEATING QUESTION

In interviews with faculty, however, the one issue that arose in many cases was the issue of cheating. One professor refused to give on-line exams, requiring his students to come to campus for all graded quizzes and exams (making 'distance education' a bit of an oxymoron). Many faculty members said they would never teach an on-line course because of cheating. Despite the fact that almost all faculty have heard stories of students who cheat in on-line courses, all of the evidence is anecdotal. For example, "…we believe the use of Web based exams is simply 'begging students to cheat' " (Chapman, Davis, Toy, & Wright, 2004). Statistics or hard evidence that students either cheated or that it made any difference are few and far between. This study begins to investigate the "cheating question" in online courses.

The Study

Presumably, students cheat in order to attain better grades than they would get if they did not cheat. One could argue that some students may cheat to get the same grades they would get otherwise, but with less effort. While a theoretical possibility, this scenario is rather unlikely because of the margin of error associated with aiming for a specific grade. In other words, a student satisfied with a 'C' would most likely feel it is wiser to play it safe and aim for an 'A' rather than cheat just enough to get the 'C.'

There are actually a number of underlying issues here, including:

- Do distance learning students cheat?
- If so, do they cheat any more than students taking in-class courses?
- If they do cheat, does it make any difference in their grades?

We investigate the answers to these three questions with a statistical study. The study compares the results of a semester introductory course in operations management—a required junior level course for all business majors—taught using traditional in-class methods and taught by distance education (DL). As Table 1 shows, the study includes five sections of the course taken during two different semesters—three traditional classes and two distance education classes. All sections were taught by the same instructor and all used the same textbook. Four of the sections used the second edition of the text and the fifth used the third edition (Schroeder, 2004, 2007). The differences from the second to the third edition were minimal.

Table 1.

The number of traditional in-class and DL sections for each semester in which measurements were taken

Semester	Traditional in-class	DL
Spring 2005	2 sections	
Spring 2006	1 section	2 sections

Table 2.

The four pairs of measurements compared in this study

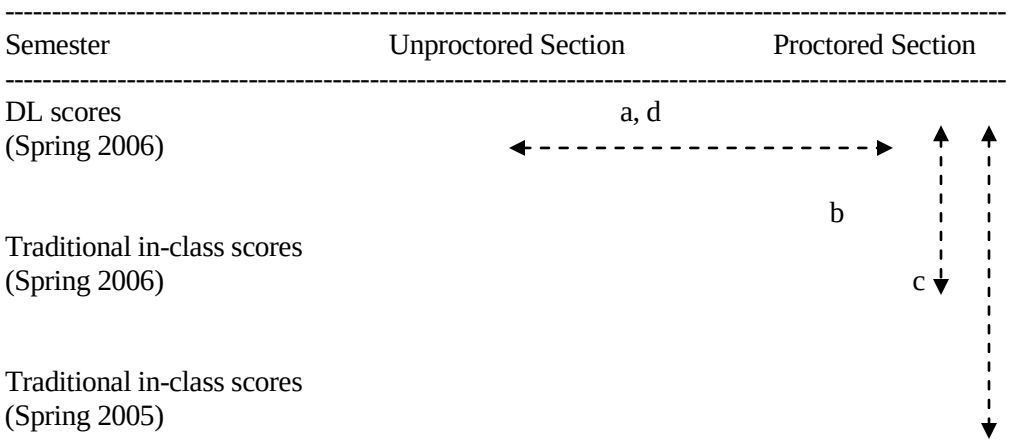

Table 3.

The differences between means of exams/quizzes given during the semester and the final exam, and their corresponding t scores; the correlation coefficient for mid-term exams/quizzes vs. final exams, and their t scores

Measure	DL95	DL96	IC	PSa	PSb
n_c	55	51	62	66	65
$DIFF_c$	-6.75	-6.38	-4.934	-10.84	-9.13
t_c	2.68	2.94	2.87	6.01	4.33
r_c	0.641	0.466	0.620	0.608	0.500
t_r	6.09	3.69	6.13	6.13	4.59

The courses all presented essentially the same information to the students. The reading assignments were identical and the lecture materials given in the in-class sections were provided on-line to the DL students. There were other differences because of the teaching media. For example, the in-class lectures were replaced in the DL classes with on-line discussions. The grading scales in the classes were the same for the quizzes, exams and finals. The software used for the DL courses was WebCT (now owned by Blackboard). The on-line quizzes were generated using the Respondus software.

