An e-Learning Course for Social Survey and Data Analysis in Rikkyo University

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Outline

- Backgrounds
  - E-Learning courses for students in arts departments
- E-learning Courses for Social Survey and Data Analysis in Rikkyo University
  - Course Design
- An Analysis of the Learning Effect of an E-Learning Course
  - Comparison to face-to-face classes

Backgrounds

Backgrounds

■ Social needs for statistics

- Social survey and marketing research
- A lot of statistical packages

■ Change in students studying statistics

- Students to study statistics as their specialty
- Students to study statistics as liberal arts
  - ➢ Not to develop new analytical methods
  - ➢ To understand results of data analysis
  - ➢ To use statistics as a communication tool
  - ➢ Mainly, students in arts departments

Backgrounds

- Problems for teaching statistics to students in arts departments
  - Lower level of motivation to study statistics
  - Lack of mathematical knowledge
    - They hesitate to study statistics because of their lack of mathematical knowledge

- Solutions？
  - Stimulating motivation to study statistics
  - Developing educational materials which do not emphasize mathematical aspects

Two Solutions-1

■ 1. Two Certificates in Statistics

- **A. Japan Statistical Society Certificate**
  - ➢ Certificate in the knowledge and skill of statistics
  - ➢ Some glades based on the knowledge and skill of statistics (Grade 1-Grade 4)
- **B. Certificate in Social Research**
  - ➢ Certificate in the basic skill of social survey
  - ➢ accredited by Japanese Association for Social Researchers

Two Solutions-2

- 2. e-Learning courses for social survey and Data Analysis
  - **Not emphasizing mathematical aspect**
  - Based on **real-life example and real-data analysis**
  - Covering subjects from **data collection to data analysis**

e-Learning Courses in Rikkyo Univ.

- Courses For All Colleges in Rikkyo Univ.
- From Data Collection to Data Analysis

Course	Topics
Introduction to the Social Survey	The basic knowledge on the process of social survey
Social Survey Methodology	The basic skill of social survey, such as how to make questionnaire etc…
Introduction to Statistics: Descriptive Statistics	The basic knowledge of descriptive statistics
Introduction to Statistics: Statistical Inferences	The basic knowledge of statistical inference
Introduction to Multivariate Analysis	The basic knowledge of multivariate analysis

An e-Learning Course for Social Survey and Data Analysis

Design Principles of the Course

- 1. Consistent Course Design
- 2. Course Materials Based on Real-Life Examples and Real-Data Analysis
- 3. Some Devices to promote interaction between teachers and students

Course Design-1

■ Configuration Image

Student's Profile

Course Information

Course Topics

Course Design-2

- **90 min ×15 Lectures**
  - Introduction to Statistics: Descriptive Statistics

START! 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 FINISH

1.統計を学ぶ	Introduction to descriptive statistics	2010/04/16～2010/07/31
2.変数の性質とデータ分析の方法	The type of variable and data analysis	2010/04/16～2010/07/31
3.データを記述する(1)	Describing one variable	2010/04/23～2010/07/31
4.データを記述する(2)		2010/04/23～2010/07/31
5.データを記述する(3)		2010/04/30～2010/07/31
6.データを記述する(4)		2010/05/07～2010/07/31
7.データを記述する(5)		2010/05/07～2010/07/31
8.データを記述する(6)		2010/05/14～2010/07/31
9.2つの変数の関連を探る (1)	Association between two variables	2010/05/21～2010/07/31
10.2つの変数の関連を探る (2)		2010/05/28～2010/07/31
11.2つの変数の関連を探る (3)		2010/05/28～2010/07/31
12.2つの変数の関連を探る (4)		2010/06/04～2010/07/31
13.回帰分析の基礎	Simple regression analysis	2010/06/04～2010/07/31
14.擬似相関と変数の統制	Spurious correlation and control of variables	～2010/07/31
15.時系列データの分析	Basics of time series analysis	2010/06/17～2010/07/31

