

A PRACTICAL APPLICATION OF BUSINESS SYSTEM IN enPiT2

**Satoru Myojin 1, Masahiro Sakai 2, Naohiko Hayata 3, Mitsutaka Yasuda 4,
Takeshi Tanigawa 5**

1,5, Department of Business
and Information Systems, Hokkaido Information University, Japan

2, Department of Medical
Management and Informatics, Hokkaido Information University, Japan

3, 4, Department of
Information Media, Hokkaido Information University, Japan

Kei Ito 6, Michiko Oba 7

6,7, School of Systems Information Science, Future University Hakodate, Japan

ABSTRACT

The Education Network for Practical Information Technologies (enPiT) is a nationwide cooperative effort between multiple universities and industries, under the auspices of the Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT). Its goal is to develop human resources capable of utilizing state-of-the-art information technology in a practical way. Throughout the latter half of 2017, Hokkaido Information University (HIU) participated in succeeding activities in enPiT for undergraduate students (enPiT2). This activity program focuses on the business-system-design field. In this program, Project-Based Learning (PBL) as CDI of CDIO is used for learning style, including a "service design" workshop in collaboration with each university student after a preliminary study of the introductory human interface and web programming (PHP). Following the workshop, students participated in facilitation and user-centered design seminars, and later conducted PBL in groups at each university campus. Collaborative learning was seen to boost student motivation significantly. The process and results of growing was seen greatly by receiving excitement while mutually collaborating each other. These contents and results are reported.

KEYWORDS

Business system design, service design, active learning, PBL, CDIO Standard: 5, 8

INTRODUCTION

There is an ongoing need for problem-solving skills in modern Japanese society. Particularly with the rapid advance of technology, the ability to incorporate information technology into solutions is indispensable. Training human resources capable of solving specific problems through the use of IT is extremely important.

1.enPiT

In order to foster such human resources, the "Project to formulate a practical education network for training information technology human resources at the Ministry of Education,

Culture, Sports, Science and Technology" was initiated in Fiscal Year 2012. This project is a nationwide network of multiple universities and industries, and is a publicly offered project aimed at implementing and disseminating practical education, such as problem-solving training based on actual tasks. As a result of the public invitation, a "Collaborative network for practical information education beyond areas and areas" (application representative school: Osaka University) was adopted.

enPiT has four fields: cloud computing, security, embedded systems, and business applications. It is oriented toward graduate school master's course students to promote a wide range of knowledge in each field. Teachers and engineers from each field gathered from 15 collaborating universities and companies across Japan (Figure 1).

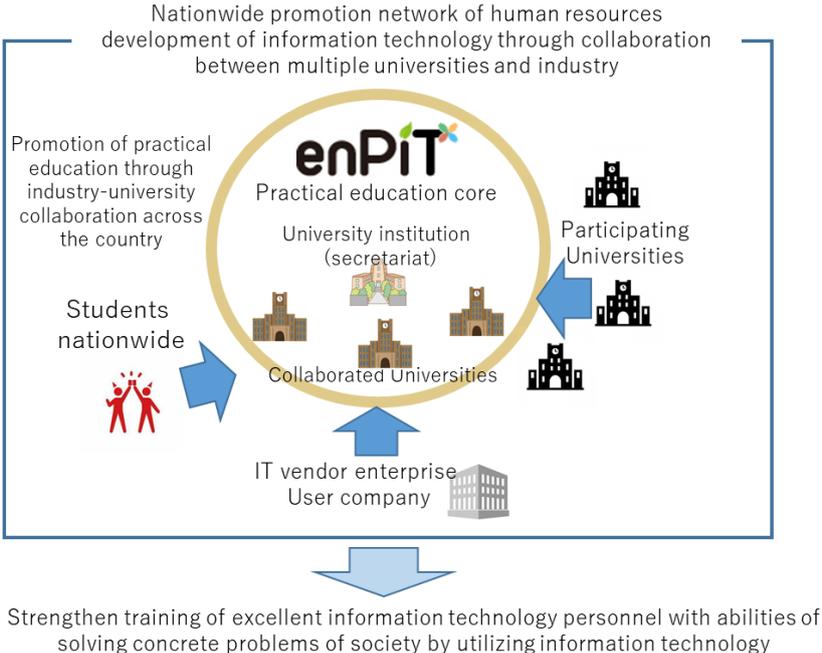


Figure 1. enPiT Structure

In enPiT, practical education is conducted in each field based on the Educational Program Framework, as shown in Figure 2 and detailed below.