The study investigated the following questions, which are also depicted in Table 2. The results of the study are shown in Table 3.

a. In the DL sections, the average grades on unproctored vs. proctored exams. If DL students cheat during on-line quizzes, the class average grades may be higher than on the proctored final exam.

b. The proctored finals in the DL vs. the traditional sections in the same semester. If the DL students cheat on their on-line quizzes, one may hypothesize that they would do worse on the proctored final exam since they have not studied as much.

c. The proctored finals for the DL sections vs. the prior traditional semester results. The same hypothesis could be posed as in the previous scenario.

d. The ability to discriminate among individual students who cheated and those who did not. One could hypothesize that those who cheat will show less correlation between proctored and unproctored examination scores.

Notation

The following notation will be used in presenting the results:

DL95 = a distance learning section given in the spring 2006 semester consisting almost entirely of traditional, on-campus students who chose to register for the distance learning section.

DL96 = a distance learning section given in the spring 2006 semester with a higher proportion of non-traditional students including true distance learning students.

IC = a traditional in-class section meeting two mornings per week given in the spring 2006 semester.

PSa = a traditional in-class section meeting two mornings per week given in the spring 2005 semester.

PSb = a traditional in-class section meeting two evenings per week given in the spring 2005 semester.

$DIFF_c$ = difference between means of exams or quizzes given during the semester and the final exam where c = the course.

n_c = number of students completing the class

t_c = t score for DIFF

r_c = correlation coefficient for mid-term exams or quizzes vs. final exams

t_r = t score for r_c

The number of students in each section was greater than fifty. All of the sections had lower average grades on the final than on the quizzes and exams during the semester. The *t* scores for all the differences were significant at the 0.005 level. The correlations between the quizzes and exams during the semester and the final exams were all significant whether it was a DL or a traditional lecture section. The critical value of *t* for very large samples at the 0.005 level of significance is 2.576. All the *t* values for the differences of the means and the correlation coefficients are greater than this value.

The results do not appear to give us any definitive conclusions. Considering the differences between mid-term and final exam average grades, the largest differences and the smallest difference were for in-class sections in which students had the least opportunity to cheat. The DL students fell in the middle. The differences are all negative which means grades were lower on the final exams than the mid-terms. In terms of the correlations between the mid-term and final exam grades, the greatest difference is between the two DL sections, with the traditional lecture sections falling in the middle. The answers to the three questions we posed at the beginning of this study are unclear as the following discussion illustrates.

Do Distance Learning Students Cheat?

If we look only at the significant drop in the grades from the non-proctored to the proctored exams, the answer appears to be 'yes.' On the other hand, there is a significant positive correlation between the two sets of grades. If we assume that cheating is at a minimum in proctored exams, then the lack of significant differences between the DL and the in-class sections would imply that the DL students do not cheat.

If DL students cheat, do they cheat more than students in traditional classes?

Based upon the statistics we have calculated, it appears that if students are cheating, they are cheating equally in DL and traditional sections.

If DL students are cheating, is it resulting in higher grades?

By looking at the DL section statistics, we may conclude that the drop in grades for the proctored final indicates that DL students have benefited from cheating on the non-proctored exams. On the other hand, the traditional sections show the same results. If DL students are cheating, they are doing a poor job of it. It would seem more likely that the grading effect arises from having to take a comprehensive final exam versus taking mid-term exams and quizzes limited to a few chapters. There are multiple demographics that could account for the differences, but given the sizes of the sections and the fact that all the students are business majors at the same university taking a required course, it is unlikely that demographics would make a difference.

Since the study, the same course has continued to be offered by one of the authors with one change—all quizzes and exams on on-line. The result has been that many more students who are 'distant' from the University have taken the course. In spite of this, there have been no discernable differences in grades between DL and traditional sections, nor between different semesters.