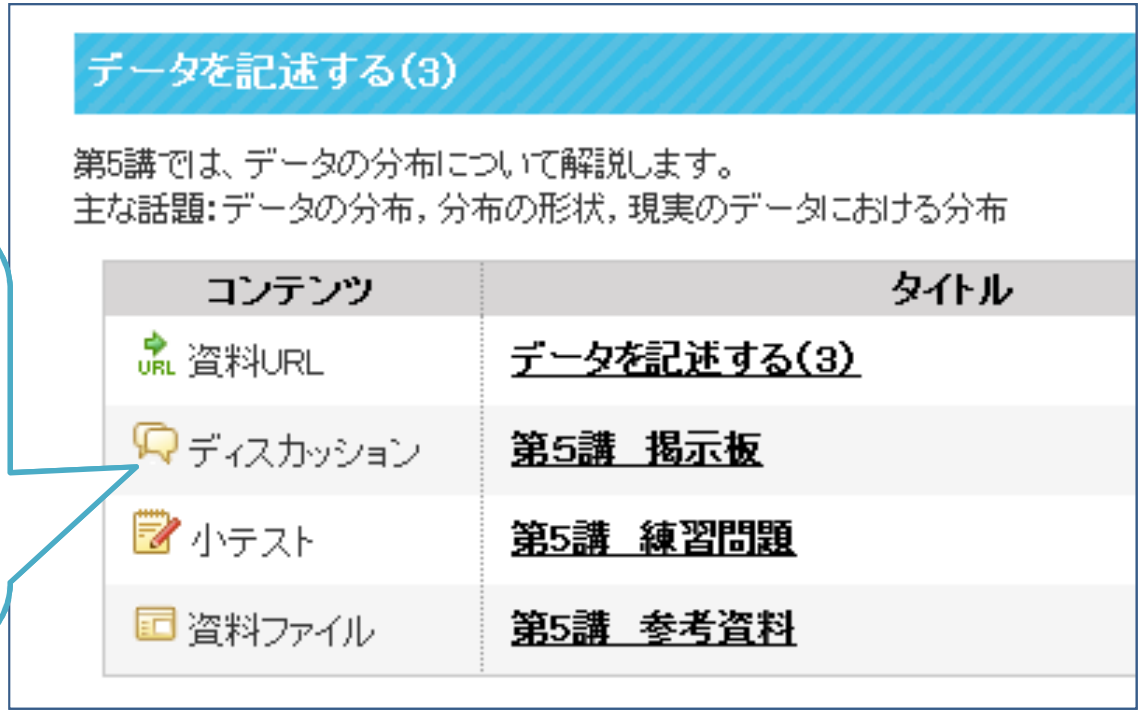
Course Design-3

■ **Three Components of the lecture**

①Course Materials

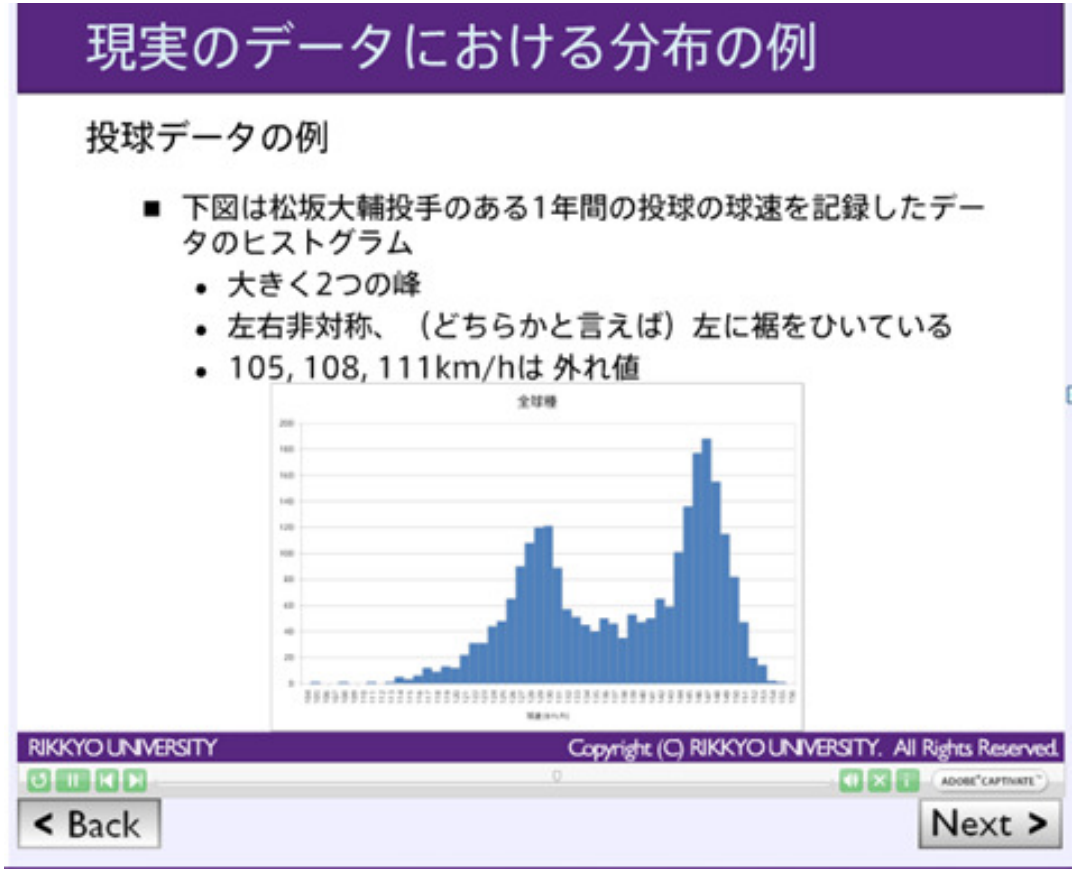
②BBS

③Exercises



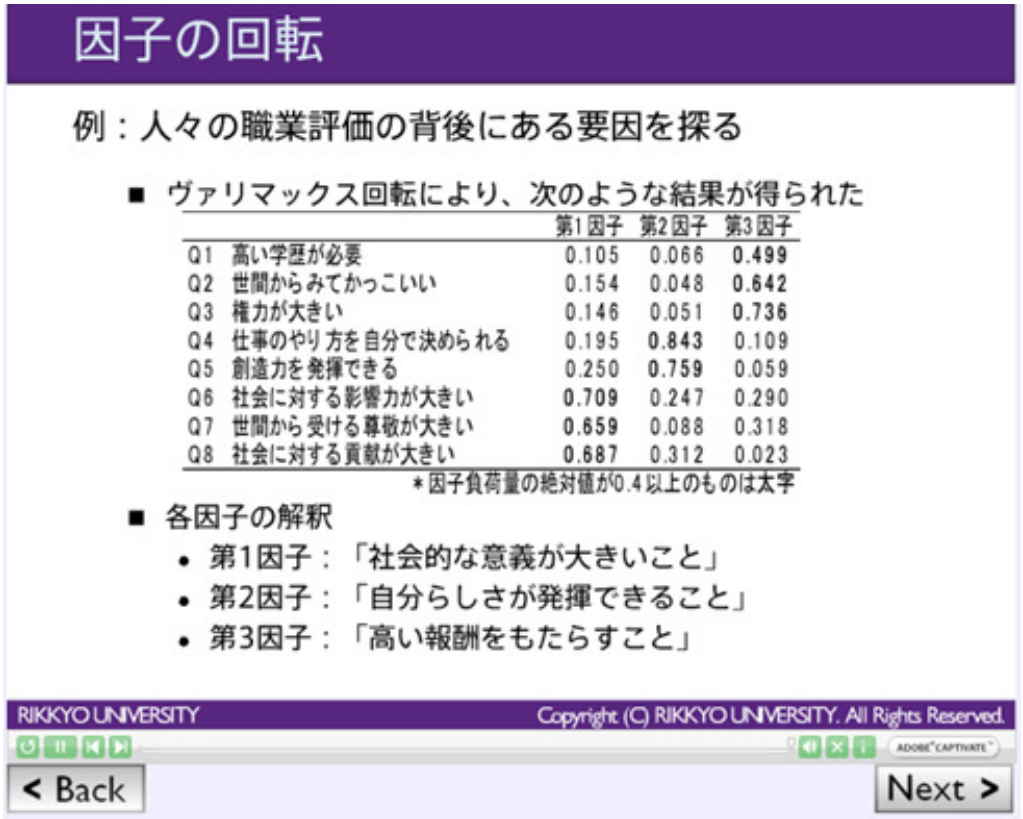
Real-Life Example-1

- **Explanation of Distribution**
  - Distribution of Pitching Speed of a base ball player



Real-Life Example-2

- **Explanation of factor analysis**
  - Analyzing the pattern of evaluations on occupation using a social survey dataset



因子の回転

例：人々の職業評価の背後にある要因を探る

- ヴァリマックス回転により、次のような結果が得られた

	第1因子	第2因子	第3因子