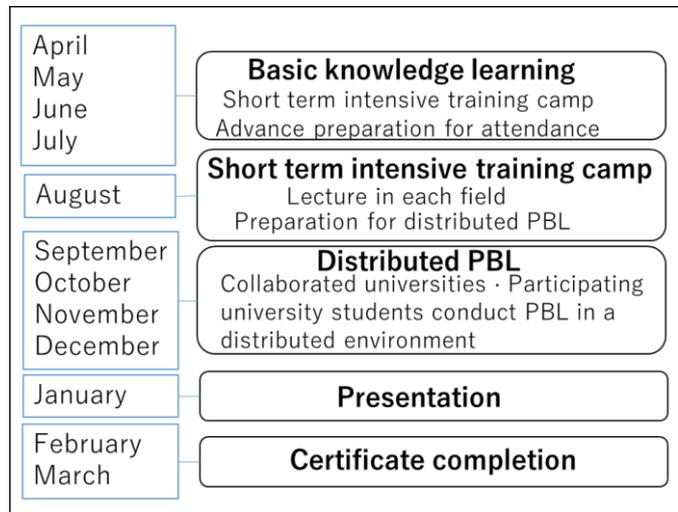


Figure 2. Educational Program Framework

1.1 Basic knowledge learning

The first phase includes learning basic knowledge necessary for implementation of short term intensive training camps and distributed PBL. Lectures from cooperating universities are offered, and teaching materials from any of the fields may be used. Different in each field, specifically, for example, software engineering, software development, prototype programming, human interface, information system security operation literacy, etc.

1.2 Short-term intensive training camp

This phase involves intensive education for about 1 week, including lectures and exercises related to each field of technology (other than basic knowledge, state-of-the-art technology etc.). This phase is preparation for PBL. Concretely, for example, practical distributed application development, practice exercise (security attack/ defense exercise /hardware security exercises/ incident correspondence exercises), robot competition, business service design workshops, etc.

1.3 Distributed PBL

PBL is implemented under the distributed environment for each field. Results are given in presentations following this phase. For example, cloud development project/ cloud service development, advanced integrated learning that reinforces practical skills and acquires applied skills, OJL (On the Job Learning), embedded system development general exercise, business service design/ prototype development, etc.

1.4 Results of enPiT

There were 305 graduates in FY2013, but in FY2016 that number jumped to 496 people. In the space of 4 years, a total of 1,742 people completed the program. In addition to the core 15 universities, the number of participating universities increased to 105, and supporting companies to 133.

2. enPiT2

Meanwhile, in FY2016 MEXT announced the "Formation of training center for information technology personnel supporting growth fields". This is a practical information technology education program that focuses mainly on undergraduate departments. This new program was named enPiT2, then original project for graduate students (enPiT) was renamed to enPiT1. Utilizing the findings of the program of enPiT1 so far, practical learning of state-of-the-art technology in the four areas of "big data/ AI", "security", "embedded systems", and "business system design" is conducted via PBL with the aim of acquiring the fundamentals of social success such as communication skills and leadership.

enPiT2 has garnered the cooperation of more than 30 universities across Japan. During FY2016 pilot-tests were done in several ways, and from FY2017 the program was officially implemented. Many undergraduates are participating (Figure 3).