Should faculty be concerned about cheating? The answer clearly is "yes," but not only in DL courses. We all use methods to minimize cheating in traditional courses. There are analogous methods for minimizing cheating in DL courses which are described in the next section.

DISCOURAGING ON-LINE CHEATING

Although the study suggests no discernable differences between DL and traditional classes regarding grades, faculty must not be complacent. In our DL course, students can choose where and when (within limits; we generally allow three days) they take quizzes and exams in an unproctored environment. Clearly they should expect to give up something in exchange for this freedom. The following are some of the techniques the authors use to discourage DL cheating:

Multiple Choice Exams

1. Use different text books for DL sections than those used for traditional class sections. This discourages students taking courses on-campus from helping those who are taking the DL sections.
2. Use software packages such as Respondus to assist in developing on-line quizzes and exams.
3. Have a large data base of questions (tip: the questions that come with most texts may fail most validity tests; write your own).
4. Choose questions randomly from the database so that each student receives a different exam.
5. Randomize the order of the answers so that one student cannot tell another that the answer to the question asking 'x' is choice 'a.'
6. Limit the time students have to answer each question. For questions which have, on average, short stems, one minute works. Longer times give students the chance to look up answers.
7. Do not allow students to return to questions. They must answer each question in sequence.
8. Do not disclose scores until the exam or quiz is closed.

9. Do not allow students to see the questions or answers on their quizzes and exams after they are closed (this will compromise the data base quite quickly since each student gets a different set of questions).
10. Disable the 'print screen' function during the quizzes and exams (IT consultants can assist with this).

There are some things that faculty members cannot stop. Faculty cannot, at present, stop students from having someone sit with them and help them. As DL proctoring services expand the scope of their offerings, this may become less of a problem (ProctorU, 2010). Giving students an average of one minute per question and not allowing students to go back over questions discourages copying questions. However, with ubiquitous mobile phones with cameras, students can have a friend take a picture of questions and then later transcribe them.

Written Assignments

It has become difficult to prevent cheating on written assignments in any kind of environment with the growth of the internet. Cutting and pasting, if not outright buying of papers, has become a favorite research method for many students. One way of combating this is to give assignments which cannot be cut and pasted or purchased. For example, at one author's school, all business students have a subscription to the *Wall Street Journal*. During the semester, 'recommended reading' articles from the *Journal* are posted on-line. Students are asked to write a paper based on the articles. Since the articles change each semester, there are no 'file articles' they can use, nor can they cut and paste from the internet.

CONCLUSION

The statistical study suggests that cheating is no more of a problem among DL students than among traditional in-class students. While faculty should be concerned about cheating in all types of courses, just as DL courses require different forms of instruction, DL also requires different methods of combating cheating. Just as faculty should not refuse to teach DL because it requires different approaches to instruction, they should not refuse to teach DL because cheating may occur. It requires different methods to minimize the cheating. The focus should be on whether or not DL is appropriate for any given course, or what should be the most appropriate approach to teaching any given subject.

As stated earlier, as a result of this study, one of the authors has completely eliminated proctored quizzes and exams in his DL courses. The result has been a larger proportion of true DL students in the course. For example, in a recent class discussion on quality in the pharmaceutical industry, one of the students was an FDA compliance inspector stationed in the Washington, D.C. area. This is the way DL should be.

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TEACHING NOTE: AN INNOVATIVE WAY TO TEACH SAMPLING AND CONFIDENCE INTERVALS USING EXCEL

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ABSTRACT

Teaching business statistics to undergraduate students is a challenging task. The "quant-phobia" or "fear of numbers" that grips many students manifests itself frequently. A key topic that challenges students is sampling theory and confidence intervals. While factually accurate, the way in which some statistics texts approach the topic of sampling offers students little reassurance. Though real world applications tend to stimulate student interest, issues related to data collection and time constraints often make instructors reluctant to engage students in real world data collection. This teaching note suggests an innovative way to teach sampling using EXCEL. The easy availability of EXCEL, and student familiarity with EXCEL, increases the chances of student success with the proposed technique.

