Enhance Students' Resilience: A Case Study in Educating Data Design Programs within Traditional Business Academia

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Abstract

This study introduces a case of a small national university in Japan that launched a new experimental education program, the Data Design Program (DDP), by integrating design thinking and data science into traditional business academia. Results from a survey conducted over the initial three years indicate that DDP students have been able to achieve significantly higher levels of resilience capability development and maintenance of self-efficacy compared to students in conventional business management programs.

Keywords

data science, design thinking, emergence school

1. Background and Program Outline

Hitotsubashi University is a small-size university in Tokyo, Japan, with a focus on social sciences. Established by Eiichi Shibusawa, one of the most prominent entrepreneurs in the industrial revolution and modernization of Japan during the Meiji era, it is set to celebrate its 150th anniversary in 2025, characterized by its traditional academic atmosphere. Initially founded as a university specializing in commerce and accounting, it later expanded to include faculties of economics, law, sociology, and data science.

In 2021, its largest faculty, the Graduate School of Business Administration, spearheaded the initiation of the Data Design Program (DDP), a new education program for undergraduate students. This paper reports on its objectives and progress, aiming to discuss the future of business management education.

The DDP is a three-year program for undergraduate students from their second to fourth year, comprising a total of 90 students and 7 faculty members. Students are selected annually through essays and interviews towards the end of their first year. Competition is

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intense, with typically 120% to 150% of the capacity applicants. Faculty expertise lies in data science, design thinking, cognitive science, engineering, marketing communication, and innovation management.

The DDP offers nine lectures and three workshops per academic year. Lectures include foundational courses in collaboration with nearby art universities for learning design basics and omnibus lectures where journalists from leading newspapers explain issues in their respective fields. Workshops are conducted in a Project-Based Learning (PBL) format, collaborating with companies and local government offices to address actual issues towards social innovation. Currently, 17 projects are operational, with students forming teams and engaging in their projects for over two years.

2. Former Research

The post-war development of corporate management was initially centered around "planning" studies. Drawing from modern accounting, financial management, and process management from engineering operation research, the focus was on devising superior management plans [1]. While there were differences among various schools regarding whether the focus of planning should be on management resources [2] or positioning within the business flow [3], the common goal was assessing the quality of plans. Technology was also interpreted as part of such management resources or as part of the business flow.

However, having excellent plans didn't guarantee success for all companies. Therefore, the discussion shifted towards absorptive capacity [4] to adapt to new management environment changes and towards understanding and utilizing environmental changes themselves. The emergence school, advocated by Mintzberg et al., represents this shift. A powerful method of grasping environmental changes is through data science. The advancement of sensor technology and the internet enabled the verification of existing theories with empirical data. Moreover, to leverage environmental changes, attention shifted not only to productivity but also to creativity, leading to the emergence of new methodologies like design thinking [5], which began to be utilized in corporate management.

3. Program Characteristics and Motivation

The characteristic of DDP is to integrate data science and design thinking to foster the development of new business leaders. Design thinking is not only a method aimed at utilizing design as a management resource but also a technique to explore statistically potential "outlier" needs through the process of empathy with extreme users. Additionally, it is distinctive to utilize participatory observation and ethnography as means to achieve empathy. The "outlier" needs brought by extreme users, unlike statistically dominant latent needs brought by marketing activities, are considered to be needs that may manifest in the near future if society undergoes changes.

In DDP, by combining data science and design thinking, it is possible to cultivate a flexible capacity to absorb towards the near future in today's highly uncertain social environment. In other words, DDP aims to learn a new management approach beyond conventional optimal planning. In the core PBL workshops of DDP, under the guidance of supervisors,

students themselves experience participatory observation. On the other hand, in programming lectures using Python or R, students learn basic statistical analysis techniques and the use of Artificial Intelligence systems, thus experiencing evidence-based social issue resolution. Additionally, students engage in prototyping using short animations and challenge themselves to propose solutions to real-world problems.

4. Student Survey and Results

During the summer of 2023, a questionnaire survey regarding their daily learning activities and outcomes was conducted among fourth-year, third-year, and second-year students enrolled in the DDP (n=79).

As a comparative measure, the same questionnaire survey was administered to students enrolled in Hitotsubashi University but not in the DDP (n=57). All questions were conducted using the 5-point Likert scale. By comparing the results of these two surveys, the educational effectiveness of the DDP was assessed.

The results revealed that overall, students in the DDP demonstrated better learning outcomes compared to students not enrolled in the program. Particularly noteworthy was the finding, as illustrated in Table 1, that DDP students exhibited significantly higher effectiveness in their ability to adapt to changes in social environments.

Table 1
Student's Self-Evaluation

	DDPs (n=79)	Non DDPs (n=57)	t-test
I can search for necessary information related to business (or work) from various sources.	4.03	3.47	$p < 0.01$
I can discover issues inherent in traditional ways of doing business or operating within an organization.	4.11	3.46	$p < 0.01$
I know how to secure the necessary resources and cooperation from others to realize ideas and achieve goals.	4.1	3.61	$p < 0.01$

Furthermore, in the case of Hitotsubashi University, it was discovered, as shown in Table 2, that DDP students were significantly better at curbing the pronounced decline in "entrepreneurial motivation" that tends to occur as students progress through their academic years.

These survey findings serve as evidence that the DDP has successfully provided high-quality learning opportunities in line with its initial objectives.

Table 2

Student's Future Vision

	DDPs (n=79)	Non DDPs (n=57)	t-test
I believe that if I challenge myself, I can surely succeed.	4.06	3.67	$p < 0.05$
I have the ambition to start my own company within the next decade or so (or perhaps have already done so).	3.29	2.19	$p < 0.01$

5. Conclusion and Further Challenge

This paper examines the case of DDP as a new educational program in traditional business academia, explaining its managerial background, educational objectives, lecture content, and structural features. DDP can be seen as an experimental attempt within the emergence school, and it was considered an important indicator whether students' resilience capability towards social changes could be developed. The results of a comparative survey conducted on DDP students over the initial three years confirmed that, as intended, students' resilience capability was significantly developed.

As a result, it was confirmed that DDP students tend to maintain a high level of self-efficacy during their enrollment and significantly exhibit a tendency to maintain a vision of starting their own business in the near future. Moving forward, it will be necessary to continue measuring changes over time and verify the contribution of DDP education to the overall revitalization of business academia.

References

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