E-BUSINESS @ SCHOOL
The Technology Adoption Advantage

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Abstract: eBusiness is an emerging interdisciplinary field combining commerce and computer science. Businesses that successfully implement technology often have an advantage, in streamlined internal and external data processing. The lack of graduates with eBusiness expertise able to successfully implement technology has created the need for a specialized programme. This paper shares the successes and challenges of being one of the first programmes in Canada to implement an eBusiness Science undergraduate programme.

1 INTRODUCTION

The term eBusiness was originally used by Lou Gerstner to define software or hardware assisted business used to automate information systems. With the advancement in technology, companies often face the choice of whether they should adopt the new technology. Integration of the technology early has played a vital role in the success of many companies if properly integrated or it may result in wasted resources and time if unsuccessfully implemented.

In most cases, successful implementation of new technology is dependant upon strong management that possess both business acumen and technical savvy. This blend of strong business sense and technological knowledge are skills that are currently in high demand. Businesses looking to fill these positions are often left with applicants who are either strong in only one aspect. The current popularity and viability of eBusiness has caused the need for academia to train students who are capable of understanding and implementing the new technology. Currently the lack of eBusiness undergraduate programmes available is hampering the growth of eBusiness. A search of universities across Canada revealed only 2 out of 149 universities offer an eBusiness undergraduate programme, with only 2 universities, Memorial University and Wilfred Laurier offering co-op options.

The Technology Adoption Advantage programme at Laurentian University provides a strong foundation in commerce and computer science as well as providing valuable work experience through a unique internship programme. The trials and tribulations of pioneering a unique eBusiness programme are detailed in the next section.

2 EBUSINESS SCIENCE AT LAURENTIAN UNIVERSITY

In September 2002, Laurentian University in Sudbury, Ontario, Canada launched its eBusiness Science undergraduate programme. This was a joint venture between two highly regarded units: the School of Commerce, and the Department of Mathematics and Computer Science. Both units have a long and successful history.

The eBusiness Science programme is a specialized honours degree drawn from two core disciplines of Commerce and Computer Science. Research by Liu et al. found a change in skills required in the new workforce, with a declining need for traditional programming skills and a greater emphasis in contemporary programming languages and web-development skills (Liu et al., 2003).

Table 1: Universities in Canada offering eBusiness or eCommerce degrees.

University	Programme	Type of Accreditation	Term Options
Laurentian University	eBusiness Science Programme	Honours Bachelors degree in Commerce and Computer Science	Full-time (4 years) with additional 1year MBA
University of Phoenix, Vancouver campus	Bachelor of Science in Business/e-Business	Undergraduate Degree Program	Full-time (4 years)
Memorial University of Newfoundland	Bachelor of Commerce (Co-operative) and Bachelor of Science in Computer Science	Joint Degrees	Full-time (5 years)
University of Ottawa	E-Business	Honour Baccalaureate in e-business	Full-time (4 years)
Wilfrid Laurier University	Honours Business & Computer Science	Double Degrees	Full-time (5 years)
Athabasca University	eCommerce Major	Undergraduate Degree Program	Full-time (4 years)
University Canada West	Bachelor of Commerce in Technology Management	Bachelor Degree	Full-time (4 years)
U of T at Mississauga	Digital Enterprise Management (DEB)	Honours Degree	Full-time (3 or 4 years)

The eBusiness Science programme at Laurentian University addresses these changes in skills and have geared courses towards the development of contemporary programming skills while adding commerce skills. The commerce component provides a solid foundation in:

- marketing management;
- financial management;
- accounting;
- human resource management;
- operations;
- project management, and
- organizational strategy.

The computer science component provides the essential foundations in:

- programming;
- data structures;
- databases;
- enterprise and web software application, and
- human-computer interaction.

Upon graduation students receive an Honours Bachelor of Commerce and Computer Science Degree.