Q1 高い学歴が必要	0.105	0.066	**0.499**
Q2 世間からみてかっこいい	0.154	0.048	**0.642**
Q3 権力が大きい	0.146	0.051	**0.736**
Q4 仕事のやり方を自分で決められる	0.195	**0.843**	0.109
Q5 創造力を発揮できる	0.250	**0.759**	0.059
Q6 社会に対する影響力が大きい	**0.709**	0.247	0.290
Q7 世間から受ける尊敬が大きい	**0.659**	0.088	0.318
Q8 社会に対する貢献が大きい	**0.687**	0.312	0.023

＊因子負荷量の絶対値が0.4以上のものは太字

- 各因子の解釈
  - 第1因子：「社会的な意義が大きいこと」
  - 第2因子：「自分らしさが発揮できること」
  - 第3因子：「高い報酬をもたらすこと」

< Back Next >

Real-Life Example-3

- **Videos which interview statisticians from industry**

Real-Data Analysis-1

■ Exercises based on real data analysis

- Two-way contingency table analyzing the relationship between respondents' residential area and amount of consumption
- Cited from Family Income and Expenditure Survey

2. 問題2

以下の表は平成19~21年平均の家計調査品目別データ(二人以上の世帯(1世帯当たり年間の支出金額))の結果から，都市と加工食品の購入金額との関係をクロス表にまとめたものである．

	加工食品				
	カステラ	ケーキ	しゅうまい	餃子	計
札幌市	488	7,857	719	1,670	10,734
さいたま市	990	9,071	1,083	2,230	13,374
宇都宮市	857	8,381	930	4,758	14,926
横浜市	1,077	7,935	2,661	1,899	13,572
神戸市	1,050	9,210	698	1,710	12,668
長崎市	6,248	7,124	491	1,844	15,707
計	10,710	49,578	6,582	14,111	80,981

