

STATISTICAL EDUCATION INITIATIVES AT RIKKYO UNIVERSITY

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In this presentation it will be introduced the statistical education initiatives at Rikkyo University. Specifically, the 11 topics are described. Among them are, for example, the history of the Center for Statistics and Information (CSI), statistical education section's project content, CSI statistical analysis seminar, cosponsoring or sponsoring off-campus statistical education-related events and preparing for the introduction of a data science minor is included. This time especially the data science minor will be introduced in detail.

HISTORY OF THE CENTER

Rikkyo University founded the Center for Statistics and Information (CSI) in March 2010. The center is comprised of three sections, statistical education, social research, and official statistics; it plays a role in social research, statistical literacy, and information literacy education at Rikkyo University and also support studies utilizing social research and statistical information. In preparation for founding this center, the center installation preparation room was established as part of MEXT's "support system improvement project for the advancement of education and research." In addition to securing human resources and maintaining the information environment, university members visited the University of Chicago, University of Michigan, University of Minnesota, and UCLA to inspect the schools' centers for social research and statistical education and research centers, and also visited Britain's Royal Statistical Society Centre for Statistical Education. During these visits, our university formulated the center's policies on social research and statistical education and gathered information on activities for improving statistical education in Britain and the United States.

STATISTICAL EDUCATION SECTION'S PROJECT CONTENT

CSI consists of three sections: the Statistical Education Section, the Social Research Section, and the Official Statistics Section; however, among these, the Statistical Education Section is the department mainly aimed at statistical education for students. Here, we introduce the Statistical Education Section's activities. The items listed below provide an outline of the main projects. Then the outline is described according to these contents.

- Management, Operation, Evaluation, and Verification of University Common Curriculum and On-Demand Classes
- Creating English Versions of On-Demand Subjects
- Hosting the CSI Statistical Analysis Seminar
- Statistical Education Forum and Open Lecture Conference
- New Development of Teaching Materials and Programs for Statistical Education
- Examining Implementation of University Exams for "Statistics Certificate" and Introducing Statistics-Related Exams
- Efforts Toward the University Collaborative and Cooperative Education Promotion Project
- Co-sponsoring or Sponsoring Off-Campus Statistical Education-Related Events
- Preparing for the Introduction of a Data Science Minor

UNIVERSITY COMMON CURRICULUM AND ON-DEMAND CLASSES

University common curriculum and on-demand classes are part of a program that allows students to take classes from anywhere at any time during the semester through a PC once they have enrolled. These resolve difficulties taking classes due to conflicting schedules and allow graduate students to take classes in both natural sciences and social sciences regardless of their department. Students studying abroad or students with difficulties commuting to school due to disabilities are also able to take classes, which is actually taking place. Student questions during class could be answered through teacher responses on the bulletin boards. Currently, the Statistical

Education Section has 5 class contents in total and each subject is a qualification certification subject for social researchers.

CREATING ENGLISH VERSIONS OF ON-DEMAND SUBJECTS

English versions of on-demand class subjects are currently being created. Professor Jimmy Doi (California Polytechnic State University) is creating the English versions of the Japanese content and our university edits the recorded class in English and turns it into a version ready for class. At the end of 2017, we will complete the English versions of “Introduction to Data Analysis” dealing with descriptive statistics content and “Data Science” dealing with inferential statistics content, and course content will become available in 2018. We plan to continue increasing the amount of English-language content.

CSI STATISTICAL ANALYSIS SEMINAR

The CSI Statistical Analysis Seminar is a lecture conference for learning and mastering relevant statistics, such as how to conduct basic analysis methods using statistical analysis software. The statistical analysis software programs used are IBM SPSS and R, and statistical analysis methods are taught, including data handling. Seminar participants include both Rikkyo University students and teaching staff. The contents of this seminar are recorded as on-demand content, which makes content available for viewing at any time. This seminar can also be positioned as part of FD activities in the sense that it is e-Learning with teaching staff.

STATISTICAL EDUCATION FORUM AND OPEN LECTURE CONFERENCE

Every year, CSI invites researchers relevant to statistical education to hold lectures. Recently, we invited Professor Jim Albert (Bowling Green State University) in 2015, Professor Andrej Blejec (University of Ljubljana) and Professor Jimmy Doi in 2016, and Professor Robert delMas (University of Minnesota) in 2017. These visiting professors spoke about the state of statistical education in each of their countries and their individual research content.