2.1 Career Prospects

An eBusiness Science graduate would have the skills to pursue a career in commerce, computer science, or eBusiness. Here are some examples of eBusiness careers and starting salaries[1]:

- eBusiness Implementation Specialist — $35,000 to $60,000
- eBusiness Development Specialist — $32,000 to $57,000
- Project Manager — $35,000 to $70,000
- Application Architect — $35,000 to $52,000
- System Analysts — $28,000 to $57,000
- Account Director — $30,000 to $55,000
- Web Developer / Programmer — $30,000 to $55,000
- Security Architect — $28,000 to $45,000
- Product Support Specialist — $28,000 to $45,000
- Corporate Account Managers — $45,000 to $65,000

The eBusiness Science programme currently boasts a 100% employment rate among graduates. Some graduates have reported multiple job offerings shortly after graduation. Others have started their own business.

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[1] Salaries are in Canadian dollars. Positions retrieved from http://www.monster.ca and http://www.workopolis.ca.

2.2 Technology Adoption Advantage

The integration of technology and business has been vital to the success of companies. Properly implementing technology allows a company to streamline the internal and external data processing, resulting in increased productivity while reducing overhead costs. The technology adopted by a company will be unique, dependent upon the type of business conducted (Wu et al., 2003). Before the new technology can be implemented, the company must decide whether the solution will be hardware based, software based or a combination of the two. The cost associated with overhauling the system currently in place must also yield a favourable return on investment. A poorly implemented system may negatively affect business performance (Bolstorff, 2002). The end goal of technology implementation is increased customer satisfaction and increased productivity. Low adoption rates or adopting the technology late may negatively impact the success of a company. In order to successfully adopt the technology, an IT team familiar with technology is required (Martin, 2006). Entrepreneurs with increased technical knowledge and qualifications will have a greater range of techniques available to them as well as an increased adoption of the technology (Lal, 1996). In building the IT infrastructure, companies must decide whether they will implement a customized system or purchase a standardized system. Research by de Jong illustrated that customized implementations yielded increased customer satisfaction scores (de Jong et al. 2003). The Technology Adoption Advantage programme exposes the students to both implementations. A successful eBusiness integrates both intra- and inter-organization aspects of the business. Understanding the technical and social factors and the interaction between the two is required in order to create an organizational learning and knowledge management strategy (Lin & Lee, 2005). The Technology Adoption (TA) Advantage is the newest addition to the eBusiness Science programme. The TA advantage is a unique programme pairing students with an industry partner in an interactive exchange throughout their four-year honours degree programme. The students undertake a project commencing in their first year, leading into an internship during the summer of their third year. The project allows for an interactive exchange between the industry partner and the student. The model for project and internship deployment is based on Six Sigma's ideology of Define, Measure, Analyse, Improve, and Control (DMAIC) (Gitlow & Levine, 2005). Students work towards making

recommendations on how to use technology to make business process improvements. During the internship with the industry partners, the students receive 6 class credits as well as paid work experience. Industry partners through their cooperation receive an overview of their existing technology and an understanding of how current technology fits into their business processes. Industry partners are also advised on new technologies and how the adoption of these technologies can lead to improvements and greater efficiencies which can ultimately improve their bottom line (O'Keefe et al., 1998). The students act like consultants exchanging information over four reports. Some of the programmes industry supporters include:

- Sudbury Area Mining Supply and Service Association (SAMSSA)
- Bestech
- Carriere Industrial Supply
- Fuller Industrial Rubber
- G1 Global
- FedNor
- Canadian Institute of Mining (CIM Sudbury)
- Greater Sudbury Chamber of Commerce

Studies have shown that allowing students to work in an environment with real problems instead of contrived problems benefit both the industry partner and the student. Students are able to apply the techniques and theories taught in the classroom setting while the industry partners involved are able to identify students who they may target for future employment (Kock et al., 2003). The theoretical, applied technology, and business process experience gained with a particular industry partner together with an Honours Bachelor of Commerce and Computer Science Degree gives graduates from this programme an excellent advantage for potential full-time employment with the partner. In recognition of the collaborative work with the eBusiness Science programme industry partners make available scholarships to students participating in the TA Advantage. These scholarships are awarded to the top-performing students in second and upper years. This year, the first year the TA Advantage was offered, two second year students received scholarship awards of $500 each from SAMSSA for producing excellent pieces of work stating how student participation in the Technology Adoption Advantage can assist and benefit the Sudbury mining supply and service industry and enhance the student's learning environment.

