Lesson: A Statistical Analysis of Tap Dancing
High School
STANDARDS: California

1.0 Students know the definition of the notion of *independent events* and can use the rules for addition, multiplication, and complementation to solve for probabilities of particular events in finite sample spaces.
2.0 Students know the definition of *conditional* probability and use it to solve for probabilities in finite sample spaces.
3.0 Students demonstrate an understanding of the notion of *discrete random variables* by using them to solve for the probabilities of outcomes, such as the probability of the occurrence of five heads in 14 coin tosses.
4.0 Students are familiar with the standard distributions (normal, binomial, and exponential) and can use them to solve for events in problems in which the distribution belongs to those families.
5.0 Students determine the mean and the standard deviation of a normally distributed random variable.
6.0 Students know the definitions of the *mean, median,* and *mode* of a distribution of data and can compute each in particular situations.
7.0 Students compute the variance and the standard deviation of a distribution of data.
8.0 Students organize and describe distributions of data by using a number of different methods, including frequency tables, histograms, standard line and bar graphs, stem-and-leaf displays, scatterplots, and box-and-whisker plots.

Statistical Analysis of Dance

Motivation: Ask students how one measures change mathematically. What measurements would one take? How would one represent these measurements so they were clear and understandable? What would it take to justify that change had occurred, or that two processes or acts are different?

Group Activity: View *Changing Personal Styles* in *Why* in *Dancing with Gregory Hines*. Then go back and watch several other samples of Hines' dancing. Ask students whether they think his style has changed. What did they notice was different? What was the same? If they had trouble noticing, how could they quantify this change?

*Independent Activity***:** Using the *Who* section of *Dancing with Gregory Hines*, ask students to statistically analyze differences between dancers and dance performances. Before beginning, ask them to brainstorm ways they could measure these differences. Suggest measurements such as the recurrence of certain moves, the number of taps per second, and the number of arm movements per second. Students should design reports in

which they collect data, represent this data graphically, and draw a conclusion from this data.

Reflection: Ask students what their thought process was in completing this activity. Where did they start? Would they start with this next time? What difficulties were involved in measuring? Do they feel they actually measured change? Why or why not?