【2-2】(配点 10 点)
このクロス表について以下の記述のうち，正しいものを全て選べ

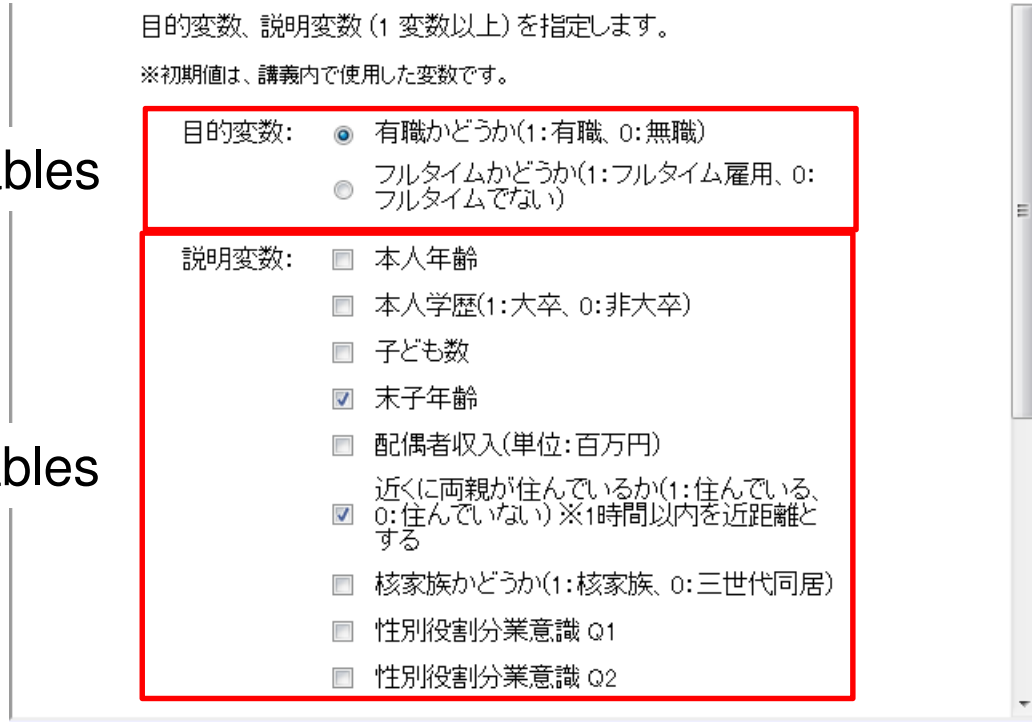
- [x] 都市によって，加工食品の購入金額がどう異なるのかに関心がある場合には，行ごと(行%)で見る
- [ ] 都市によって，加工食品の購入金額がどう異なるのかに関心がある場合には，列ごと(列%)で見る
- [ ] 加工食の種類によって，どの都市が最も購入金額が高いかに関心がある場合には，行ごと(行%)で見る
- [x] 加工食の種類によって，どの都市が最も購入金額が高いかに関心がある場合には，列ごと(列%)で見る

Real-Data Analsis-2

- **Interactive materials based on S-plus**
  - Students can reanalyze datasets with additional variables in the course (Binary logistic regression analysis)

Dependent variables

Independent variables



Interactive materials

■ Question-and-Answer Session

- Bulletin Board System (BBS)
  - ➢ To receive students' questions about course materials and exercises
- Education Coach
  - ➢ The staff member who is a specialist of social survey methodology and statistics
  - ➢ Answers students' questions on BBS from the view point of a specialist

- Same level of the Q & A session with students as the ordinary-type of lecture

An Analysis of the Learning Effect of an E-Learning Course

Learning Effect of an E-Learning Course-1

- An Analysis of the Learning Effect of an E-Learning Course
  - Do students attending the e-Learning courses understand the basic concepts of statistics?
- Comparison to face-to-face classes
  - E-Learning course
    - ✓ Introduction to statistics: Descriptive Statistics
  - Face-face classes
    - ✓ Introductory Statistics: 2Classes

Learning Effect of an E-Learning Course-2

- The same questions are included in the final exam of each 3classes
  - **Question1**
    - To answer the appropriate method when comparing distributions
  - **Question2**
    - To answer the relationship between measures of central tendency based on the shape of distribution
  - **Question3**
    - Same as question 2
  - **Question4**
    - To answer the variance of frequency tables

Learning Effect of an E-Learning Course-3

■ Comparison to Face-to-Face Classes

	Question1	Question2	Question3	Question4
Introduction to Statistics: Descriptive Statistics	18%	58%	50%	85%
Introductory Statistics:A	14%	50%	60%	74%
Introductory Statistics:B	51%	84%	85%	90%

■There is no significant difference of correct answer rate between e-learning course and face-to-face class (introductory statistics A)

■ The correct answer rate of introductory statistics B is very high. However, this is due to the similarity between the question and exercises in the class.(we will skip this analysis.)