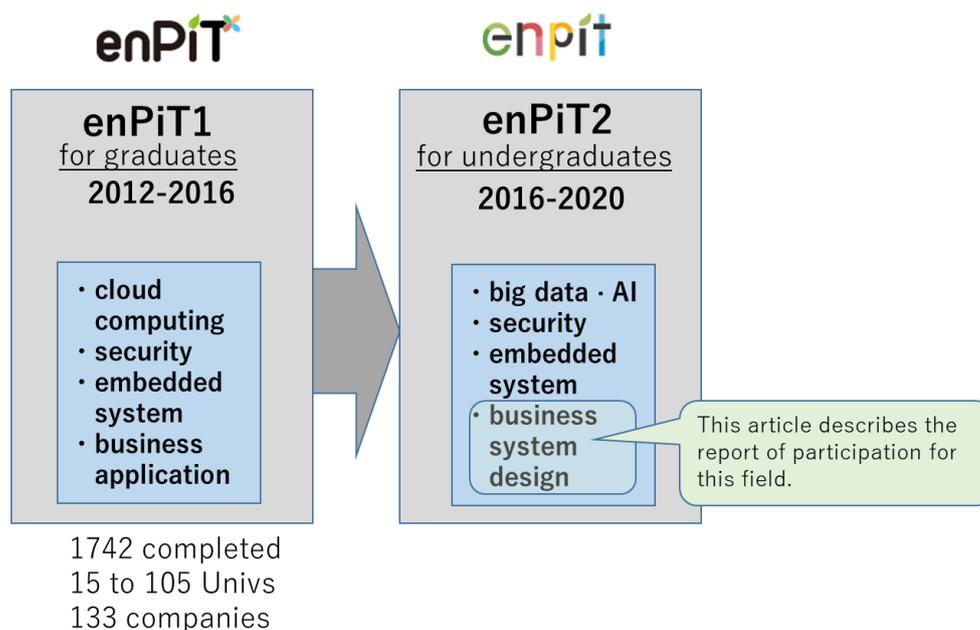


Figure 3. enPiT1 and enPiT2

Since 2017, Hokkaido Information University is working in tandem with Future University Hakodate, one of the collaborated universities in enPiT2.

The following describes our involvement with enPiT2 "business system design" during FY2017 and its relation to CDIO standards.

BUSINESS SYSTEM DESIGN PROGRAM

The enPiT2's business system design field (referred to as BizSysD) aims to develop human resources who can propose and develop their own business applications and system designs as practical solutions to the needs of society and business, and to meet the potential demands of customers. The aim is to nurture innovative human resources who can voluntarily solve practical problems. This program is to develop human resources coping with the innovation in IoT era utilizing ICT business application/ system.

PRACTICE REPORT ON BUSINESS SYSTEM DESIGN

From Hokkaido Information University, 3 students from the Department of Business and Information Systems, Department of Systems and Informatics, and Department of Medical Management and Informatics, and 6 students from the Department of Information Media (total 9) conducted enPiT2 activities described below from July to December 2017.

Basic knowledge learning

As a preliminary study, PHP basics were held from July 21 to August 11 as an introductory topic for web programming for inexperienced programmers. In addition, from July 7 to August 3 we had a human interface lecture and paper prototyping exercise to experience the screen design of smartphones.

Service Design summer camp

A "Service Design" summer camp was conducted at Future University Hakodate for 5 days from August 14 to 18. A total of 25 people, 14 from Future University Hakodate, 9 from HIU, 2 from Kanagawa Institute of Technology students, participated (Figure 4).

We invited lectures from Wide Book Co., Ltd., Cookpad Co., Ltd., DCM Homac Co., Ltd., and provided lectures and practical training on formulating new business models.

The first day featured lectures and group exercises on ideas and leadership. On the second day, there was a lecture on "Service development that successfully attaches to uncertainty" from Cookpad Corporation, and there was an explanation about service development, business model, user first, etc. After that, a panel discussion based on questions from the students was held to further understand the technical aspects of service development and how to proceed with service development.

From the afternoon of the 2nd day until the morning of the 4th day, we held a new business planning exercise with the theme of "making tourism revenue of Hakodate 1.5 times in 2020". We learned about specific idea making, expression, innovation, the business model canvas, and conducted group exercises and presentations. On the afternoon of the fourth day, DCM Homac Co., Ltd. gave a lecture titled "Business Strategy of DCM Holdings, DCM Homacs" on the points of growth of home centers, business strategies and corporate social responsibility. On the fifth day, students finished their service proposal, learned how to summarize the proposal and how to present it, and then each team gave presentations. As a result of the evaluation by the faculty, Team 5, which proposed Custom Journey, received the Best Award (Table 1. Best Service Design Award).