TEACHING NOTE

To facilitate a conceptual understanding of sampling and confidence intervals, a 6-step, action-oriented approach is outlined. It is recommended that this approach be implemented in a computer lab. Students with limited EXCEL background may find a reference book helpful (Walkenbach, 2007).

Students study the concept of a population in sampling theory. A sample represents all elements of interest in a particular study. Students are taught that taking repeated samples from a normal population produces a sampling distribution that is normal regardless of the sample size. The sampling distribution represents the probability distribution of the sample mean, $\bar{X}$. The students are also taught that the confidence interval width varies inversely with the sample size. Instructors generally do not verify these principles with data. Consequently, students may have little understanding of the concept. The example provided in the Appendix encourages students to verify the concepts of sampling distributions and confidence intervals.

The student response to this approach has been quite gratifying. One student said "I finally get this stuff!" Another said, "We all generated different sets of random numbers, yet came up with the same result. Neat!" Students enjoyed the experience and most claimed it help them understand the concepts.

It is encouraging to see students excited about performing statistical tasks. EXCEL takes the monotony out of repetitious work by offering convenient copying and pasting strategies. In addition to their visual appeal, pivot tables and charts are quite helpful pedagogically. Each student generates different samples but gets, basically, the same results. This emphasizes the power of random sampling and why only one appropriately sized random sample is sufficient for most national polls. The exercise helps students understand the concepts of sampling and confidence intervals. The active learning paradigm can be applied to additional statistical topics such as probability, regression, and hypothesis testing.

REFERENCE

Walkenbach, J., "EXCEL 2007 Bible," Wiley, 2007.

APPENDIX

Step 1: Generating the Population

Generate the population consisting of 2000 values using the RAND and NORMINV commands. The RAND function generates a random number between 0 and 1. The NORMINV function takes a given value of probability, p, population mean, μ, and standard deviation, σ, and finds the value X such that P(X ≤ x)=p. Replacing p by RAND, and using the COPY/PASTE feature, we can generate 2000 random numbers from a normal distribution having population parameters (μ, σ). To keep the numbers from changing, select them all, use COPY, then PASTE SPECIAL with the VALUES option.

Step 2: Creating Pivot Table and Chart for the Population

Create a pivot chart from the 2000 random numbers created in step 1 to view the distribution. Details regarding creating pivot tables, frequency distributions, and pivot charts may be found in Walkenbach (2007).

Step 3: Generating 100 Samples of Size 20

RANDBETWEEN (1, 2000) generates a random number between 1 and 2000. COPY and PASTE it 20 times to generate 20 numbers. To keep the numbers from changing, select all 20 of them, do a COPY, then PASTE SPECIAL with the VALUES option. The 20 numbers between 1 and 2000 represent the positions of the numbers to include in the sample. To illustrate sampling without replacement duplicate numbers can be replaced using the RANDBETWEEN function again until all unique position numbers are obtained. Using these numbers as the lookup-value, the function VLOOKUP (lookup-value, table-array, and column index number) finds the value associated with the look-up position number. The table-array would have two columns with 2000 values each – the position numbers (arranged chronologically from 1 to 2000) and their corresponding values. The column index number used is 2. The same procedure is used for other elements of the sample using the COPY command. The same procedure can be used repeatedly to get values for each sample of size 20. The AVERAGE and STDEV functions can be used to compute the mean and standard deviation of each sample.

Step 4: Creating the Sampling Distribution

Create a frequency distribution and pivot chart for the sampling data using the same procedure employed for the population.

Step 5: Making 95% Confidence Intervals for 100 Samples of Size 20

Estimate the 95% confidence interval for the mean for each of the 100 samples of size 20 and plot the lower and upper limit points on a scatter plot. The lower and upper limit are given by $\overline{X} \pm t_{(\alpha/2,n-1)}\, s/\sqrt{n}$ where $\overline{X}$ is the sample mean, s is the sample standard deviation, n is the sample size, and $t_{(\alpha/2,n-1)}$ is the t-value, obtained in EXCEL by using the TINV function with α/2 equal to 0.025, and n-1 equal to 19. Plot the lower and upper limits of all 100 samples on a scatter plot with joined lines.

