Business Datafication Project for Intrapreneurship Supported by University-Industry Collaboration

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Abstract

This case study demonstrated the design, implementation, and evolution of the business datafication project for intrapreneurship in an e-business course. The project was grounded in the experiential learning theory and supported by the university-industry collaboration that brought real data (new oil of the digital economy), real problems (business problems), and real people (the CEO of a real company) to students' learning experience. Datafication and business pitching were taught by simulating the authentic business environment encountered by intrapreneurs. The e-business course evolved from face-to-face to pure online data-mining training, from an intra-university student group project to an inter-university business case competition. Nevertheless, the university-industry collaboration was not easy to achieve. In the present case, the university and the industry partner went through a mutual negotiation and came up with the solutions to make the collaboration happen. The achievements of the e-business course are evident in the feedback from students, instructors, and industry partner. The experiences of initiating, developing, and actualizing an e-business course backed by university-industry collaboration are expected to inspire business educators to make their courses more authentic, relevant, and engaging. The solutions to mitigate conflicts between the university and the industry partner can also contribute to prior literature where possible mitigating measures are lacking. We take this opportunity to invite institutions across the globe to join us to bring students an authentic, boundaryless e-business learning experience.

1. Introduction

Education should be authentic, relevant, and engaging to nurture graduates ready for their careers and society [1]. The present case study demonstrated the design, implementation, and evolution of the business datafication project for intrapreneurship in an e-business course. With the advantages of university-industry collaboration, the project simulated an authentic business environment to allow students' experiential learning—students learn from their subjective experiences of intrapreneurship through authentic business datasets and businesspeople.

Along with the pandemic chaos, the program team made small changes to the business datafication project for intrapreneurship and created a big difference in student learning experiences (see Table 1 for the summary of the implementation and evolution of the project). The project relied on a learn-from-home mode to teach students data mining techniques using a cloud-based Software-as-a-Service (SaaS) application and foster student interactions using other technologies during the pandemic lockdown. In 2022, as the world gradually adapted to the post-pandemic new normal, the project was enhanced and inserted into the e-business course of another university and brought about the inter-university business case competition, making students' intrapreneurial experience even more vivid and exciting.

Since the first commencement of the course in 2019, over 1,500 business students (in over ten course sessions) have completed it. We are honored that the business datafication project for intrapreneurship has gained multiple recognitions, including the university innovative learning award and features in the university newsletters and mass media. The achievements of the course are also evident in the feedback from students, instructors, and industry partner. The design and implementation of the project remarked that business courses could be relevant and attractive to students with university-industry collaboration in terms of real data (new oil of digital economy), real problems (business problem), and real people (the CEO). It also demonstrated that students were self-motivated to outperform when high expectations were set (opportunity to present directly to the CEO) and trendy technologies were adopted (live streaming on YouTube).

By sharing the good practices of the present case, we expected that business educators would be inspired to the solutions of university-industry collaboration and technology-mediated interactive teaching and learning for nurturing intrapreneurs. Other institutions across the globe may also work with

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us to bring students an authentic and boundaryless learning experience.

In the remainder of this article, the project design will be introduced. The potential conflicts between the university and the industry partner will be explored, and the solutions will be suggested. Feedback from students, instructors, and industry partner will be reported. The challenges of implementation and future development directions, from the program team's perspective, will be discussed.

2. e-Business Course

The e-business course, in the present case, was designed and commenced before the pandemic outbreak and has continued to date. It underwent different delivery modes and proactive rejuvenation to adapt to the changing learning environment in the pre-, during, and post-pandemic periods (see Table 1). The course emphasizes student experience in the learning process. It comprises ordinary large-class lectures to cover theories and textbook knowledge, small-group tutorials to teach and experiment with data mining skills, and group projects to nurture intrapreneurship by incorporating authentic industry elements. These industry elements make this course stand out from other e-business courses.

