What Is a Statistical Project?

A statistical project is the process of answering a research question using statistical techniques and presenting the work in a written report. The research question may arise from any field of scientific endeavor, such as athletics, advertising, aerodynamics, or nutrition. A project differs from a statistical poster in that a written report is used to present the findings.

Data-Based Problemsolving

The process of developing a statistical project should demonstrate the scientific method and pose a focused question or questions, collect appropriate data, analyze the data thoughtfully, and draw correct conclusions.

Because students are asking questions continually about what touches their lives, they should have little trouble generating questions about themselves or their schools, families, neighborhoods, or interesting phenomena in the world.

Once a question is proposed, students should examine it. First, is it a question that can be answered? (The question "Is there intelligent life in the universe that does not come from Earth?" is an extremely interesting question, but not one that is likely to be answered in a short-term project.) Second, can students collect data to answer the question or has someone else already collected data that could be used to find the answer?

Once the question is chosen, data must be collected. If published data are used, students should understand how the data were obtained and record their source. Usually, students choose to collect their own data. Time should be spent deciding how to collect this data. If a survey is used, how are the people chosen to answer the questionnaire? If two treatments (i.e., models, grades, genders, etc.) are to be compared, how

can comparisons be made fairly? How will the data be recorded?

After the details have been worked out, students are ready to obtain the data. Great care should be exercised at every stage of data collection. Careless measurement or recording of data cannot be remedied in the analysis phase of a project.

Thoughtful analysis of the data may take many forms and should be guided by the question and how the data were collected. Usually, it is best to begin by graphing the data. Can graphs be used to give the answer to the question or questions? Most of the time, graphics have been the sole method of data analysis for grades 4–6. As students gain experience, simple statistical methods such as a chi-squared test or a t-test may be used. Regression has been used occasionally. Sometimes, estimation is most appropriate and hypothesis testing is not needed. Other methods may be used, depending on the question and data.

Once analysis is complete, the question should be answered. The data may not be able to provide a conclusive answer. For example, one treatment may appear to be better than another, but the difference was not significant. If the question has a definitive answer, that should be presented. A check should be made at this point to make certain the answer matches the question. It is easy to get caught up in the analysis phase and obtain many answers, none of which addresses the research question.

Finally, consider the strengths and weaknesses of the project. What would be changed if the project was done again?

The Written Report

Great latitude may be taken in developing the written report. Students should plan how to

communicate their work effectively. The longest report does not necessarily represent the best project. However, the report must accomplish the following:

- Demonstrate how and why the particular topic was chosen
- Show how the research was conducted
- Delineate what conclusions were obtained
- Include the collected data and its analysis
- Discuss the strengths and weaknesses of the selected statistical methods

A Final Note

The NCTM Standards for Curriculum and Evaluation in School Mathematics presents the vision that problemsolving is a main goal of mathematics instruction at all levels and calls for student involvement in statistical activities at all grade levels. The standards indicate statistical thinking should start in the primary grades with the creation of student data from class activities. In upper grades, the emphasis is on collecting, organizing, summarizing, and interpreting data from other school disciplines, such as the physical or social sciences, as well as outside interests of the students. The statistical project is a powerful tool for attaining these goals while exercising essential communication skills.