Step 6: Generating 100 Samples of Size 80

There is no substantive change in the methodology for generating and analyzing 100 samples of size 80 from the population data. The PIVOT TABLE and PIVOT CHART for the sampling distribution histogram can be made as before. The impact of sample size on the confidence interval width can be captured by plotting the upper and lower confidence limits for sample sizes 20 and 80 on the same plot. The average confidence interval width varies inversely as the sample size. As the sample size grows from 20 to 80, the confidence interval width shrinks in half.

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SERVICE OPERATIONS MANAGEMENT AT THE GOLF COURSE: INFORMATION TECHNOLOGY DESIGN CHOICES CHANGE GOLFERS' WAITING TIME

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ABSTRACT

The current status of the golf industry suggests that golf course managers and/or designers must proactively create experiences to maintain competitiveness. Previous research by one of the authors proposes applying a pace of play simulation model to identify course bottlenecks. Once bottlenecks are identified, this paper presents preliminary research on alternative methods for bottleneck management other than simply alleviating the bottlenecks by reducing cycle times or adding capacity.

We surveyed golfers to identify activities for golfers to experience while waiting. Some of the activities were based on the use of information technology such as kiosks of current course conditions and soon-to-be played holes. Once identified, we continued the research by implementing some of the options and surveying golfers on the merits of the options. Our conclusions demonstrate that alternative opportunities do exist for managing bottlenecks.

INTRODUCTION

According to the National Golf Foundation (NGF, 2009), the number of golfers has declined from 30 million in 2005 to 28.6 million in 2008. Similarly, the number of rounds played has dropped from a high in 2000 of 518.4 million to 489.1 million in 2008.

It seems that the decline is due to round length. A survey of 18,000 golfers conducted by the Little Family Foundation found that players still want a challenge but prefer more playable courses that are shorter and quicker to complete. The survey found the major complaint among today's players is slow play, followed by course difficulty (Golf Business Magazine, 2006). Similarly, Knuth (2006) found that slow play is a major reason golfers quit a current round of golf and has driven some to quit the game completely.

Various golf course owners and consultants have observed and explained industry statistics. David Smith, CEO of Golf Projects International, attributes the change in golfers to a new generation of male golfers. Smith observed that male players of the prior generation would regularly take all day Saturday or Sunday to leisurely play a round of golf, have lunch at the club and then get home in time for evening social events. The current generation has different priorities. The new generation of players may "steal" a Saturday morning for a quick round of golf and then race home for family activities. A KPMG Director of their golf industry division cites the time needed to complete a full round of golf (Kauffman, 2005) as a reason for the change in golfers. The present environment in the golf industry emphasizes the

need to examine different strategies to increase public interest and increase revenue. Several strategies including focusing upon the revenue stream, capacity management in the service sector, pace analysis systems and innovation in the "experiences" economy are highlighted in the review of literature.

REVIEW OF RELEVANT LITERATURE

Revenue Management

The strategy of revenue management (RM) has been successfully implemented in service industries where revenues declined due to changing consumer attitudes or increased competition e.g., airlines, hotels, cruise ships (Cross, 1997). Licata (2010) explored using RM to achieve two golf industry needs: increasing playing interest and course revenue. She found that specific types of golfers are willing to pay for premium tee times.

Service Systems Approach

Another strategy involves thinking of a golf course as a service system with a measurable capacity and constraint(s). Although golf is a leisure service, it has three characteristics that permit the service to be operationally modeled to increase throughput. First, daily golf course play is a stochastic system. As such, random events, such as lost balls, weather and/or poor shots, as well as interactions, such as waiting for the group in front to play through to the next tee, greatly impact the pace of play. Second, daily golf course operations are similar to other complex systems, such as: (1) a manufacturing plant where parts are moving from production process to process (2) a distribution network where transportation devices move from location to location, and (3) an emergency room at a hospital where patients wait for treatment. With each example, performance is impacted by variability and interactions. And third, a golf course is a terminal system with a definite beginning and ending as a function of the amount of daylight. With terminal systems, performance is very dependent on the system's initial conditions. For a golf course, a slow group early in the day often spells disaster for the remainder of the day in terms of rounds played (throughput) and the round length (cycle time) (Tiger and Howard, 2007). These traits suggest that throughput needs to be managed.

