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Creating an Experiential Learning Based Multi-Disciplinary Program

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Abstract[35]

For many years, curriculum development has considered learning outcomes at the program level largely via learning outcomes at the course level. Some programs have modified their designs to use different structures such as condensed courses or project based learning. Recently, there has been an increased interest in experiential learning as a way to facilitate student acquisition of real-world applicable capabilities while enhancing student learning of 'soft skills' such as professionalism, communication, and team management. Historically, such engagement including complexities of real-world problems has been accomplished through internships, co-op, capstone courses, or project based learning. In this paper we present an innovative model for experiential curriculum design based on skill requirements and learning outcomes derived from industry needs combined with technology enabled learning. The curriculum has been designed in a highly modular approach to ensure flexibility in student learning pathways to meet the requirements of the work related learning projects that are integrated as part of the program design. The conceptual model of this approach to curriculum design will be presented through a case study of the development of the informatics program at UOIT. Areas of caution are explored to identify recommendations for risk mitigation when developing a program utilizing this type of learning environment. In particular, student selection, technical infrastructure requirements, learning outcome measurement, faculty scheduling, and program management are considered.

Keywords: experiential learning; curriculum design; modular; inter-disciplinary

The apprenticeship system that dominated skilled trade education in the era of guilds provided extensive training and practice in the real-world application of a set of skills in authentic situations applied to genuine problems. This experiential approach to training ensured the development of the wide base of complementary skills necessary for effective work within the trade. The rise of labour mobility and the speed of technological progress, two of the drivers of the productivity gains of modern economies, have made the apprenticeship model of training less attractive to employers. This is particularly true in North America where dual-school arrangements that combine extensive job-placement training with academic study are less common. Nonetheless, modern employers require employees who have the requisite skills and experience to be productive members of the team, ideally from day one. Effective solutions to this training conundrum have proven difficult to devise, and the seemingly expanding disconnect between university education and the requirements of employers seems rather intractable.

This training disconnect has proven significantly problematic in the domain of the management of information and related technology. Modern employers need people who understand how to leverage technology to meet the

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changing needs of the global economy to provide a competitive advantage for their organization in the marketplace. Demand in informatics related professions is high and growing fast. Already more than 200,000 professionals are in business technology management jobs in Canada. It is estimated that employers in every industry will need 65,000 more by 2015 (CCICT, 2010b). Graduates in informatics will help drive technology-enabled changes within Canada and the global economy, helping to improve innovation and economic growth.

According to CCICT (Canadian Coalition for Tomorrow's ICT Skills) there is a large industry-based need for professionals with business skills who are well integrated with relevant information communication technology (ICT) skills to help achieve high levels of productivity and innovation, and to develop competitive advantages in Canadian organizations. Statistics Canada data provides supporting evidence for this need as employment in the Information Systems and Business Analyst area grew 38% from June 2009 to June 2010 (CCICT, 2010a). Given the increased level of ICT integration into all business processes, graduates with these skills are increasingly in demand by employers in all sectors. In 2010, CCICT launched a $2 million "digital jobs for tomorrow" (CCICT, 2010a) campaign for the development of business informatics programs and to support university partners and students enrolled in accredited programs.

The Health Information Management (HIM) profession is also facing a major revision of its role in the industry and society. There is an industry- and government-driven demand for more specialization and advanced knowledge to meet the changing needs of the information age. According to CHIMA (2012), "continuing to 2022, we will see the continuing convergence of health informatics and health information to manage organizational change." Some projections indicate a shortage of Heath Information and Health Information Management professionals as early as 2014. Roles under greater demand and/or at "High Risk" of skills shortages include those in data analytics, systems architecture, security and privacy standards, data quality, information governance, business analysis, and clinical informatics (COACH, 2014).

Background
New managers entering the workforce direct from academic degrees arrive with a strong background in formal techniques and extensive, but inert factual knowledge about the operations of their area of specialization and of the organization more broadly. Moreover, while many have experience as consumers, they typically have little understanding of the complexities of real-life application of management and decision- making (Cannon & Feinstein, 2005). According to the accreditation bodies for health information management, health informatics, and business technology management professionals, there is a need for graduates to have completed some form of industry related work experience. This situation accentuates the need for greater focus on the importance of integrating experiential learning opportunities into the design of such academic programs. Experiential learning in its broadest term refers to a variety of programs such internships, practicums, and cooperative education assignments for providing students

with work-based learning opportunities (Lee, 2008; Lee & Dickson, 2010). The concept of cooperative education (Co-op) was founded on research by Herman Schneider ("Intuitive Educators: Herman Scheneider 1872-1939," 1955) at Lehigh University and the first co-op program that he started at the University of Cincinnati in 1913 (Fincher & Knox, 2013).