Learning Effect of an E-Learning Course-4

■ **Improvement of materials based on the analysis of learning effect**

	Question1	Question2	Question3	Question4
Introduction to Statistics: Descriptive Statistics	18%	58%	50%	85%
Introductory Statistics:A	14%	50%	60%	74%
Introductory Statistics:B	51%	84%	85%	90%

■ Q1: Correct answer rate is quite low among 3 classes

■ Q2,3: Correct answer rate is low in the e-learning course

☆Students in the e-learning course have difficulty understanding how to compare distributions.

■ Improve the course materials to emphasize the method to compare distributions

Thank You for Your Attention !

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Please ask a question in plain English

Introduction to Social Survey

1. The purpose of social survey
2. Types of social survey
3. History of social survey: The case of Western Countries
4. History of social survey: The case of Japan
5. How to select respondents
6. The method of quantitative survey
7. The process of quantitative survey: The design of survey
8. The process of quantitative survey: The design of questionnaire
9. The process of quantitative survey: The analysis of survey data
10. The outline of qualitative survey
11. The methods of qualitative survey
12. The process of qualitative survey: The design of survey
13. The process of qualitative survey: Data collection and data analysis
14. The method of field work
15. The ethical problem of social survey

Social Survey Methodology

1. What is social survey ?
2. The design of social survey
3. How to select the mode of survey
4. The method of sampling
5. The practice of sampling
6. The design of questionnaire
7. The design of question item
8. The design of response categories
9. The conduct of social survey
10. Data collection and data analysis
11. The outline of qualitative survey
12. The method of field work
13. The method of interviewing
14. The method of participant observation
15. How to write articles based on social survey

Introduction to Statistics: Descriptive Statistics

1. Introduction to descriptive statistics
2. The type of variable and data analysis
3. Describing one variable: Frequency tables and histogram
4. Describing one variable: Statistical graphs
5. Describing one variable: The concept of distribution
6. Describing one variable: Measures of central tendency
7. Describing one variable: Measures of dispersion
8. Describing one variable: Comparing distributions
9. Association between two variables: Correlation and Causality
10. Association between two variables: Two-way contingency tables
11. Association between two variables: Odds ration and chi square measure
12. Association between two variables: Pearson's *r*
13. Simple regression analysis
14. Spurious correlation and control of variables
15. Basics of time series analysis

Introduction to Statistics: Statistical Inferences

1. Introduction to statistical inference
2. Random sampling and sampling error
3. Probability and probability distribution
4. Sampling distribution
5. Point estimation and interval estimation
6. Statistical estimation of mean
7. Statistical estimation of ratio
8. Basics of statistical hypothesis testing: its concept and procedure
9. Basics of statistical hypothesis testing: some cautions
10. T-test for difference of two means
11. Analysis of variance
12. Chi square test for two-way contingency tables
13. Analysis of three-way contingency tables
14. Correlation and Regression
15. Some approaches to causal analysis

Introduction to Multivariate Analysis

1. Introduction to multivariate analysis
2. Descriptive and inferential statistics
3. Correlation and partial correlation
4. Multiple regression analysis: Simple regression analysis
5. Multiple regression analysis: Basics of multiple regression analysis
6. Multiple regression analysis: Dummy variable and its interpretation
7. Binary logistic regression analysis
8. Two-way ANOVA
9. Three-way contingency tables and Log-linear models
10. Factor analysis : Basics of factor analysis
11. Factor analysis : Rotation of factor
12. Principal component analysis
13. Cluster analysis
14. Structural equation models
15. Summary of multivariate analysis