In order to bring in the industry elements, the program team had a mutual negotiation with the industry partner to understand and reconcile the potential conflicts between the two parties. Their practices and experiences in initiating the university-industry collaboration can contribute to the limited academic discussions on the possible solutions that foster university-industry collaboration [2].

2.1. Industry elements and university accountability

Any data of a private company means everything to its business. Sales records and customer databases of a company on others' hands can mean sharing valuable private assets and exposing their competencies and strategies to competitors. It is reasonable for private companies to handle their data confidentially. The same data, however, means great opportunities for knowledge transfer and creation for universities and their students. These data open doors to the real business world, inspiring solutions and knowledge for the good of society as a whole. It is the ultimate goal of academics to claim universal triumphs of novel solutions to real-world problems and empower students to do so. They are more than happy to share their knowledge immediately and publicly [2]. Besides, the confidentiality of data becomes even more complicated if the individuals involved are considered. They are the most vulnerable stakeholders because they can only rely on the integrity and capability of companies to protect their privacy. Information leakage costs individuals' privacy as badly as companies' goodwill [3].

These conflicts and concerns behind the potential university-industry collaboration project then became the hints that directed the design and implementation of the business datafication project for intrapreneurship in the present study. To gain the confidence and trust of the industry partner, the industry partner was guaranteed that they were to decide the coverage of the datasets to be offered and anonymize data by replacing customer names and customer numbers with random identifiers; only one assigned program team member could handle the data; and only aggregate data would be released upon the industry partner's approval. To ensure the collaboration was valuable for the industry partner, their CEO and senior management were invited to develop the group project and be one of the assessors of students' group projects. The involvement of the CEO was a win/win scenario because students had an authentic learning experience, and the industry partner also gained new insights [4].

By reconciling the conflicts and taking up sole accountability for confidentiality protection, the industry partner accepted the precautionary measures suggested by the program team. An agreed code of practice was also established through a formal protocol. With university-industry collaboration, students' experiential learning was made possible.

2.2. Experiential learning theory

Distinguishing from cognitive and behavioral learning theories, the experiential learning theory emphasizes students' subjective experience in the learning process [5]. Learning is considered to occur when students are immersed in the context by experiencing and thinking to internalize knowledge and by reflecting and acting to externalize knowledge. It is highly commended, particularly in professional education and training [5]. Therefore, grounded in the experiential learning theory, the e-business course in the present case adapted authentic business materials (real data) and settings (real people) to engage students and prepare them for intrapreneurship (solving real problems). It was designed to equip students with datafication knowledge and skills to enhance organizational efficiency and competitiveness through a student group project—the business datafication project for intrapreneurship.

2.3. Business datafication project for intrapreneurship

The value of data is no less than any other valuable asset to a company in this digital era. Data shapes every aspect of the business, from strategic planning to daily operations, from product design to sales marketing. Big or small, urgent or long-term business

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decisions rely on the hints and wisdom hidden in the data. Datafication, hence, becomes the foundation of business development. It refers to the process of converting whatever happens on earth to digital data and analyzing the digital data into insightful information. By leveraging the insights obtained from datafication, informed business decisions are more likely to be made and the business is more likely to succeed [6].

If datafication is the key to innovation, intrapreneurs are the keymen to innovate for a company's sustainability and competitive advantages. By delving into the data of the company they work for, successful intrapreneurs can identify the challenges and innovation space, create innovative solutions, and solicit resources to actualize innovative ideas [7]. Since intrapreneurial innovations may not be department-specific, an intrapreneurship-friendly environment should be built to guide and host the borderless innovation process [8]. Therefore, with the advantages of university-industry collaboration, the business datafication project for intrapreneurship in the present case simulated an authentic business environment to expose students to an intrapreneurship scenario.

2.3.1. Learning outcomes. The business datafication project for intrapreneurship was, thus, designed and developed to foster students' learning outcomes from their subjective experiences in data mining and business case competition (see Appendix 1). Upon completion of the project, students will be able to:

a. Identify data-driven business problems and opportunities using data analysis techniques.

b. Propose data-driven e-business solutions to address identified data-driven business problems and opportunities.