> *Co-op experiences are typically paid, supervised by a professional from that career discipline, and complete more than one assignment with the organization to gain progressively increased levels of responsibility. Internship on the other hand is an experiential learning opportunity involving students working in their expected career field during a summer or single semester. Internships may be paid or volunteer work and may or may not carry any academic credit in the program of study.* (Cooperative Education & Internship Association, 2013)

In a more traditional academic setting, experiential learning may include project-based learning or problem oriented learning. This experiential approach integrates a particular project or problem from industry into the classroom learning environment. Interdisciplinary group work is often included as a feature of this approach to try to reflect the real-world situation as closely as possible (Fincher & Knox, 2013). Examples include senior capstone design courses in engineering or capstone courses in business where students work with an industry partner to develop solutions to a particular open-ended problem for real clients.

According to Nasr et al. (2004), experiential learning "has the potential to produce a student with a higher level of aptitude for obtaining soft skills employers in today's market so desperately seek" (p.13). In an educational system designed to integrate experiential learning throughout the program the experiential learning provides the opportunity for students to apply what they are learning as they are learning it (Dressler, 2003). This approach to education offers enormous potential for confronting students with highly complex and dynamic situations that call for the application of both general principles from lower-level classes and synthesis of analytics from higher-level courses (Cannon & Feinstein, 2005). These experiential learning techniques provide a relatively cost effective way of addressing the need for dynamic knowledge as learners are immersed in an environment in which they actively participate in the acquisition of knowledge (Cannon & Feinstein, 2005).

Experiential learning has been reported to support higher perception of learning outcomes by students in some areas related to the classroom experience (Lee, 2008). Regardless of the level of knowledge development acquired during an experiential learning activity, the experience will affect their classroom learning experience and that of their peers (Morgan, 2004). It has also been shown to improve students' self-confidence and social skills (Gillin et al., 1984), increase practical knowledge and skills (Williams et al., 1993), enhance graduation employment opportunities (Clark, 1994), and improve the assimilation of graduates into the workplace (Rosenbaum & Kariya, 1991).

It is important to remember that experiential learning is not a specific set of tools or techniques but is above all a philosophy of education based on Dewey (1938) "theory of experience" (A. Y. Kolb & Kolb, 2005). In this context, experiential learning has been defined by D. A. Kolb (1984) as a cycle which includes the active involvement of a person in an activity, their reflection and evaluation of that experience, the determination of useful knowledge from the experience, and finally the application of this knowledge during a subsequent new experience. This experiential learning therefore involves: a) experience, b) critical reflection, c) abstract conceptualization, and d) active experimentation (Chavan, 2011). The experiential learning theory is built on six propositions (A. Y. Kolb & Kolb, 2005):

1. Learning is best conceived as a process. Students should be engaged in a process that best enhances learning through feedback on the effectiveness of their learning efforts
2. All learning is a form of relearning. It is best if learning draws out a student's perception and ideas about a topic so that they can be examined, tested, and integrated with new and more refined ideas.
3. Learning requires the resolution of conflicts between diverse modes of reflection and action and feeling and thinking.
4. Learning is a holistic process of adaptation to the world.
5. Learning results from the synergetic transactions between a person and their environment.
6. Learning is the process of creating new knowledge. Experiential learning is a constructivist theory of learning.

D. A. Kolb (1985) suggests that there four types of abilities required for effective learners: (1) concrete experience (CE) ability, (2) reflective observation (RO) ability, (3) abstract conceptualization (AC) ability, and (4) active experimentation (AE) ability. Since this seminal work, there have been many studies that have examined experiential learning and Kolb's learning styles resulting in an expanded model which includes 9 learning styles and learning spaces (A. Y. Kolb & Kolb, 2005; D. A. Kolb et al., 2001; Lamberski, 2002). More recently, there has been a proposed modification to Kolb's original experiential learning theory to overcome criticisms of the model (Bergsteiner et al., 2010). This new model is a two cycle model with a cycle for concrete, active, primary learning and another intersecting cycle for abstract, passive, secondary learning (Bergsteiner & Avery, 2014). It provides a formal framework for demonstrating the integration of hands-on experiential learning and more traditional classroom, example based approaches. The model also provides a clearer understanding how a variety of learning styles can be met through the use of experiential learning integrated with classroom curriculum. This is the theoretical underpinnings of the experiential learning model used in the design of the informatics curriculum.