2.3 SAP North American University Alliance

In 2003 Laurentian University became a member of the SAP University Alliance. The SAP University Alliance programme assists university faculty members by giving them the tools and resources necessary to teach students the integration of business process and strategic thinking. The skills learned by the students add immediate value to the marketplace (SAP, 2007). The eBusiness Science programme encompasses the mySAP Business Suite family of solutions, such as mySAP ERP, to allow students to apply theories learned in the classroom to practical use through demonstrations, exercises, and problem-solving. Insight is gained on how technology can empower a business to optimize key processes such as accounting and controlling, human capital management, project planning, plant and materials management, and sales and distribution. Students also get to explore SAP's transactional processing as well as set up modules to configure new enterprises. The popularity of the programme's Enterprise Application Software course with a focus on SAP, has led to an influx of students from other programmes. The success of the course has drawn the interest of leading companies such as Deloitte and Accenture who have visited, interviewed, and offered positions to students from this course before graduating.

2.4 MBA in One Year

During their undergraduate studies eBusiness Science students take the core commerce courses that make up the first year of the MBA programme. Upon graduation these student have the option to complete the MBA in one additional year at Laurentian University; a process that takes non-eBusiness/commerce students two years full-time.

2.5 The New eBusiness Science Curriculum with Technology Adoption Advantage

The new eBusiness Science curriculum requires students to gain 120 credits consisting of 60 commerce credits, 45 computer science credits, 3 statistics credits, 6 economics credits, and 6 social science or humanities credits.

COURSE	CREDITS
First Year	**30**
Introduction to Economics	6
Foundations in Mgmt of Organizations	6
Understanding Financial Information	3
Introduction to Computer Science I	3
Introduction to Computer Science II	3
Discrete Math	3
* Introduction to E-Commerce	3
Social Sciences or Humanities Elective	3
Second Year	**30**
Business Statistics	3
* Management Science	3
Management Accounting and Control	6
Financial Management	6
Data Structures I	3
Data Structures II	3
Database Programming	3
Internet Tools	3
Third Year	**30**
Marketing Management	6
Organizational Behaviour	6
+ Operations Management	6
* Project Management	3
Enterprise Application Software	3
Systems Analysis	3
+ Object Oriented C++	3
* Internship	6
Fourth Year	**30**
Strategic Management and Policy 1	3
* eBusiness Strategy Implementation	3
Applied Networks	3
Data Management Systems	3
+ Human-Computer Interaction	3
Social Science or Humanities Elective	3
Commerce 4000-level Elective	3
Computer Science 4000-level Elective:	3
Artificial Intelligence	*3*
Computer Assisted Systems	*3*
Web Data Management	*3*
Expert Systems	*3*
Software Engineering	*3*

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* Signature course covers phase of Six Sigma.
+ New addition provides operations focus.

2.6 Set-up and Operation Costs

The eBusiness Science programme is unique, in its minimalist set up and running costs. The majority of courses provided in the curriculum draw upon courses that already exist in either the commerce or computer science disciplines. Set up entailed only the development of the curriculum and the addition of five new courses. The new courses are inter-disciplinary to "gel" commerce and computer science and target the essence of eBusiness. Courses are taught by faculty from either commerce or computer science. Two of the five new courses are charged to commerce and computer science, while the remaining to eBusiness science. Coordination of the programme is the responsibility of the eBusiness Science Programme Coordinator. Duties include:

- Performing the necessary tasks for the daily operation of the eBusiness Science programme;
- Liaising between the Department of Computer Science and the School of Commerce;
- Providing academic advising to eBusiness science students;
- Refining the eBusiness science curriculum;
- Providing direction to staff hired to promote and market the programme, and
- Managing the eBusiness science budget.

The eBusiness Science Programme Coordinator is given a 3-credit course reduction to compensate the extra workload (Krovi & Vijayaraman, 2001). During the internship portion of the eBusiness programme, students have several options that they may undertake for the project. The ideal choice would be for the student to find their own internship with the industry partner of their choice. In the event that they are unable to locate an industry partner to work with, the Computer Science Co-op coordinator will help find a placement for the student. If there are no placements available, the third alternative would be for the student to conduct a case study/project with a faculty member.