2.3.2. Teaching and learning activities (data mining tutorials). To ensure the authenticity of the student learning experience, an industry partner, Hong Kong's leading and public-listed fashion retailer, was invited to co-develop the business datafication project for intrapreneurship. The industry partner was involved in three different aspects.

First, the industry partner provided real data—a rolling dataset as teaching materials. The rolling dataset comprised the recent three years of customer purchase histories of genuine fashion chains (with any personal information masked). Approximately 1.4M sales data and 270k customer data were involved. The genuine dataset would not only allow students to identify real problems in a real business entity but also inspire the fashion retailer to new knowledge and innovative ideas.

Second, the CEO of the industry partner, the real people, was one of the members of the judging panel of the business case competition. The panel was to determine the assessment criteria and appraise the student deliverables. The student deliverables were business proposals and presentations on their data-driven e-business solutions to identified problems.

During the pandemic, the business datafication project for intrapreneurship and related online tutorials were adjusted to be geographical-, time- and platform-independence. Fundamental big data analysis and mining techniques, including data filtering, association detection, and cluster analysis, were covered in the tutorials through Zoom and YouTube. Video consultations were provided during online tutorial sessions and upon request through Zoom and WhatsApp.

Technically, the software applications and a cloud-based SaaS data mining application selected for this course were platform-independent. They were available on popular computer and mobile device platforms. Students shared the same teaching and learning experience regardless of their choice between Windows or Mac systems. Zoom, YouTube, SAS Enterprise Miner, OBS Studio, and WhatsApp were the major software applications required.

2.3.3. Assessment task (from intra-university to inter-university business case competition). As part of the e-business course assessment, students acted as intrapreneurs to prepare a business proposal on their data-driven e-business solution to enhance the sustainability and competitiveness of the fashion chain. They delivered an online video presentation to pitch their proposals to the CEO in an authentic business setting during the pandemic. This assessment was framed as a business case competition, whereas student groups prepared and presented their proposals to compete for a final award. The competition mode would motivate and engage students. It would also allow students to apply classroom knowledge to real business circumstances and experience an authentic competitive atmosphere. It is one of the best actualizations of experiential learning and is widely adopted in business education [9].

Student proposals must be based on the data analysis results obtained from the genuine dataset provided by the industry partner. Students utilized data mining techniques to identify business problems by filtering, detecting, and analyzing the dataset. They also needed to draw data evidence to support the costs and benefits of their proposed solutions, just like intrapreneurs addressing resource constraints and return on investment expectations.

Student presentations were assessed by the judging panel based on a set of criteria, which emphasized the balance of creativity and feasibility. The whole setting simulated authentic business situations to make students feel the realness and learn from vivid experiences [9]. Students were briefed on the judging criteria. They also understood that the

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CEO, the real dataset owner, was a member of the judging panel, and their proposals might be adopted to solve the CEO's real business problems.

In 2022, as the world gradually recovered from the pandemic, the business datafication project for intrapreneurship gained new momentum for new achievements. The program team further enhanced and invited another university with a similar undergraduate e-business course, bringing the original intra-university business case competition to the inter-university level. This achievement contrasted with other courses that simply bounced back to the original course design.

Specifically, while maintaining the uniqueness and culture of the two universities, the syllabi of both e-business courses were based on the same textbook. This ensured that students from different universities could learn a similar scope of knowledge and skills. Students were provided with the identical genuine dataset of the industry partner. They faced the exact assessment requirements and criteria regarding the project.

The breakthrough was that, instead of ending the project within one university, outstanding proposals from both universities were put forward to the inter-university business case competition stage. A new guest lecture conducted by the senior management of the industry partner was added to the original teaching plan. Students from both universities gathered to attend the guest lecture about the strategic goals and pain points of the industry partner. The industry partner also shared their expectations of a good business proposal and a successful business pitch.

