Mathematical Accuracy in Measuring

Summary

Students need to know and understand the principles of replication and variation (reliability and validity) in order to be successful in using and formulation recipes.

Main Core Tie

Food And Nutrition I

Strand 2 Standard 3

Time Frame

1 class periods of 45 minutes each

Group Size

Large Groups

Background for Teachers

REPLICATION is a basic principle of empirical/analytic science. Mathematics is basic to science. Because people are human and subject to human error, the scientist relies upon mathematics and standard measurement to guarantee reliability, validity, and to help control the amount of curability in acceptable products.

RELIABILITY means that the unit of measurement will be the same every time it is used. For example, one inch on a ruler is always the same whether measuring a cake pan, the length of spaghetti, or the size of a bar cookie. One inch on standardized rulers or yard sticks is the same from one implement to the other.

VALIDITY means that a proper way of measuring or the proper unit of measurement has been chosen. For example, it is more valid to use a teaspoon rather than an inch as the unit of measurement for vanilla or lemon extract in a recipe. It is also more valid to use a teaspoon than a cup to measure vanilla or lemon extract for a recipe.

VARIANCE is not desirable in most products using recipes because it can prevent quality and consistency in the results. The ideal is to produce products of like quality. The desire, for example, is to have the quality of the product the same each time a recipe is used. Standardized measurements support quality products.

Intended Learning Outcomes

Students will compare, analyze, and appraise the principles of replication, variation, precision, and standardization in recipes.

Instructional Procedures

See attachments below:

As a PREASSESSMENT, the students will choose correct measuring equipment for different foods and food products. (see ARE YOUR MEASURING UTENSILS ACCURATE? and RECORDING CHART.)

At the conclusion of all the experiments, the teacher and students will discuss the results and implications of the experiments and recorded results. The experiment recording chart can be placed in the student's science notebook.

The students will review and demonstrate knowledge of accurately measuring some basic recipe ingredients. (See SCIENTIFIC MEASURING EXPERIMENTS - FLOUR, SUGAR, OIL, AND LIQUID

AND RECORDING CHART-for each ingredient.)
At the conclusion of all the experiments, the teacher and students will discuss the results and implications of the experiments and recorded results. The experiment recording charts can be placed in the student's science notebook.
The students will practice using scientific equipment by doing two experiments: USING SCIENTIFIC EQUIPMENT - THE TRIPLE BALANCE BEAM and USING SCIENTIFIC EQUIPMENT - BEAKERS AND CYLINDERS.
By answering the questions on SUMMATIVE EVALUATION - REPLICATION AND VARIATION OF MEASUREMENTS UNIT TEST worksheet, the students will:
1. Analyze problems caused in food preparation when ingredients of a recipe are not measured accurately.
2. Explain the relationship between standard variation and accuracy of replication in food preparation.

3. Extrapolate basic scientific principles from simple observation and experiments.
NOTE TO TEACHER: If you desire, the students may refer to their scientific measuring experiment charts.

Authors

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