Case Context
The University of Ontario Institute of Technology (UOIT) is a relatively new institution in Ontario, Canada. As a young university, it can still be considered in a start-up phase of development and therefore is open to the development of creative new programs which are unique in Ontario. UOIT has a mandate to be market driven and a leader in technology enabled learning. The

university has also been charged with being a leader in the support of access to higher education through college to university transfer agreements called pathways.

Faculty of Business and Information Technology
The program will be situated with the Faculty of Business and Information Technology (FBIT) – an interdisciplinary faculty rather than a business school or computer science faculty. The faculty has made a commitment to ensure all graduates have some form of work experience upon graduation. This is done through its commitment to experiential learning in the form of required internship or 4th year consulting Capstone courses. These experiential learning opportunities expose students in the program to additional perspectives on the impact of technology and their program perspective on individuals, organizations, and society. The Faculty has over 30 faculty members with expertise in Informatics related disciplines. FBIT's existing Bachelor program in Commerce and Bachelor of Information Technology will complement the learning outcomes of the Informatics majors by providing domain specific expertise and examples that would be faced by graduates throughout their careers. Students in the Informatics majors will be able to work on interdisciplinary projects with colleagues from other FBIT programs, Health Sciences, Engineering, or Education that will reflect real-world environments.

Informatics
Informatics is the study of information and communication systems for social and economic situations. Informatics focusses on the planning, development, implementation, operation, optimisation and economic use of information and communication technologies and systems. Informatics specialists are interdisciplinary interpreters of information systems and the application domain (business or healthcare) - between technologists, managers, and professional stakeholders (e.g. clinicians, financial service providers, logistics and supply chain specialists, etc.) Professionals are able to integrate several areas together (e.g. data analytics, strategy, security, and information systems) and think about how processes and human work factors in an enterprise can be affected and improved by technology. These individuals not only need management and technical capabilities but must also be effective communicators and be able to mediate between people of disparate professional backgrounds. The program will emphasize research questions concerning the architecture, design, creation and dissemination of information and knowledge, as well as the systematic assessment and efficient use of area specific information and communication technologies, rather than focussing on the technical details of hardware and software. The federal government continues to invest in research and development in fields related to informatics through research councils and agencies such as CANARIE and Compute Canada.

The FBIT at UOIT proposes a new Bachelor of Informatics (B.Inf.) Honours program with majors in Business Technology Management and Health Technology Management. This program is designed to produce highly trained Business and Health Informatics professionals who are well positioned for

roles in the public and private sector. It is a direct response to market demand for professionals with domain specific knowledge and ICT related skills. According to Information & Communications Technology Council (2008) the labour market for professionals with business informatics skills was an IT occupation that continued to thrive through the recession due to industry need. Each major will include coursework in management, information technology, informatics, and analytics which is implemented using a fully outcomes based assessment model through integrated experiential learning projects.

Business Technology Management: The major in business technology management is a four-year Honours Bachelor program. There are also two degree completion pathways; one for students with a college business diploma, and one for students with a programmer analyst college diploma. The program offers a balance of information technology and business courses designed to meet the needs of today's technology-enabled economy. Students completing this program would qualify for the Certified Business Technology Manager (CBTM) designation from CCICT, once they obtain sufficient work experience. The program will develop student skills in data analytics, information systems, change management, and data security.

Health Technology Management: The major in health technology management is a two-year degree completion program for Canadian Health Information Management Association (CHIMA) designation holders and for graduates from CHIMA-accredited Health Information Management college programs. The program fills the gaps in knowledge and skills in health informatics that have been identified by recent industry reviews in Canada and the United States. An additional 6,200 – 12,200 health informatics and health information management (HIM) professionals, including 70% in IT and HIM roles, will be needed in Canadian healthcare over the next five years due to replacement and growth demand (COACH, 2014). The program will develop student skills in project and change management, data analytics, and security and systems management. This program will also be of interest to students who want to pursue post-graduate education in Informatics, Computer Science, Health Informatics, IT Law, or Management.