2.7 "Teething Troubles"

Development of the eBusiness Science programme continues to challenge those determined to improve it. After successfully gaining approval to launch the programme, the next hurdle was recruiting students to a new and "untested" programme. Since the programme was in the initial stages of inception, no success stories could be shared with potential students. The focus of the marketing campaign centered on the diverse knowledge students would gain from the programme. Local schools within the

Greater Sudbury vicinity were visited, ads placed in newspapers and an interview with Macleans magazine was arranged. The marketing campaign was a resounding success, leading to 75 applicants showing interest in the programme during the first year. Only 20 of the original 75 interested people enrolled in the programme however, while only 7 students remained in the programme and graduated in 2006. This trend was seen over the next couple of years. The programme was successful in garnering interest from prospective students, but failed in generating a commitment. Furthermore, an exceedingly high drop-out rate from the programme was observed. When students were canvassed, they had replied that they were unable to meet the requirements of the programme. The students who had enrolled in the programme and transferred had replied that they chose to switch programmes since some courses were very difficult and transferring to another programme was relatively easy. The initial ideology of curriculum design was to incorporate the foundational courses in both commerce and computer science in order to make the programme more attractive. The inclusion of both core components would enable students to transfer to commerce or computer science with the completion of some additional courses offered during the summer term. This arrangement came as a convenience to the non-technical students who had found the computer science courses too challenging, allowing them to transfer and graduate from commerce within a 4 year time frame. The marketing strategy had clearly backfired, leading to the removal of the option from all marketing material. Students in the newly revised TA Advantage curriculum are still able to transfer, but would require the investment of an extra term. Studies by Gasco et al. in 1994 had shown that increased training effectiveness could be obtained by increasing the interaction between trainers and students (Gasco et al., 1994). In an effort to promote retention, a mentorship programme and frequent social events were introduced. Kock et al. had found that informal social events would often lead to insightful discussions and exchange of information not normally seen in formal situations (Kock et al., 2003). The initiatives of the social interactions are supported by the programme but run by upper-year students. The additional efforts and the new TA Advantage curriculum have seen a positive impact on student retention. The eBusiness Science programme initially targeted the elite student and required an average score of 80% or more as well as having a limited-enrolment for high-school applicants. The score was unachievable by most

students and explained the high levels of interest but low numbers in registration. The admission requirements have been revised and lowered to be in par with commerce and computer science degree requirements of 70%. The effect of this alteration will be noticed next year. Another common problem seen amongst the students of the programme were timetable clashes. During the first week of each term, students spent their time trying to resolve time conflicts between commerce and computer science courses. Some others were displeased with the discontinuity of courses in the programme. The new TA Advantage curriculum was designed with these issues in mind. Follow-up courses are now scheduled during the same academic year or the proceeding academic term. Prior to the start of each academic year the Registrar's office are notified in which section eBusiness students should be placed. The TA Advantage curriculum includes new courses to enrich the technology and operations focus, four "signature courses", and an internship. These entail the implementation of initial and successive phases of Six Sigma's DMAIC model for an industry partner.

3 CONCLUSION

Being one of the first in Canada to develop a curriculum to address the current and future requirements of the eBusiness industry is rife with stories of success and failures. Early development of a curriculum can create a great advantage for the students entering the programme. The lack of other universities creating an undergraduate programme also means that there is no blueprint to follow. Each school must learn from their own errors, as opposed to learning from those who had successfully implemented the programme earlier. With technology continually evolving, students entering the job market must be creative and able to adapt to the ever changing industry. The Technology Adoption Advantage curriculum gives students the hands on experience required to successfully keep abreast of both the business and technical aspects of the industry. The early adoption of new technology can lead to long-term company success, if the properly trained management are in place. The eBusiness Science programme at Laurentian University successfully merges commerce and computer science into a cohesive programme where students gain expertise in both commerce and computer science. This report delineates the growing pains of implementing a new curriculum combining two specialized programmes already present in most

universities. The evolution of this inter-disciplinary phenomenon requires academia to keep abreast of current needs and requirements in hopes of delivering graduates who have the knowledge and insight to implement advancing technology.

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