Pace Rating System

The United States Golf Association (USGA) has developed a Pace Rating System that uses hole length and obstacle difficulty to determine the time that it should take each hole (Knuth, 2006). This approach has been successfully applied at many courses, speeding up play by thirty minutes or more. Although successful, it will not identify the location of system constraints, nor does it take into account congestion which occurs when tee time intervals put more golfers on the course.

Pace of Play Modeling

Another technique uses a model that accurately represents the variability and interactions that impact the pace of play on a golf course. A model of pace of play on golf courses to increase play throughput has been offered by Kimes and Shruben (2002), Tiger, Speers, Simpson, and Salzer (2003), and Tiger and Salzer (2004). The Tiger et al. (2003) model differs from the Kimes and Shruben (2002) model on four points: software, location of the queue, queue logic used to model the course congestion, and applicability. The last point speaks to the overall utility of the systems, with the Kimes and Schruben's (2002) system specific to one course and the Tiger et al. (2003) system applicability to any course. Although effective in indentifying and managing bottlenecks, in

peak times, waiting still exists regardless of how well the course is managed. Other service systems with similar problems have found that improving efficiency is not sufficient. Skok and Kobayashi (2007) demonstrate that the highly operationally efficient Tokyo taxi cab industry is no longer enough to maintain demand.

The Experiences Economy

Pine and Gilmore (1998, 1999) offer a four-stage evolution of the history of economic progress. Beginning with agrarian systems, the evolution continues through phases of industrial and service dominance. The fourth phase identified by Pine and Gilmore (1998,1999) is the "experiences" economy. The following quote offers a complete and clear illustration of the movement from "agrarian" to "experiences."

> "As a vestige of the agrarian economy, mothers made birthday cakes from scratch, mixing farm commodities (flour, sugar, butter, and eggs) that together cost mere dimes. As the goods-based industrial economy advanced, moms paid a dollar or two to Betty Crocker for premixed ingredients. Later, when the service economy took hold, busy parents ordered cakes from the bakery or grocery store, which, at $10 or $15, cost ten times as much as the packaged ingredients. Now, in the time-starved 1990s, parents neither make the birthday cake nor even throw the party. Instead, they spend $100 or more to outsource the entire event to Chuck E. Cheese's, the Discovery Zone, the Mining Company, or some other business that stages a memorable event for the kids – and often throws in the cake for free. Welcome to the emerging experience economy (Pine and Gilmore, 1998, p. 97)."

Although similar, services and experiences are not the same. Experiences are the next step. Customers seek experiences and choose with whom they will do business based upon this desire. Consequently, business must be able to stage experiences to remain competitive.

What is an experience? An experience is a memorable event designed by a company by using services or products as props. The product or service, while required, is only a vehicle for creation of the experience. The experience is personal. It is a state of mind; consequently, it is unique to the individual (Pine and Gilmore, 1998).

Examples of the importance of creating experiences are found in literature. Of course, the Walt Disney Company is the master of this trend. Additionally, Hickman and Mayer (2003) provide a theme park case study examining how human resource practices affect the delivery of experiences. McCabe et al. (2007) suggest that the most successful retailers are those who are staging experiences rather than merely delivering goods and services. Within the hospitality industry, room attendants' impact is studied (Boon, 2007). In restaurants, Kimes et al. (2002) discuss dinner duration expectations impact on revenue and customer satisfaction. Morgan and Rao (2003) provide three case studies (a furniture store, a bank, and dairy) demonstrating how mundane activities can be turned into profit and fun. Chapman et al. (2002) discuss the factors that nurture innovation in logistics services.

Staging Golf Course Experiences to Increase Playing Interest

In this paper, we propose identifying the system constraints either through direct observation (existing courses) or through pace of play modeling (future courses). Similarly, rather than relying totally on efficiency and reducing round length to create demand, we propose focusing on providing experiences while the golfers are at the course.

The remainder of this paper is organized as follows: (1) we investigate whether experiences are of interest to golfers (2) we test experiences at an existing course, and golfer feedback is collected (3) we draw conclusions, including the contribution of this research in service innovation.

