

STATISTICS FOR EDUCATION – VARIETY OF STATISTICAL EDUCATION WEB CONTENTS OFFERED BY STATISTICS BUREAU OF JAPAN

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The Statistics Bureau of Japan (SBJ), which conducts the two largest surveys of Population census and Economic Census, has committed to raise statistics awareness and literacy at all levels of the population. To that end, SBJ has been developing three layers of web contents for school pupils, high school students, and college students/business persons. Moreover, SBJ, in collaboration with professors and business practitioners, has launched MOOC courses as the first case among the Japanese Governmental organization. This paper demonstrates their content and its impact.

INTRODUCTION

With the development of information and communication technology (ICT) in recent years, everything has become connected to the Internet (IoT: Internet of Things) and a huge variety of information known as "big data" is generated on a daily basis. Along with this, the importance of solving problems based on data has been increasing. In Japan, we are faced with important issues such as a declining birthrate, an aging society and a decline in the productive age population ahead of the world, so it is an urgent task to develop human resources that can make effective use of data.

Within this trend, at the SBJ, we think that it is important to acquire statistical thinking not only for working adults facing everyday tasks at the business place, but also from childhood. Therefore, we have been developing internet based statistical learning contents that can teach about statistical education required at each stage. Through these efforts, we want people to recognize the importance of statistics, and want to promote the dissemination and public awareness of statistical surveys.

ABOUT THE STATISTICAL EDUCATION WEB CONTENTS OFFERED BY STATISTICS BUREAU OF JAPAN

The SBJ offered the following statistical education web contents.

- “Statistics Academy (For elementary/junior-high school students)” (www.stat.go.jp/naruhodo/index.htm)
- “Statistics Academy (For high school students)” (www.stat.go.jp/koukou/index.htm)
- “Data Science School” (www.stat.go.jp/dss/index.htm)
- “Online Data Science Courses” (<http://www.stat.go.jp/dss/online.htm>)

“Statistics Academy (For elementary/junior-high school students)” is a statistics learning site for elementary and junior high school students, which consists of five categories: "Search / Use, Make", "Learn / Know", "Familiarize", "Playing" and "After School". It was opened following revision of the curriculum guidelines in 2010. It is offered in an easy-to-use manner, through free research assignment using statistics, quizzes to enjoy learning statistics and a rich amount data. It is a site covering not only statistics as arithmetic and mathematics, the data provided by the SBJ, but also statistics for understanding social concerns, and it is also a site for making discoveries, raising awareness, understanding, and familiarity about statistics.

In addition, we will briefly introduce the Statistical data portal site for elementary and junior high school students to be released by the SBJ in early summer this year. This site is a web system for elementary and junior high school students that enables students to learn basic knowledge and techniques for utilizing statistical data, and where they can easily retrieve statistical data related to textbook units or keywords, etc. We are currently developing "Statistical Dashboard Jr." as a system where children can actually make a practical use of statistical data,.

“Statistics Academy (For high school students)” is a learning site for high school students where they can learn statistics easily, and which gives them many materials for nurturing the ability to decipher and utilize statistics to survive the information society. It was opened following the revision of the curriculum guidelines in 2013. Through basic knowledge of "What is statistics", how statistical surveys are conducted, how to analyze collected data and various data and analysis

derived from it, they can learn concrete methods for making a practical use of statistical data. It consists of five categories: "Introduction", "Creating and analyzing statistics", "Major statistical data", "Statistical analysis case", "Bits of knowledge". The categories "Creating and analyzing statistics" and "Bits of knowledge" introduce the process of solving problems through a method focusing on utilization of statistics, "PPDAC" (Problem: clarification of problem, Plan: plan of investigation, Data: data collection, Analysis: data analysis, Conclusion: problem solving), so the students can cultivate the ability to understand the basic idea of statistics, organize and analyze data and grasp trends. We also post examples of usage of intriguing topics on statistics that are utilized in various fields such as natural sciences, medical care and business.

In addition, we created contents for teachers who are teaching statistics at school and posted various diverse lesson models and teaching aid with the results of the statistical survey conducted by the SBJ introducing the opinions of statistical education experts etc.