Program Development Process
A program of Informatics brings together all areas encompassed in the Faculty of Business and Information Technology. The design of the Bachelors of IT programs included the integration of business concepts but left little room for analytics and the social aspects of the impact of technology. The commerce program integrates business computer applications but does not provide the technical background for data mining, data visualization, and programming. As a result, there was a gap in programming for students seeking a blend of business and information systems knowledge. In 2012, with the results of the closure of the university's HIM program and strong demand from industry (CCICT and CHIMA) along with inquiries from prospective students a faculty based committee was struck to design the informatics program. This effort was being driven by the interest of the faculty to meet this market demand and provide a program that would present a good

fit for students interested in the intersection of business/health and information systems.

Recruiting a Development Team

One of the critical components of the development effort behind the informatics program at UOIT was the formation of a team that brought together expertise from across the faculty and the university. Representation from core business disciplines, information technology, and the university's game development and entrepreneurship program ensured that a wide variety of perspectives were available to promote the most effective design effort possible. The team also solicited assistance from the education faculty in order to guarantee that the design conformed to the best practices in educational system design. Finally, the team also solicited input from external stakeholders including industry accreditation bodies, potential experiential learning and Ontario college pathway partners. This multi-faceted team was critical in supporting the holistic approach to the design and implementation of the program learning outcomes.

Shift from courses to Program Outcome and Learning Experience

Among the most important departures from traditional practice in higher education, and also among the most difficult to work through, was the transition from a course based program design to an outcome and experience based design. The team, largely due to habits developed through experience in developing traditional course-based programs, initially began with a course-based mentality, considering the array of courses that would be necessary in order to facilitate the development of a well-rounded skill set by students. The team rapidly transitioned to an approach with a significant emphasis on experiential learning - through projects developed in conjunction with external partners, directly with the employers of working professionals (allowing them to continue in their careers), and through working directly with (or being part of) start-up companies (their own or in partner incubators) to facilitate this experiential learning. The integration of work experience into the curriculum enhances learning and prepares students to become a productive member of the workforce. Small class sizes and team environments will provide the structural support for student learning in a dynamic environment. Academic recognition for these types of experiential learning requires the development of appropriate assessment mechanisms. The experiential learning model will be supported by hybrid and online modules of relevant theoretical and analytic content, as well as faculty and peer mentors.

The shift to an outcome-based concept was accomplished with the assistance of an expert from the UOIT Faculty of Education. With his assistance, the team took the capabilities requested by industry as reflected in the CCICT's business technology management professional's learning outcomes and the national standards for e-health professions as the starting point and worked back from there to determine what students would need to demonstrate in order to confirm that they had achieved the necessary learning outcomes. Whereas in a traditional classroom approach to learning, an array of readings, assignments, and classroom activities are used to develop competencies that students are expected to be able to use after completion of their program, the

experiential approach adopted for the informatics program began with the desired outcomes in terms of student competencies and developed structures to assist student development of those competencies and mechanisms to facilitate assessment of student development / achievement.

This experiential approach to student learning and the process of education places substantial responsibility in the hands of students, requiring greater accountability in order to manage a self-directed learning process.   In addition, there is a concomitant responsibility for faculty to make the requirements of successful completion of a program of study sufficiently explicit that students can seek assistance with the development of appropriate skills and competencies. Much as in an apprenticeship environment, students are expected to develop and demonstrate their skills through project work in or analogous to real-world contexts. One central component of this approach, both for assisting student development of capabilities and facilitating assessment of their achievement, was the development of learning outcome rubrics.   These rubrics, developed with guidance from the Faculty of Education expert, distil the learning outcomes expected by faculty members and ultimately by industry into explicit statements of the critical skills in a particular learning domain that students must be able to demonstrate. Rather that approaching these skills as the province of an isolated course, the program requires that students demonstrate competence in each of a wide range of skills through their work on projects.