Determining the Golfer's Interest in Activities When Waiting

This study seeks to determine which, if any, activities are of interest to golfers while waiting behind another group of golfers. A prototype of the survey was developed by the researchers and reviewed by a panel of four golfers, with handicaps ranging from 2 to 13. Each of the golfers in the panel had played resort courses in the past. Their comments were taken into consideration in modifying the survey into its final form. The survey identified 20 activities (**Table 1)** that could take place during a bottleneck on a golf course.

Table 1: Survey Activities and Averages of Players' Preferences of Waiting Activities

Photographer	2.63
Kiosk with magazines	2.71
Cigar stand	2.83
Visitor's Center (for the area)	2.85
Kiosk with TV (Financial News)	2.90
Kiosk with Internet Access	2.90
Drive simulator	2.93
Do no activities	2.95
Kiosk w/ TV (CNN or Fox News)	3.02
Kiosk with golf news	3.24
Kiosk w/ TV (Golf Channel)	3.27
Stand for filling out evaluation form with incentives	3.46
Stand with course information (including Fun Facts)	3.59
Equipment Purchase (balls, gloves, tee, etc)	3.61
Putting Green	3.80
Telephone for pre-ordering food when you finish	3.85
Snack Bar	3.93
Kiosk with detailed information about upcoming holes	3.95
Restrooms	4.10
Equipment cleaner (balls, clubs, etc.)	4.20
Water	4.27

Responses were restricted to a five-point Likert Scale, with 1=Strongly Disagree, 2=Disagree, 3=No Opinion Either Way, 4=Agree, and 5=Strongly Agree. Golfers were also asked if "Do no activities" was a viable option as well. In addition to these activities and options, the following demographic information was obtained from each respondent: state of residence, gender, age, USGA Handicap (or estimated average 18-hole score if no handicap), number of years playing golf, average number of rounds played on home course (monthly), and average number of rounds played while on vacation (annually).

The target population was tourist golfers in Myrtle Beach, SC. Myrtle Beach markets itself as "The Golf Capital of the World," and features over 75 courses (www.GolfHoliday.com), which has also seen decline in recent years (MBGA, 2009). The sample consisted of golfers playing an upscale resort course in Myrtle Beach on June 20, 2008.

The golfers were playing in foursomes. Surveys (pencil and paper) were placed with the score cards on the golf carts to be used by the golfers. Each golfer who completed the survey received a sleeve of three Nike NDX golf balls. Fifty golfers were asked to complete the survey. Of these, forty-four completed the surveys and received the sleeve of golf balls. Of the forty-four completed surveys, forty-one were used for the data collection; three of the two-page surveys were not completed on both sides. **Table 1** also shows the average of players' preferences of waiting time activities.

First, the activities traditionally used on courses (water, ball cleaner, and restrooms) were ranked the highest. Also, the *No Activity* ranked in the lower half; seeming to indicate that golfers prefer something over nothing. Finally, **Table 1** shows that information technology-based activities did not fare well, except for a single activity, *Kiosk with detailed information about upcoming holes*, indicating that golfers are interested in some specific information about holes soon to be played. Based upon these findings, the following hypothesis was tested and a follow-up study was conducted.

> *H_0 – Golfers had no preference between doing something versus doing nothing*
> *H_1 – Golfers preferred doing some activity versus doing nothing*

Analysis of Variance (ANOVA) was used to test if the twenty-one activities' average scores were significantly different from each other. The resulting F statistic and p-value were 1.58 and 1.32E-35, respectively. Since the ANOVA showed that some activities were different than others, Fisher's LSD test was used to test if the *No Activity* was significantly different than the other activities. **Table 2** shows that many activities were preferred over doing nothing. One information technology-based activity, *Kiosk with detailed information about upcoming holes*, indicated that golfers are interested in some specific information about holes soon to be played.