Teachers from collaborating universities and participating universities and lecturers from companies promoted team formation. During the summer school of service design session, students learned about the design process [CDIO 4.4.1], the design method [4.4.3], and made presentations of the realization method from the design of their ideas [3.2].

Table 1. Team Themes and Awards

team	Short term intensive training camp To make Hakodate Tourism Revenue 1.5 times	
1	Effective Utilization of Hokkaido Tram	Presentation award
2	Squid robot city guide	Idea award
3	MTB rental business	Technical award
4	Hakodate Premium Passport	Business plan award
5	Custom Journey	Best Service Design Award



Figure 4. a: Participants. b: Idea drawing. c: Presentation.

User centered design (UCD)

On August 22 to 24, at HIU, "Mini UCD" was held by Future University Hakodate for 9 students. A lecturer from Osaka University of the Arts was invited and held a SF movies workshop. On the first day, after students watched a SF movie (Star Trek) while sketching with all the students, they understood the worldview of the movie by. They made ideas for the characters in that world and the services and tools that people want to use (Figure 5).

On the second day, they actualized the idea as a real scale prototype and revised it repeatedly while evaluating it experimentally. On the third day, students gave presentations using posters and prototypes, and acted out how to use the prototypes with short skits. At the very end a Q and A session was held between the faculty and students of HIU and Future University Hakodate. This SF workshop created intriguing ideas [CDIO 4.7].



Figure 5. a:SF workshop. b:Private barrier. c: Instantaneous excrement transfer

Facilitation

The ability of leaders to facilitate and encourage participation by students in PBL and to make collaboration successful by members is important. This is an ability that not only leaders but all participants should have. A total of 21 people including 8 enPIT2 participants, 5 other students, and 8 faculty members, participated in HIU session on September 19. This facilitation exercise (how to make meeting/ speak/ listen) was conducted by inviting an external lecturer so that the following PBL to be carried out smoothly.

Distributed PBL

From September to December, on Friday 6 period, we conducted PBL while talking with Future University Hakodate using a video conference system. There were two teams from HIU: Team A's theme was "University Classroom Reservation System" (Figure 6), and Team B's was " Web service for Credibility Judgment of Medical Information from Web" (Figure 7). While doing discussions with teachers and students at Future University Hakodate, the students created and implemented prototypes. The prototype development environment was "PHP and CakePHP" for Team A, and "HTML, CSS and Python" for Team B. In the service

design summer camp and this PBL group work, problem definition and solution [CDIO 2.1], gradual preparation by student groups to plan the project was carried out [CDIO 2.4.7, 4.3.4]. Students also experienced remote communication and team work [CDIO 3. 1, 3.2].

Hokkaido Information University Team A

The System for Reservation Classroom in University

Kazato Sato Manami Inafune Syuya Abe Yusuke Kikuchi



Outline
Existing Reservation system



Problems

- Legacy User Interface
- Small Text Sizes, Useless
- Bad User Interface through Smart Phone
- Offline booking for the special classroom in the secretariat
- Students can not use it anyway

Proposal System

- New Useful User Interface
- Online Negotiation for Existing Reservation
- New system for Students

Proposal Application

Reservation Rules

- Reservation till two days before
- Priority: Students < Teachers < Secretariat First Priority: Class or Events
- One week penalty for three consecutive unused reservations without canceling

Procedure of Reservation System



Prototype



Issues

- Improvement of System for Negotiation Function
- The University Should Recognize System Problems and Re-press it

copyright © 2017, 12, Hokkaido Information University

Figure 6. Team A Classroom Reservation

Hokkaido Information University Team B

Development of Web service for Credibility Judgement of Medical Information from Web

Mototsugu Izumi Yusuke Ichikawa Ryo Kubouchi Yutaro Takada Hanuna Higuchi



Outline



Backgrounds
When the patient themselves investigates the disease, they can obtain treatment methods and various information by searching the internet. On the other hand, many of them have low credibility.

Purpose
The purpose of this system is to show the reliability of information about cancer on SNS by percentages, show comments about it, and support the process of information judgment and decision making.

Proposal Service



Generate classifiers by machine learning texts of cancer recommended treatment guidelines in Japan. The user posts the copied text from the SNS. The system judges the coincidence ratio between the posted content and the guideline and comments on the credibility of the content.