As the only university in Ontario with a specific focus on technology integration and interdisciplinary research, we are uniquely positioned to support students in informatics programs. The programs are designed to incorporate a high degree of interdisciplinary teaching and learning, representing the integration of the technical and domain specific knowledge required in these emerging fields. These interdisciplinary learning experiences will ensure students are able to apply the knowledge to meet the changing demands of the market and be innovators and drivers of the future growth of the ICT industry. The approach will also ensure a high level of continuous engagement of students and faculty in the learning process.   The small project-based groups working with industry and academic mentors provide a high level of motivation for inquiry, reflection, and both individual and community-based reflection.   The proposed pedagogical approach of experiential learning is unique in Canada and will provide students will many opportunities to integrate and apply their knowledge to organizational problems at partner locations as well as in small start-up ventures of their own. Thus, students graduating from the programs will have demonstrated the learning outcomes through involvement with cutting-edge research and teaching methods and in turn will differentiate themselves from others in the workforce.

Final Program Structure
The Bachelor of Informatics (Honours) program is a four-year, 120 credit program with 30 credits per year. Students will complete 15 credit hours of assessed learning outcomes each semester. A typical 36 hour (three credit) course will be articulated as three, one-credit learning modules. Each module

will consist of four weeks of material. This format provides flexibility in the delivery of the material to allow for increased team teaching and a truly interdisciplinary approach to the presentation of concepts and their application. The modularization will also aid in the efficiency of updating material to stay current, a critical aspect in the informatics area due to the pace of technological change. Components in a module include online video clips and appropriate learning resources; synchronous group activities and discussions, and experiential application of material to be done in project groups.

The first year of the program will focus on fundamental skill development including communications, time management, numeracy skills, technology applications and programming skills, and fundamental concepts related to the area of study. During this year, students will be introduced to how to learn through simulated cases and experiential learning mini-projects. In the second year, students will become more immersed in the experiential learning model approach as their skills increase and their ability to analyse situations and apply concepts to solve organizational problems develop. During this time, the students will be part of project teams but will not normally be leaders of any team. In the final two years of the program, students are expected to act as both project leaders as well as team members in active experiential learning opportunities in order to complete their program learning outcomes. Their roles and responsibilities in the project teams will increase as will the expected level of application, analysis, problem solving, and solution implementation for assessment of the learning outcomes.

Each program learning outcome is supported through a blend of face to face faculty-student instruction, online tutorials, peer mentoring, and real-life and simulated case based experiences. Students will be immersed in a number of different real-world situations with existing community-based partners, start-up companies, or in upper years in their own start-up enterprise to demonstrate and apply the theoretical constructs. Assessment of the learning outcomes will be conducted using both traditional exams as well as the analysis of documents, project performance, and product developed in the experiential learning settings.

Each semester students will be placed in teams and specific roles on project(s) to help them meet the learning outcomes they are progressing during that semester. Learning outcomes have been designed in modular fashion to enable flexibility in the ordering and scaffolding of the components to particular project applications. Online resources such as video clips, tutorials, and simulations will be provided to students from content experts (i.e.: professors from our own Faculty or a recognised expert from another institution or industry partner). These will be available to students using our learning management system and/or UOIT's iTunesU repository. The support material will be prepared in shorter segments as deemed appropriate for each course or learning module. Each video clip or supporting resources is expected to have a useful life of two - three years due to technological change and market demands.

Each experiential learning project will have a student team leader as well as a faculty mentor. Faculty mentors will provide guidance to the student team with additional faculty course instructors providing guidance on projects related to the program learning outcomes in progress for which they are responsible for the assessment. It is expected that faculty members teaching courses in the program for a given year will serve as mentors for experiential learning projects associated with those learning outcomes. Student team leaders will be progressing learning outcomes related to project management, leadership, communication, and integration of concepts as well as new informatics skills. Meetings with the faculty mentor, the entire project team, and when appropriate the industry partner, will be scheduled on a regular basis to ensure the project is well managed and clear communication exists between all parties with respect to expectations, outcomes, and deliverable timelines. During these group activities, the application of relevant theoretical material and its application to the project will occur. As needed, these sessions will also integrate synchronous discussions with other instructors and faculty members to support project problem resolution and systems development.

Program Reviewer Feedback

The program has been reviewed by an academic external reviewer familiar with the informatics industry as part of the quality assurance process. The reviewer expressed that the program was grounded in a solid foundation and had only minor recommendations for improvements. These improvements were not regarding the pedagogical approach but comments regarding the importance of integrating change management and additional opportunities to enhance knowledge discovery and data exploration skills. The review did caution that it would be critical to ensure strong industry support to be able to sustain the experiential learning opportunities in the program.

