

The Correlation of PLATO® Curricula to Common Core State Standards: High School: Statistics & Probability

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INTRODUCTION

PLATO Learning Inc. combines PLATO computer-assisted instruction into a flexible integrated learning system to enhance instructional effectiveness in education programs. This document identifies PLATO instructional activities that correlate to the Common Core State Standards: High School: Statistics & Probability, Mathematics Standards, High School: Statistics & Probability. URL: <http://www.corestandards.org/>.

It is recommended that instructors review the correlation in order to fine-tune the activity to fit their educational environment. Modules may be added or removed; Web sites and offline activities may also be incorporated to enhance the learning path.

The following PLATO courseware was used in this correlation report:

PLATO® Course Probability and Statistics

PLATO Learning, Inc. looks forward to supporting your initiatives in providing successful educational programs using PLATO® computer-based lessons.

High School: Statistics & Probability

Interpreting Categorical & Quantitative Data

Summarize, represent, and interpret data on a single count or measurement variable

I. Represent data with plots on the real number line (dot plots, histograms, and box plots).

PLATO Course Probability and Statistics

Unit I: Representing and Interpreting Data

Data Plots

Unit Activity: Representing and Interpreting Data

2. Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.

PLATO Course Probability and Statistics
Unit 1: Representing and Interpreting Data
Showing Data Center and Spread
Unit Activity: Representing and Interpreting Data

3. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).

PLATO Course Probability and Statistics
Unit 1: Representing and Interpreting Data
Interpreting the Shape of Data Distributions
Unit Activity: Representing and Interpreting Data

4. Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.

PLATO Course Probability and Statistics
Unit 1: Representing and Interpreting Data
Normal Distributions
Unit Activity: Representing and Interpreting Data

Summarize, represent, and interpret data on two categorical and quantitative variables

5. Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.

PLATO Course Probability and Statistics
Unit 2: Relating Data Sets
Relating Categorical Data

6. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related

a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a

function suggested by the context. Emphasize linear, quadratic, and exponential models.

PLATO Course Probability and Statistics
Unit 2: Relating Data Sets
Relating Quantitative Data
Unit Activity: Relating Data Sets

b. Informally assess the fit of a function by plotting and analyzing residuals

PLATO Course Probability and Statistics
Unit 2: Relating Data Sets
Relating Quantitative Data
Unit Activity: Relating Data Sets

c. Fit a linear function for a scatter plot that suggests a linear association

PLATO Course Probability and Statistics
Unit 2: Relating Data Sets
Relating Quantitative Data
Unit Activity: Relating Data Sets

Interpret linear models

7. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.

PLATO Course Probability and Statistics
Unit 2: Relating Data Sets
Interpreting Data as a Line
Unit Activity: Relating Data Sets

8. Compute (using technology) and interpret the correlation coefficient of a linear fit.

PLATO Course Probability and Statistics
Unit 2: Relating Data Sets
Making and Interpreting Correlations
Unit Activity: Relating Data Sets

9. Distinguish between correlation and causation.

PLATO Course Probability and Statistics
Unit 2: Relating Data Sets

Making Inferences & Justifying Conclusions

Understand and evaluate random processes underlying statistical experiments

1. Understand statistics as a process for making inferences about population parameters based on a random sample from that population.

PLATO Course Probability and Statistics
Unit 5: Making Inferences and Conclusions
Making Inferences Based on Statistics
Unit Activity: Making Inferences and Conclusions

2. Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?

PLATO Course Probability and Statistics
Unit 5: Making Inferences and Conclusions
Evaluating the Validity of a Statistical Model
Unit Activity: Making Inferences and Conclusions

Make inferences and justify conclusions from sample surveys, experiments, and observational studies

3. Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.

PLATO Course Probability and Statistics
Unit 5: Making Inferences and Conclusions
Using Statistics in Surveys, Experiments, and Studies

4. Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.

PLATO Course Probability and Statistics
Unit 5: Making Inferences and Conclusions
Analyzing a Survey

5. Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.

PLATO Course Probability and Statistics
Unit 5: Making Inferences and Conclusions
Statistically Comparing Two Treatments

6. Evaluate reports based on data.

PLATO Course Probability and Statistics
Unit 5: Making Inferences and Conclusions
Evaluating Reports Based on Data

Conditional Probability & the Rules of Probability

Understand independence and conditional probability and use them to interpret data

1. Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ($A \cup B$, $A \cap B$, and A^c).