Unlike the original one, students in the rejuvenated project competed with those from another university. They presented their proposals in person in front of the judging panel and the audience of both universities. Table 1 summarizes the implementation and evolution of the project.

Table 1. Implementation and evolution of the business datafication project for intrapreneurship

	Pandemic Period		
	Pre-	During	Post-
Tutorial delivery mode	Face-to-face	Online	Face-to-face
Student project pitch/ presentation	Face-to-face	Pre-recorded video	Face-to-face
Business case competition	Intra-university	Intra-university	Inter-university

3. Discussion

The business datafication project for intrapreneurship remarked that business courses could be authentic, relevant, and engaging. In the present case, an ordinary classroom was transformed by the university-industry collaboration in terms of real data, real problems, and real people. We are honored that the business datafication project for intrapreneurship has gained various recognition, including the university innovative learning award and features in the university newsletters and mass media. The achievements were also proven by the frank and positive feedback from students, instructors, and industry partner. The following feedback was extracted from secondary sources, e.g., debriefing sessions, interviews, and teaching evaluations.

Most of the students commended the realness of their learning experience. Being undergraduate students, they cherished the opportunity to access the genuine dataset and interact with real business talents on authentic business topics.

"Guest lecture helps students a lot to understand the history and situation of the company…… is necessary for students to interact with industry."

"The real online presentation experience to the CEO with a real business dataset was a once-in-a-lifetime and valuable experience as a business student."

Particular to the business case competition, students highlighted that the competition was an intensive training, which have significant implications for their intrapreneurship and career development.

"This experience is especially relevant for upcoming internship preparations, business-related competitions, and start-up pitching."

"A lot of time and effort was spent on transforming a piece of homework into a real business proposal with the right terminologies, accurate information, and appropriate time allocation. This training is extremely beneficial."

Besides, comments from the industry partner highlighted the gaps between academia and industry. According to the industry partner:

"Commercially viable and sustainable is often overlooked by business educators and their students…… I wish that students can learn and narrow this gap through this competition."

The industry partner's comments nicely echoed the program team's initiative to introduce the business datafication project for intrapreneurship and upgrade the business case competition to the inter-university level.

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"Students could understand more about the actual business operation and face real people. More importantly, they could learn from external counterparts, making students know their position and learn to maximize strengths and avoid showing weaknesses cleverly."

Feedback from students also proved that they did learn to think like a real intrapreneur. They showed their self-motivation to outperform as high expectations were set. They were also proud to be able to apply their classroom knowledge to real business circumstances.

"The most important yet challenging part is to make the proposal feasible and impactful. We are glad that we finally did it and obtained the recognition of the panel."

"It's a great opportunity for us to come up with creative and feasible ideas. The award represented the panel's approval and appreciation of our ideas."

Overall, the performance of the project manifested in student enthusiasm and determination.

"The competition was extracurricular. I am glad my students decided to go for it, and none of them withdrew."

"Hats off to students for their tireless preparation, which is thousands of times of their 6-minute presentation."

"The satisfaction of overcoming challenges and the adrenaline of presenting in front of the real CEO made the entire process unforgettable and amazing. We will definitely recommend our fellow students to take this course and fight for a place in the competition."

5. Challenges and Future Directions

The feature that made the business datafication project for intrapreneurship stand out from others is the realness of learning experiences that nurture intrapreneurship in students. No wonder the course design and industry support were the major challenges for simulating a business context. Sales figures and customer databases of a real company are precious materials for student learning. Yet, they are rarely available because they are the most sensitive information that demands complete integrity and security. The program team is grateful that, after mutual communication, workable solutions that live up to the expectations of the industry partner and stakeholders were worked out. In future university-industry collaboration projects, careful consideration should be put into the completeness of the datasets, the university's responsibilities, and the industry partner's benefits.

