Hokkaido University	Challenge To equip medical students with a working knowledge of statistics by highlighting its cross-disciplinary uses in the life sciences.

Proficiency in statistics becomes a medical school standard

Hokkaido University designs a course to help medical students develop transferable statistics skills

It used to be that the only college students who registered for statistics classes were the ones who majored in the subject. But those days are behind us. Today, statistics is everywhere: medicine and public health. Manufacturing and supply chains. Transportation. Sports. Even politics, with polling becoming an ever more relied-upon source of public opinion insights. So no matter where students end up, it's likely that a knowledge of statistics will help them go far. In fact, basic statistics is increasingly essential knowledge for individuals working in scientific careers.

How might a university help its students land top-notch jobs in medicine and the life sciences once they graduate? Hokkaido University is ahead of the curve in putting the ubiquity of statistics into practice.

Yoichi M. Ito, Associate Professor in the Department of Biostatistics at the Graduate School of Medicine, offers graduate students a trail-blazing course called Statistical Group Research Methodology. With a combination of classwork and practical exercises covering the basics of statistical analysis as well as its application, students learn to appreciate the usefulness of a more statistics-minded way of thinking about science.

A practical approach to analytics teaching and learning

Hokkaido University has always embraced what it calls the "frontier spirit" – pioneering practical learning that will prepare students for what comes next. Ito, for one, takes that mandate very seriously.

His new course is split into two parts. First, the "basics" – where students get an overview of how statistics works – and then "applications." After all, the primary goal of this course, Ito says, is to help students see statistics not just as an academic discipline, but as a methodological tool with which to approach other scientific inquiries. It's during the applications section that JMP® is especially invaluable.

"There are many advantages to JMP," he says. The ability to grasp data visually, the extensive exploratory data analysis methods, the capacity to create new parameters with formulas, and the power to save and reuse analysis results with JMP script."

Practical exercises include the use of theoretical distribution, group comparisons and analysis of contingency tables, among others, while

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application-oriented exercises teach regression analysis with variable selection, general linear model, logistic regressions for medical research, survival time analysis, the non-parametric method, clinical sample size determinants and multivariate analysis.

Foundational knowledge is a platform for exploration

Ito argues that students do best when they're given the reins to explore the data for themselves – to experiment with new analyses or generate hypotheses by looking at data from a range of different perspectives. And that's why JMP is his tool of choice: JMP is, at its core, an exploratory platform.

Another advantage of using JMP to teach statistics, Ito contends, is that the abundant sample data included in the JMP data library can be used in his classes. "My students use JMP sample data to practice using the software's many analytical capabilities," says Ito. "Statistical analysis methods are often best learned in a case study format."

Ito teaches his students that in biostatistics, even if there is a relationship between variables, it is not necessarily a causal relationship. And occasion-

ally the inverse is also true. As a result, researchers must marry a statistical approach with an observational one, taking into account factors like strength and consistency of relationships, time and biological dose-response gradients.

"One of the many advantages of JMP is the sheer variety of analytical applications it puts at your fingertips," says Ito. "Whatever the purpose of the analysis – whether the outcome variable is binary, continuous value, survival time, etc. – there is a JMP platform suited for it: distribution summary, comparison between 2 groups, comparison between multiple groups, prognostic factor/stratification adjustments."

"We structured the curriculum so that students can learn about as many of these methods as possible," he notes. "And I think that the possibilities of JMP script are really big." The application-oriented nature of the course allows students to explore those lines of inquiry that are most relevant to their field of specialization.

As students become more accustomed to using JMP, Ito observes, they begin to not only analyze data as required for class, but to explore how they can use statistics in their own future scientific studies and research. And this, Ito says, is exactly what he was hoping for.

This article was last updated November 2015.

Solution
Yoichi M. Ito of the Hokkaido University Graduate School of Medicine has designed a unique practical statistics course that applies the user-friendly exploratory features and data library of JMP.

Result
Students now learn to appreciate how even a basic understanding of statistics can elevate their future research and professional careers in the life sciences.

To contact your local JMP office, please visit: **jmp.com/offices**

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