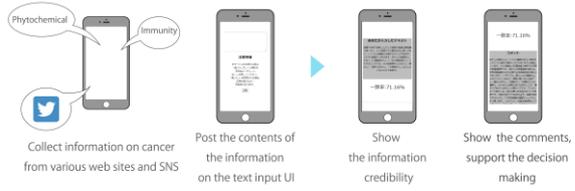
Technology of the Proposal Service

Machine learning: Learning data, discover hidden patterns and features and make their predictions.



Doc2Vec: Natural language processing library
A technology to compute word vectors for a document of an arbitrary length.

Prototype



Collect information on cancer from various web sites and SNS

Post the contents of the information on the text input UI

Show the information credibility

Show the comments, support the decision making

Figure 7. Team B Medical information Review

Result report meeting (at Future University Hakodate)

On December 8 and 9, students gave presentations with posters at Future University Hakodate (Figure 8). It seems that other students and the general public have heard about this, and the students who presented also gained satisfaction and achievement. The announcement on the 9th was a joint presentation in Hokkaido and Tohoku districts at locations such as Muroran Institute of Technology, Iwate Prefectural University, and the University of Aizu. It was evaluated from the viewpoints of ideas, technology, processes, deliverables, and posters, and the students at HIU got a relatively good evaluation.



Figure 8. a: Presentation venue. b:Team A. c:Team B

CONCLUSION&FUTURE WORK

The participating students had a good opportunity to realize their ability by discussing and presenting other university students. It seems that the students who participated generally also gained confidence (Table 2). We also confirmed that our students can effectively participate in country-wide efforts. Prior evaluation was carried out with PROG, an evaluation test of generic skills which is carried out as a standard in enPiT. A variety of students made achievements in interpersonal foundation ability, self-fundamental ability, and task assignment fundamentals. The post-PROG test revealed that the human ability of the students such as problem handling capability, communication skill and self-control ability was improved. This collaborative project with universities represents the adoption of CDIO in a scenario where students receive opportunities to improve various teamwork, and project management skills. Students experience conceive-design-implement-operation through a series of activities. As well as opportunities to improve interpersonal skills, self-management, problem-solving skills etc. [CDIO Syllabus 2.4]

The tasks highlight the necessity of having initiatives early in the process and how to proceed with projects such, as reflecting on service designs learned in the first half of the second half of PBL. As a remedial measure, it is conceivable that HIU could practice digital business development methodology focusing on customer value and profitability check through simulation of business model canvas using system dynamics (Figure 9). We would like to work on enPiT2 as a participating school of Future University Hakodate next year also, in order to improve these objectives.

Table 2. Post Impressions of Participating Students

Post Impressions of Participating Students	
<p>Keep New experience and learning (business idea, idea creation method, prototype development, facilitation, joint development of Web services, exchange with other departments and other universities, opinions gained by diverse people, business model, concept thinking, project management, service design, group work), stimulation and growth</p>	<p>Try Continue to learn what learned(technical issues and communication methods, practical methods) for future practice and try to master practical skills and business thinking</p>
<p>Problem Inadequate completion of production, separation of practice at the late PBL of summer school acquisition technique, part of separation of lecture (BPM, UCD, ticket development) and workshop (late PBL)</p>	