Follow-up Study Implementing a Kiosk at a Known Course Bottleneck

A prototype of a golf information kiosk was developed for the purpose of collecting golfers' preferences and interests regarding content. The web-based prototype was developed in XHTML and was presented on a laptop computer. The kiosk **(Table 3**) was placed between the sixth and seventh holes and had location-specific information about the upcoming holes and greens**.**

The target population consisted of tourist golfers who play golf in Myrtle Beach, SC. The sample consisted of golfers who had just completed playing a local tournament on Saturday, July 5, 2008. The golfers were asked to listen to an

explanation about the kiosk program and complete a second survey. Of forty-four golfers who were asked to complete the survey, thirty-nine completed them and received the sleeve of golf balls in exchange for their time and opinions. Responses were restricted to a five-point Likert Scale, with 1=Strongly Disagree, 2=Disagree, 3=No Opinion Either Way, 4=Agree, and 5=Strongly Agree.

Table 2: Fisher's LSD test results for *Doing Something* vs. *Doing Nothing* When Waiting (alpha = 0.05, LSD statistic = 0.42)

Activity	*Mean Difference*	*Significant?*
Water	1.32	Yes
Equipment cleaner (balls, clubs, etc.)	1.24	Yes
Restrooms	1.15	Yes
Kiosk with detailed information about upcoming holes (touch screen)	1.00	Yes
Snack Bar	0.98	Yes
Telephone for pre-ordering food when you finish	0.90	Yes
Putting Green	0.85	Yes
Equipment Purchase (balls, gloves, tee, etc.)	0.66	Yes
Stand with course information (including Fun Facts)	0.63	Yes
Stand for filling out evaluation form with incentives for completing form (such as coupons, etc.)	0.51	Yes
Kiosk w/ TV (Golf Channel)	0.32	No
Kiosk with golf news	0.29	No
Kiosk w/ TV (CNN or Fox News)	0.07	No
Drive simulator	-0.02	No
Kiosk with TV (Financial News)	-0.05	No
Kiosk with Internet Access	-0.05	No
Visitor's Center (for the area)	-0.10	No
Cigar stand	-0.12	No
Kiosk with magazines	-0.24	No
Photographer	-0.32	No

Table 3: Kiosk Web Pages Examples

Welcome page
Information about hole 7
- Yardage information from all tees
- Handicap rating
- Location of trouble
- Commentary about the hole and how it might be played

Information about hole 8, with similar information as hole 7
Information about hole 9, with similar information as hole 7
Pin position on hole 7
- Picture of the pin location of the day
- Distance of pin location from the edge of the green
- Commentary about the pin location and how it might be played

Pin position on hole 8, with similar pin location information as hole 7
Pin position on hole 9, with similar pin location information as hole 7
Snack bar menu and prices
Weather radar

Table 4: Kiosk Use Average Results

I like the idea of this kiosk being available for my use	**4.28**
I would take time to use this kiosk if I was waiting to tee off on the next tee	**4.54**
I would take time to use this kiosk even if there was no wait on the next tee	**4.18**
I would check pin location photos and descriptions of pin locations	**3.82**
I would check information on yardages and hazards for the holes	**4.72**
I like the idea of a menu for the snack bar to help me with call-in orders between sides	**4.26**
I would definitely check the weather radar for potential/impending storms	**4.46**
The kiosk would be a good way to alert golfers of impending weather (or other) emergencies	**4.56**

Table 4 indicates that the average player's response supports the use of the kiosk. Usage preferences were highest when waiting, and to determine yardages and hazard location. For each statement, a one-tailed t-test was completed to determine if the average score was significantly greater than 3.0 *No Opinion Either Way*. For all statements, the average score was significantly greater than 3.0 with p-values less than 0.001.

CONCLUSION

Service innovation promotes the design of new services and enhancements in service delivery systems. In this paper, we explore service innovation decision making within the golf

course industry at the design and operations level. We propose managing known bottlenecks to convert bad waiting into good waiting; thus, creating experiences that golfers find enjoyable. Managing a bottleneck in this fashion is in contrast to either simply forcing golfers to hurry along or by reducing the number of golfers on the course. Our research identified that information technology, such as kiosks, strategically placed at known bottlenecks were accepted by vacationing golfers playing in Myrtle Beach, SC, a well-known tourist destination for golfers. We found no research in the use of kiosks at known bottlenecks, and believe our research is the first of its kind applied at golf courses.

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