The feedback received by potential partners has been overwhelmingly positive. Given our positive experience of the past ten years with 4th year consulting capstone project placements partners are eager to engage with this experiential learning model. Many organizations have expressed their interest in hosting students for their experiential learning projects and participating as mentors in the program. The support from potential college pathway partners has also been positive with interest already being expressed in expanding the potential applicant pool to other related diploma graduates. Prospective students have been inquiring about an informatics program for some time. As the program is not yet available for registration, we have not formally promoted either the content or the design. That being said, the increased interest from parents and students alike in gaining work experience through experiential learning such as co-operative education programs and internships will make the proposed design attractive to potential candidates.

Recommendations and Conclusions

One critical element of FBIT's success in developing a new program with a dramatically new pedagogical approach, and one that is well-established in literature presenting research across a broad swath of collective activities, was the incorporation of diverse points of view on the development team.

FBIT actively sought input from a diverse range of specializations and solicited assistance from faculty of education experts in order to ensure that the development team explored pedagogical approaches beyond those with which we are familiar from long experience in a classroom-based learning environment. The diversity of perspectives around the table, coupled with outside input affording deep expertise in pedagogical theory, allowed the team to develop a program that leverages a substantially new approach to education.

Among the critical success factors for the resulting program, the team identified the need to recruit and select a group of students with appropriate academic capabilities, but also with the requisite temperament and self-reliance regarding their own educational development. We are confident that many students who have developed their pre-university skill set in a pedagogical system structured around classroom-based learning would have difficulty with the self-directed experiential program we have developed. However, for a subset of capable student who are sufficiently independent and self-reliant, such a program provides opportunities to develop essential skills and competencies much more efficiently and effectively. The program also allows much greater freedom for students to pursue broader interests and to develop more focussed interests. We regard such expanded freedom of learning and discovery as among the greatest benefits of this new program design. It simultaneously encourages the development of greater proficiency in valuable skills for employers to leverage and produces an environment that encourages entrepreneurial experimentation that should facilitate the launch of fundamentally new ventures by students who find a passion and identify an appropriate opportunity while in the program.

There are risks that accompany the introduction of an initiative such as this. We are cognisant of the fact that, notwithstanding availability of suitably qualified candidates, the selection of students is a concern: traditional methods of both education and evaluation are not always well adapted to the identification of students who could thrive under such a different educational structure. To put it another way – how do we find those people who will do well, and how do we know they will do well? We believe that we have both experience and the ability to determine the former, and to a certain extent of course the latter is both under our and the students' control, and experience will build quickly. Of course measurement of learning outcomes becomes a critical aspect of such a program simply because of this issue – sensible and considered evaluation at critical points is built into the program, and of course, success in such a program is measured not so much through exam results as through skill retention and observable achievements in the entrepreneurial environment the program is building. That said, accreditation and advancement are key, and we are mindful of the need to be sensitive to the requirements of external others, both employers and professional associations.

Such an initiative is also resource intensive, both in terms of people and infrastructure. We are keenly aware of the need to be able to properly provide the technical infrastructure necessary to support this initiative – UOIT is a

technologically advanced university with motivated and experienced support and technical staff, but it behoves us to realise that the pedagogical shifts in the program will put a strain on our infrastructure that must be monitored and adapted to. Additionally, because of the way the learning strategies and outcomes are organized, there are additional issues with the scheduling and teaching load of faculty and, whilst our faculty are also motivated and experienced, there are questions still to be answered as to how they will be able to contribute and be recognised as such. Coupled with this, the management of the program itself is of prime importance. It was recognised early on in our work that managing such an undertaking, tracking faculty, support and students, is not a straightforward task. While there are strategies in place to address this, including dedicated program managers, it remains one of the vital support pins of the initiative.

As with any such initiative, there remain questions. It should be cautioned that we have not yet embarked on the initiative proper, since we are in the process of acquiring government approval in due time. We look forward to being able to report on lessons learned, adaptations made, and the successes to come. Areas of caution are explored to identify recommendations for risk mitigation when moving to this type of learning environment. In particular, student selection, technical infrastructure requirements, learning outcome measurement, faculty scheduling, and program management are considered.

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