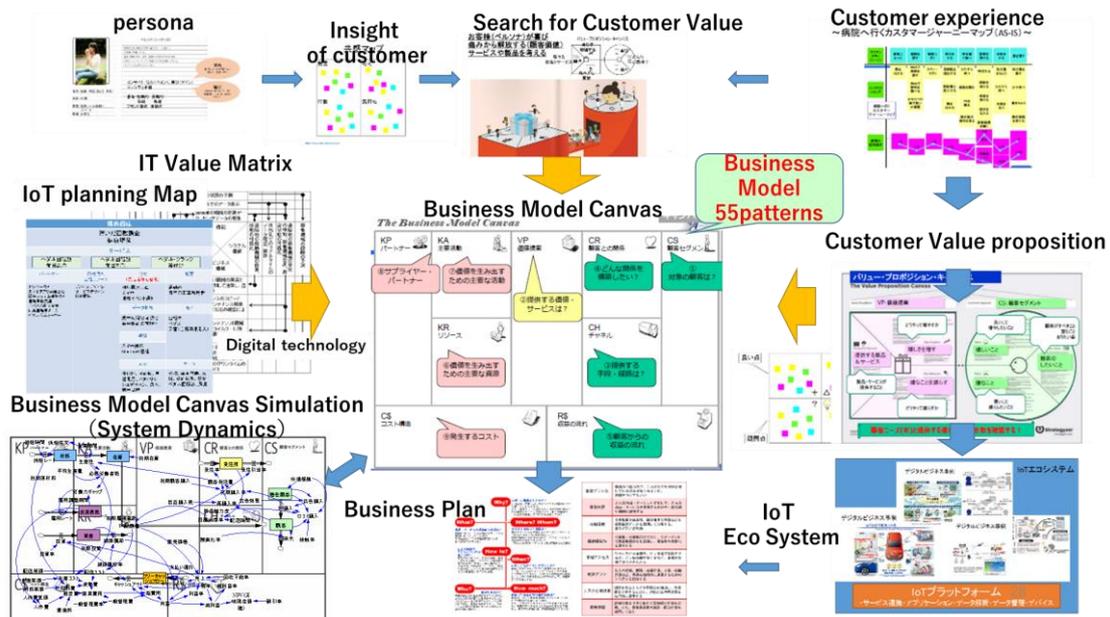


Figure 9. Digital Business development methodology

ACKNOWLEDGEMENTS

The authors wish to express their thanks to Japanese Ministry of Education, Culture, Sports, Science and Technology for supporting this work with a grant.

REFERENCES

enPiT (2017). ANNUAL REPORT FY2016. *Education Network for Practical Information Technologies (enPiT)*". Retrieved from http://www.enpit.jp/img_new/publications/enPiT_annualreport_uni_2017.pdf

RIASEC (2017). PROG (Progress Report on Generic skills). Retrieved from http://www.riasec.co.jp/prog_hp/

Minato, N. (2013). Integrated methodology for business model design and evaluation using Business Model Canvas and System Dynamics. *The Japanese Journal of System Dynamics*, 12, 41-56.

BIOGRAPHICAL INFORMATION

Satoru Myojin is a Professor in Digital Business and Chair of the Department of Business and Information Systems at Hokkaido Information University, Hokkaido, Japan. His current research focuses on digital business development methodology and incubation platforms for healthcare services.

Kei Ito, Ph. D., is an associate professor in the School of Systems and Information Science at the Future University Hakodate. His current research focuses on software engineering

and on systems for supporting education such as programming education and project-based learning with system development.

Masahiro Sakai, Ph. D., is an associate professor in the Faculty of Medical Informatics at the Hokkaido Information University. His current research focuses on media technology, medical application systems and support systems for Cognitive Behavior Therapy (computerized CBT systems).

Naohiko Hayata, Ph.D., is currently a professor in the Department of Information Media, Hokkaido Information University, Japan. He is engaged in the enPIT2 program at Hokkaido Information University. His academic field is Environment-Behavior Studies. His researches focus on active learning and freshman education in the era of popularization of university education, and community design for super aged societies.

Mitsutaka Yasuda, MBA and MSIT, is a professor in the Department of Information Media, and Director of the Media Creative Center (MCC), at Hokkaido Information University. His current research is pedagogy for practical education in digital content and design industries. He collaborates with Oulu University of Applied Science in Finland in the area of Nordic pedagogies for entrepreneurship in the aforementioned industries.

Takeshi Tanigawa, Ph.D., is a professor in the Faculty of Business Administration and Information Science at Hokkaido Information University. His current research focuses on systems development for education.

Michiko Oba, Ph. D., is a professor in the School of Systems and Information Science at the Future University Hakodate. Her current research focuses on software engineering, documentation systems and support systems for project-based learning with system development.

Corresponding Author

Professor Satoru Myojin
Hokkaido Information University
59-2 Nishi-Nopporo, Ebetsu, Hokkaido,
Japan 069-8585
+81-11-385-4411
myojin@do-johodai.ac.jp



This work is licensed under a [Creative Commons Attribution-NonCommercial-NoDerivs 4.0 International License](https://creativecommons.org/licenses/by-nc-nd/4.0/).