PLATO Course Probability and Statistics
Unit 3: Independent and Conditional Probability
Sample Space
Unit Activity: Independent and Conditional Probability

2. Understand that two events **A and **B** are independent if the probability of **A** and **B** occurring together is the product of their probabilities, and use this characterization to determine if they are independent.**

PLATO Course Probability and Statistics
Unit 3: Independent and Conditional Probability
Independent Events
Unit Activity: Independent and Conditional Probability

3. Understand the conditional probability of **A given **B** as $P(A \text{ and } B)/P(B)$, and interpret independence of **A** and **B** as saying that the conditional probability of **A** given **B** is the same as the probability of **A**, and the conditional probability of **B** given **A** is the same as the probability of **B**.**

PLATO Course Probability and Statistics
Unit 3: Independent and Conditional Probability

Conditional Probability
Unit Activity: Independent and Conditional Probability
Unit 4: Applying Probability
Applying Conditional Probability and Independence
Interpreting Conditional Probability
Unit Activity: Applying Probability

4. Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.

PLATO Course Probability and Statistics
Unit 4: Applying Probability
Interpreting Two-Way Frequency Tables
Unit Activity: Applying Probability

5. Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.

PLATO Course Probability and Statistics
Unit 4: Applying Probability
Applying Conditional Probability and Independence
Unit Activity: Applying Probability

Use the rules of probability to compute probabilities of compound events in a uniform probability model

6. Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model.

PLATO Course Probability and Statistics
Unit 4: Applying Probability
Interpreting Conditional Probability
Unit Activity: Applying Probability

7. Apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$, and interpret the answer in terms of the model.

PLATO Course Probability and Statistics
Unit 3: Independent and Conditional Probability
Applying the Addition Rule for Probability
Unit Activity: Independent and Conditional Probability

8. Apply the general Multiplication Rule in a uniform probability model, $P(A \text{ and } B) = P(A)P(B|A) = P(B)P(A|B)$, and interpret the answer in terms of the model.

PLATO Course Probability and Statistics
Unit 3: Independent and Conditional Probability
Applying the Multiplication Rule for Probability
Unit Activity: Independent and Conditional Probability

9. Use permutations and combinations to compute probabilities of compound events and solve problems.

PLATO Course Probability and Statistics
Unit 3: Independent and Conditional Probability
Using Counting Techniques to Determine Probabilities
Unit Activity: Independent and Conditional Probability

Using Probability to Make Decisions

Calculate expected values and use them to solve problems

1. Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions.

PLATO Course Probability and Statistics
Unit 6: Using Probability to Make Decisions
Random Variables
Unit Activity: Using Probability to Make Decisions

2. Calculate the expected value of a random variable; interpret it as the mean of the probability distribution

PLATO Course Probability and Statistics
Unit 6: Using Probability to Make Decisions
Expected Value of a Random Variable
Unit Activity: Using Probability to Make Decisions

3. Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the

expected value. For example, find the theoretical probability distribution for the number of correct answers obtained by guessing on all five questions of a multiple-choice test where each question has four choices, and find the expected grade under various grading schemes.

PLATO Course Probability and Statistics
Unit 6: Using Probability to Make Decisions
Making Predictions Based on Probabilities

4. Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value. For example, find a current data distribution on the number of TV sets per household in the United States, and calculate the expected number of sets per household. How many TV sets would you expect to find in 100 randomly selected households?

PLATO Course Probability and Statistics
Unit 6: Using Probability to Make Decisions
Making Predictions Based on Empirical Data

Use probability to evaluate outcomes of decisions

5. Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values.

a. Find the expected payoff for a game of chance. For example, find the expected winnings from a state lottery ticket or a game at a fast-food restaurant.

PLATO Course Probability and Statistics
Unit 6: Using Probability to Make Decisions
Ins and Outs of Expected Value
Unit Activity: Using Probability to Make Decisions

b. Evaluate and compare strategies on the basis of expected values. For example, compare a high-deductible versus a low-deductible automobile insurance policy using various, but reasonable, chances of having a minor or a major accident.

PLATO Course Probability and Statistics
Unit 6: Using Probability to Make Decisions
Ins and Outs of Expected Value
Unit Activity: Using Probability to Make Decisions

6. Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).

PLATO Course Probability and Statistics

Unit 4: Applying Probability

Using Probability to Make Fair Decisions

Unit 6: Using Probability to Make Decisions

Fair Decisions with Random Variables

7. Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).

PLATO Course Probability and Statistics

Unit 4: Applying Probability

Using Probability to Analyze Decisions and Strategies

Unit 6: Using Probability to Make Decisions

Complex Decisions Using Probability