NEW DEVELOPMENT OF TEACHING MATERIALS AND PROGRAMS FOR STATISTICAL EDUCATION

CSI not only develops teaching materials for statistical education but also develops new programs. Here, we address staff workshops involving CSI teaching staff as part of FD activities for teaching staff.

Faculty Development (FD) activities promote improvement and advancement of staff teaching methods and these have become more active in recent years. MEXT (2005) defines FD as a “collective term for systematic efforts for teachers to improve and advance class contents and methods. Its meaning is quite extensive; however, concrete examples include implementing mutual classroom visits among teachers, holding research groups on teaching methods, and holding workshops for new teachers.” A variety of practical methods are used as part of FD activities, such as teachers’ mutual classroom visits, called peer reviews, as well as e-Learning that enables learning outside of classroom hours using the Internet; lecture materials, as well as class materials such as deliverables, distributed items, and question items are gathered for teaching portfolios that help improve classes; and active learning where learners acquire knowledge skills by actively challenging themselves with problems rather than passively receiving knowledge.

The Statistical Education Section, which develops these activities, has been involved in this project since 2016 and it is part of Rikkyo University’s staff training. This workshop’s content includes first learning about basic statistical knowledge and data handling, and then based on this, university staff analyzed the data themselves, and then presented it and held a discussion on the final day. On the final day, there was also a period for comments and questions and answers regarding the CSI teaching staff’s analysis results.

IMPLEMENTING UNIVERSITY EXAMS FOR “STATISTICS CERTIFICATE”

Statistics certificate is a useful test for quality assurance of statistics studies in Japan. Rikkyo University conducts statistics certificate tests twice a year in June and November.

Previously, we implemented statistics certificate guidance and renovation project for Levels 2 and 3 statistics tests for the on-demand classes.

EFFORTS TOWARD THE INTER-UNIVERSITY COLLABORATIVE AND COOPERATIVE EDUCATION PROMOTION PROJECT

JINSE is a project working to develop teaching methods and prepare a standard curriculum through collaboration among universities in order to foster human talent in problem-solving using statistics. This project also aims to establish a quality assurance system for statistical education. Rikkyo University is one of the eight universities in this collaboration in Japan. Each CSI teaching staff has a position within a committee such as the quality assurance committee, curriculum development committee, and so on, and they presented on which content will be taught for each field, such as medicine, business administration, or humanities, and also the standard content for these and order in which it will be taught.

CO-SPONSORING OR SPONSORING OFF-CAMPUS STATISTICAL EDUCATION-RELATED EVENTS

Rikkyo University supports various off-campus statistical education-related events. In this section, we will introduce a sports data analysis competition organized by Rikkyo University. Since 2014, the CSI recruited participants for the sports data analysis competition from all undergraduates at Rikkyo University, and the CSI Statistical Education Section teaching staff became the faculty supervisors and led projects encouraging participation in teams. This year, the project was in its second year, and there was one applicant in the first year and five in the second year, these participants actually participated in the competition, were involved in data analysis, and made presentations at the results meeting. The presentation themes and titles are as shown in Exhibit 2 below.

Table 1. Rikkyo University Students' Participation in the Sports Data Analysis Competition

Year	Participating Department	Presentation Title
2014	Baseball (SEM Causality Analysis Special Award)	The Psychological Impact on Baseball Players of the Number of Spectators—Will They Win Even if the Team is Weak?
2015	Soccer Tracking	The Impact of Player Substitution—Can It Change the Momentum?

Regardless of the student's grade level or faculty, we recruited students who were interested and who could engage in the analysis and we provided them guidance. In both 2014 and 2015, the students were able to present results at the results meeting. In 2014, our university was able to do a poster presentation at the Japan Statistical Society's Spring Conference.

Figure 1 is an actual path diagram created by the students. In 2014, we applied for the SEM Causality Analysis Special Prize and performed structural equation modeling using JUSE-StatWorks/V5. Based on data from the baseball department, we created a correlation model to understand how psychological factors such as how many spectators there were in the venue, as well as the number of errors in the previous game and the score from the previous game, affect the team's pitching and batting powers.