"Data Science School" is a learning site opened in 2014, which makes it easy for working adults and university students to understand the data science and supports learning the basics of statistics, aiming at improving the capability of data science useful for practical business situations etc. It consists of four categories: "Statistics courses useful for business", "Points for making presentation graphs", "Business utilization techniques of an able person", "Topical number", "Your statistical ability". "Statistics courses useful for business" introduces statistical fundamentals in an easy-to-understand manner with illustration-based comics through historical famous people such as Florence Nightingale, called "mother of modern nursing education", who was also deeply involved in statistics. "Points for making presentation graphs" explains the points in using graphs for presentation materials created by working adults in an easy-to-understand manner. Its contents are comprised by learning resources on how to use graphs in practical situations, such as planning sales strategies and examining efficiency of business in companies. "Business utilization techniques of an able person" introduces mainly interviews of statistical experts and persons in charge of companies etc. about how data (statistics) are used at the business site. It posts experiences of a person (data scientist) in charge who actually takes advantage of big data etc. and is responsible for company management about what kind of situation of business requires statistical thinking and data utilization.

"Online Data Science Courses" is the first MOOC (Massive Open Online Courses) course offered by the Government of Japan to support self-learning on the web. It explains data science in an easy-to-understand manner for working adults and college students. MOOC is large-scale open courses accessible for everyone, free of charge on the Internet, which consists of video lectures, tests, reporting and bulletin boards for discussion and issues certificate of completion. It was developed at US universities and gradually spread all over the world. After starting "Introduction to data science for working adults" in March 2015, "Exercise of data science for working adults" started in April 2016, "Open data of statistics accessible to anyone" opened in June 2017. "Introduction to data science for working adults" is introductory course for obtaining basic knowledge of data analysis, which describes analytical cases using statistical data, the foundation of statistics, and viewpoints of data. "Exercise of data science for working adults" is a course for more practical learning based on the Introduction Course, which describes business forecasts, report of analysis results and points on utilizing data science in business etc. "Open data of statistics accessible to anyone" is a course for learning basic knowledge of official statistics and practical methods of data analysis toward utilization of open statistical data. The learning time is of four to seven 10-minute sessions a week (for four or five weeks). It can be used with smartphones or tablets, so that the user can learn little by little at his/her own pace on the go, or by using pockets of time. With these three course, you can learn from the fundamentals to applications of data science, and it also responds to the needs of relearning for working adults.

IMPACT AND CHALLENGE OF "DATA SCIENCE ONLINE COURSES"

About 49,000 participants in total, have taken "Introduction to data science for working adults" and about 25,000 participants in total, have taken "Exercise of data science for working adults", About 10,000 participants in total, have taken "Open data of statistics accessible to anyone". Up to now, about 85,000 people in total have taken those courses since 2015, when they were opened. According to the questionnaire of the participants, there are a lot of people in the

prime of their working age, in their 30s to 40s, and in occupations which are not technical and professional, but also men in managerial positions and female clerks. Also, in view of the coursework of the three courses, it people are not necessarily taking all courses, but they consider whether or not to attend depending on the contents of the course. Regarding the degree of satisfaction of the courses, the percentage that answered "very satisfied" and "well satisfied" is over 90%. From these facts, although the degree of comprehension for the statistical survey has been low, fields where the use of data at the actual business site etc. are increasing, and the demand for learning data science is considered to be very large. Although the number of universities at which we can learn about data science are increasing little by little in recent years, it is not enough compared to overseas, and learning environments where working adults can study from the fundamentals to the application of data science are not enough as well, so developing the learning infrastructure an urgent issue. Also, since there are few university students in any of the courses, we would like to consider coursework management that will allow students to attend as well.

CONCLUSION

In the curriculum guidelines to be applied after 2020, improvement of statistical education for collecting and analyzing necessary data and solving the problem based on the trend is mentioned. It is considered that the weight of statistical education will increase more and more in the field of school education in the future. In addition, according to the government's "The World's Most Advanced IT State Creation Declaration, Basic Plan for Promotion of Public-Private Data Utilization" it is said that the government will work together to develop data utilization human resources to build a "public and private data utilization society" that enriches people with "data". However, at present, there are only a few talented people who have acquired data science ability. In anticipation of future expansion of demand for such human resources in the future, it is predicted that future talent shortages will occur. The SBJ has been engaged in dissemination and public awareness of statistical literacy so far, but we would like to continue to strive to develop human resources capable of effectively utilizing data that will contribute to Japan's future economic growth.