To keep up with the rapid pace of technology development, business educators should embrace the technologies trending in the business sector and equip students with relevant skills. For example, the program team of the present case has started incorporating and managing the use of generative AI.

Students found cooperating with fellows from different disciplines challenging, especially under a tight schedule. Yet, it can be advantageous for them to meet and work with new people, just like elite intrapreneurs working in the globally distributed business environment. Educators may consider facilitating students to team up with students from other universities, making interactions more complex and ideas more innovative. They may also revamp the course to the international level to make multi-national teams possible, given that e-business is a limitless industry.

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Appendix 1. Business Datafication Project for Intrapreneurship

Summary

The structure of this group project follows the Cross-Industry Standard Process for Data Mining (CRISP-DM): (1) Business Understanding, (2) Data Understanding, (3) Data Preparation, (4) Modeling, (5) Evaluation, and (6) Deployment. Based on a selected set of real business data from a famous fashion chain, students are required to extract useful business information to identify those important business problems and opportunities, hence propose feasible and creative data-driven e-Business solutions to the fashion chain.

This is a collaboration project between University A and University B. Students from both universities will receive the same dataset, project requirements, and tutorial materials. At the end of this semester, selected well-performing project groups from both universities will present their professional creative e-Business solution to the senior management of the fashion chain like a business competition. The best-performing groups and finalists will all receive award certificates.

Description of the Datasets

The provided dataset Project2023.zip consists of four files as follows:

	File Name	Descriptions	No. of Records
1	AssoDect2023.csv	Association Detection Dataset of the fashion chain brand	751k
2	AssoDectSal2023.csv	Association Detection Dataset of the Brand A	309k
3	AssoDectSuD2023.csv	Association Detection Dataset of the Brand B	307k
4	CustomerCluster2023.csv	Cluster Analysis Dataset of Anonymous Customers	206k

These are real sales and customer records for the three financial years: 1/Apr/2020 to 31/Mar/2023, with some scrambling and anonymous treatments of sensitive business and private data. Some transactions, such as B2B sales, have been removed; therefore, these datasets cannot be directly compared with the company's financial reports.

Report of Identified Business Problem or Opportunity (10% Individual)

Students are required to identify an important data-driven business problem using various data analysis techniques and summarise findings in Week 7 as a 2-page report of the identified data-driven business problem/opportunity. Students can include additional graphics and tables on the third page for illustration. Apply association detection and cluster analysis skills to complete this individual task.

Key assessment criteria

- Clear and convincing elaboration of the identified data-driven business problem or opportunity
- Clear identification of the data requirements and data sources to identify the business problem or opportunity
- Meaningful and valuable business information deduced from the given data using data analysis techniques
- Simple, precise, and convincing message delivery to the CEO/Senior Management

Group Task 1: Report of Proposed E-Business Solution (15% Group)

Students are required to submit a 6-page report by Week 14 on a data-driven eBusiness solution for the identified data-driven business problem or opportunity (in a consultation report and solution proposal style), a presentation PowerPoint file with a 6-minute presentation.

Key Assessment Criteria

- Clear and convincing elaboration of the identified data-driven business problem or opportunity with consideration of competitive analysis
- Feasible and creative data-driven eBusiness solution, with consideration of social responsibility
- Clear identification of the data requirements and data sources to identify the business problem or opportunity and create the e-Business solution
- Accurate estimation of cost and benefit (return on investment) for the deployment of the proposed e-Business solution
- Professional delivery with consistent styling of fonts, capital letters, punctuations, etc.

Group Task 2: Presentation of the Proposed E-Business Solution (10% Group)

Students will meet the CEO and senior management and present their eBusiness Solution in a quick business pitching. In this task, they have to

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deliver a 6-minute presentation to convince the CEO to adopt and invest in their proposed solution.

Key Assessment Criteria

- A clear, convincing, and professional presentation of the proposed e-Business solution
- Cohesive teamwork and time management.

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