In 2015, after understanding the players' positions on the soccer field in the first and second half of the game using the scatter chart, we summarized numerically with a cross-tab table how frequently there were advantageous situations for the offense versus the number of defense players in the first and second half. We conducted a chi-square test with the cross-tab table. The overview is summarized in Table 1.

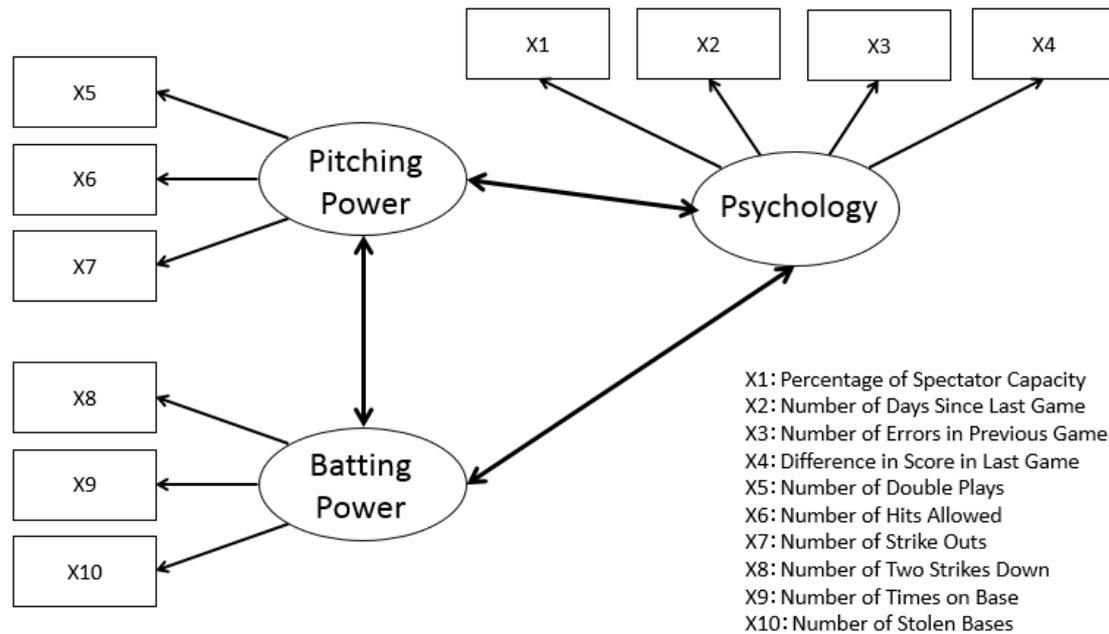


Figure1. 2014 CSI Teams (SEM)

Table 2. 2015 CSI Teams (Cross-Tab Table)

Shonan's Situation	Explanation	First Half	Second Half
Offense	Situations where the number of offensive and defensive people is equal and a shooting opportunity is likely to arise.	1287 (0.51%)	1242(0.49%)
Middle	Situations where there are lack of ideas for offense, but that are likely to turn offensive.	21190(0.53%)	18789(0.47%)
Defense	Situations where the offensive players are scarce and it is difficult to take a shot.	9362(0.57%)	6959(0.43%)
0 Offensive Players	Situations where Shonan has no offensive players	37333(0.43%)	50216(0.57%)

PREPARING FOR THE INTRODUCTION OF A DATA SCIENCE MINOR

Rikkyo University is preparing to establish a data science minor as part of the global minor. This minor aims to foster human resources capable of utilizing their expertise more globally by acquiring data utilization skills and IT skills. While emphasizing expertise as a player in fresh innovation, we will prepare a minor “to acquire data utilization skills and IT skills.” The specific minor program consists of subjects provided by the CSI, as well as statistics, social research, and information-related subjects. Additionally, overseas experience is a requirement for completion of this minor. Taking statistics-related subjects overseas, participation in overseas internship of related content, or participation in a data analysis competition count toward fulfilling this

requirement. Currently, CSI is considering collaboration with institutions providing overseas statistical education programs, and we are in the process of creating short-term overseas programs for students who have chosen this minor course.