



Student science fair winner uses MINITAB

Lindsay Burke took home regional and state awards in the Pennsylvania Junior Academy of Science Competition. The 18-year-old senior from Cardinal O'Hara High School, in Springfield, PA, used MINITAB as a key tool for her winning project.

Lindsay studied research from the Minnesota School District and the Minnesota Regional Sleep Disorders Center that showed that the biological clocks of teenagers are set differently than those of an adult or a child. According to Mark Muhowald, director of adult neurology at the center, the research suggests that the bodies of teenagers are programmed to go to sleep later and wake up later and that a high school student's best performance occurs later in the day.

Based on this research, Lindsay developed the following hypothesis: "If I compare the mean math scores for different quarters of freshman and sophomore students to see if the class period of the day affects their scores, then I should find that students perform best later in the day (8th period)."

Lindsay used first and second quarter grades for a sample of 405 students (201 freshman and 204 sophomores). She collected grades from three periods of freshman algebra classes and three periods of sophomore geometry classes. The 8th period was assigned as the control and the other two periods in each grade level were assigned as variables.

With the help of her statistics teacher, Alice Dugan, Lindsay used MINITAB Release 12 to prepare her winning project. Ms. Dugan said, "I gave her some basic instruction on how to use MINITAB and in no time she was showing me things! I am happy that she was able to use the software in such a productive hands-on way. I know that this experience will help her so much in her college and career plans."

Lindsay used MINITAB to compare the shape of the distribution of the grades, the mean values, and the maximum, minimum and standard deviation. She created stem-and-leaf plots, box plots, and normal probability plots for each sample to better understand the distribution of the grades. Using these visual aides and numerical values, she was able to determine which class period had the highest average grade and

whether there was a correlation to the time of day the class was taken.

Lindsay's experiment enabled her to conclude that class period does affect a student's grade in math. Of the sample of 405 students, the students seemed best able to learn after lunch and at the end of the day. Her original hypothesis was proven partially correct. Freshman students did perform best in 8th period, but sophomore students performed best in 6th period. The results supported Mark Muhowald's statement about the biological clocks of adolescents.

Lindsay developed an oral presentation with overhead transparencies to enter the science fair. She used the graphs that she created in MINITAB and imported them into her PowerPoint presentation. She stated, "I found MINITAB to be not only easy to use and understand but also very helpful in different areas of statistics. In class, we worked on several projects on the computer using MINITAB, and I feel that using the software helped to clarify what we were doing and showed how important technology is in mathematics."

In March 2000, Lindsay participated, along with more than one hundred fifty 7th - to 12th-grade students, at the regional level from the Delaware County area in Pennsylvania. Lindsay received a first place award with a perfect score and the Veterans' Award for Excellence in the category of Math and Computers. Students were judged on a variety of criteria, including

scientific and experimental methods, analytical approach, and presentation.

Lindsay's first-place win in the regional competition qualified her to advance to the state competition. More than 4,000 students, teachers, and parents traveled to Penn State's University Park campus on May 14 to attend the 66th annual statewide science fair. A team of Penn State graduate and undergraduate students and junior-high and high school science teachers judged the projects. Students competed to earn Penn State scholarships, tuition to summer science camps, and thousands of dollars in monetary prizes. Lindsay placed third in her category at the state level.

"The experience of doing a research project and communicating its results in a formal way to other members of the scientific community is of tremendous value to these students," said Norman Freed, associate dean of the Penn State Eberly College of Science, which hosted the event. "It helps them to make decisions about their college major and it prepares them to make professional presentations in industry, business, or wherever they eventually make their careers," he said.

Lindsay has been submitting entries to the competition since 7th grade. Her favorite high school class was statistics. She is involved in several extracurricular activities, including ballet, jazz, and tap. She is also a member of the theatre department and is the editor of the senior section of the yearbook. In the fall, Lindsay will attend LaSalle University in Philadelphia, where she will double major in marketing and math, specifically statistics. Her goal is a career in advertising.

DO YOU KNOW?...

Release 13 allows you to hide and unhide columns in a worksheet. Just highlight the columns and right-click or use the Editor menu to go to Column > Hide Selected Columns or Unhide Selected Columns. Use Editor > Column > Use Hidden Columns in Dialog Boxes to have the hidden columns shown in the dialog boxes (or not). You can also set this as a default by choosing Edit > Preferences > Dialog Box, Use all columns in dialog boxes (or Use only unhidden columns in dialog boxes).

When viewing a topic in Help, choosing Edit > Annotate provides a space for you to type additional information associated with the topic. When a topic is annotated, a paper clip icon appears at the top of the topic. Click the paper clip to display this dialog box and the annotation text.

Release 13 provides capability for creating and analyzing mixture designs that includes linear constraints, process variables, mixture-amount experiments, extreme vertices designs, and many graphs to help you visualize your mixture design.

In Release 13, you can use Response Optimizer with a single response (not just a multiple response optimizer). The Response Optimizer is now available for Factorial and Mixture designs (not just Response Surface designs).

Release 13 now handles cases when your data has few or no failures in a Reliability/Survival analysis (Bayes analysis).

You can generate random data and calculate probabilities for a Hypergeometric distribution in Release 13.