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Exploring Generic Probability Using TI Calculator

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ovCMST SCOLLARCITY Lesson Plan Template-Lesson Plan using **TI Technologies** (Due Tuesday, July 27th)

Submit as hard copy AND electronically through ANGEL

Name: Sarah Laiosa
Grade level(s)/Subject taught: Teachers Canidate
Objectives: (Remember…*How will the modeling tool help the student better learn the objective?)* To utilize the tools we learned in the TI classroom to give a graphic understanding of genetic probability

Items to include in your TI Technologies lesson plan: (use *your* area/discipline/concepts).

For the math teacher:

1. *Write* the Mathematical Concept or "key idea" that TI Technologies will be used to teach: (e.g. Students use mathematical modeling/ multiple representation to provide a means of presenting, interpreting, communicating, and connecting mathematical information and relationships)

and/or…

For the Science teacher:

1b. *Write* the Science Concept or "key idea" that TI Technologies will be used to teach: (e.g. Organisms maintain a dynamic equilibrium that sustains life).

Genetics are the building blocks of heredity and inherited phenotypic and genotypic characteristics.

For your **TI Technologies** lesson and using the following prompts, please provide a rich **one-page, single-spaced** description or a *vision* of your best thinking on a way or ways you might teach the planned lesson using the TI technology. Pay special attention to the modeling package

in your description. Also, construct and submit a tentative rubric that you might use with your students. ** see example page 5

Genetics is a topic that is both very prominent and very difficult within the field of Biology. The basis of genetics is probability, and that is what I am going to base my lesson plan on.

Utilizing the probability modes within the calculator, the start of the lesson would be an introduction of how to use probability functions on the calculator. This would be with running simulations rolling dice and pulling cards, just to show how the functions work.

Then the actual biology lesson would go into an explanation of Mendelian genetic interpretation and Punett Squares. This introduces the students to how probability within genetic codes and reproduction really works, such as the 50/50 when you are pulling recessive pairs vs dominant pairs, the 1:2:2:1 when you are doing to heterozygous pairs and so on.

That sets up a great basis for a lesson that incorporates the use of the TI calculator for setting up a simple experiment utilizing kidney beans of 2 differing colors, one to show recessive traits and one to show dominant traits.

The beans are placed into a container and pulled at random using the replacement method. Each pair represents what genetic trait you are pulling: say that you have red and white kidney beans where red represents the dominant trait and white represents the recessive trait.

Record each of the pulls in pairs in 2 separate lists under the STAT and Edit menu.

You can do this as many times as you want, but the more pulls and the more trials that you do, the more the graphic representation (using the STAT plot and using a bar graph as your pictorial representation) will represent the theoretical probabilities that come from doing these trials.

Take the results from each students set of trials and compare them or combine them into a single data set to demonstrate to the students how the graphing calculators can help them to get a different representation outside of just memorizing statistical sets and understanding the theory behind it. It is a good way to show the real life application of genetics in more than one way.

Rubric:

5: Excellent understanding of the probability concepts of genetics, being able to fully utilize the TI to show the probability predictions and being explain them to others.

3: Understands the probability and is able to follow the directions given to graphically represent the materials, but cannot explain well what is going on.

1: Cannot grasp underlying concept, cannot follow the directions to graph trials, and does not see association between genetic probability and inheritance.

"...a rich **one-page, typed, single-spaced**, description or a *vision* of your best thinking…"

Prompts:

1. How will you assess the prior knowledge of the student?
2. How will you begin the lesson?
3. What are the teacher and students doing every 5-10 minutes? (Teacher Actions and Student Actions
4. How will you assess the learning for the lesson?
5. How will TI be integrated into your teaching? (i.e. you may want to discuss a problem or describe how you might use the chosen modeling package in your plan. How does the model/tool help the concept(s) to be taught)?

Using the TI graphing calculators, I plan on having my students…
(software / modeling package(s)

Assess? Ask students informal questions regarding probability and genetics at beginning of lesson

Model the probability concepts that lie behind genetic inheritance

Begin lesson with introduction to genetics and probability and then simulations of the dice rolls and card draws etc.

There will be interactions where after the students have been taking notes and learning how to do the program, the students will be asked to do the project with te kidney beans on their own following separation directions and modeling. The teacher will be moving throughout the room answering questions and directing people on what to do both individually and as a whole group.

Assessment will be based on informal questioning as well as a final project in which the students will design this type of assignment for themselves in how probability can be modeled under differing conditions.

This whole lesson was based on a TI modeling instruction and I would plan to do these activities throughout the year as the curriculum dictates.

Example: "I was thinking about beginning the class on [modeling X] by using the overhead to ask students what they know about X. From this brainstorming session, I might ask them to get into groups and discuss one or more of the ideas they gave me. After about ten minutes, I would have the students give their ideas on X and write them down on a transparency so they would be able to see them for the entire hour. From here, I would provide a 10 to 15 minute demonstration of the basics of using _____modeling software. I would use an conceptual example that they would find familiar with such as getting a cold and how it is transmitted. From here, I would have students at the computer stations using a prepared guide or tutorial to get them started on basic software usage. I expect that in a short time a number of students would "catch on" rather quickly and be able to help others. …….. By the third lesson, I suspect that most would be well on their way to development of their own or small group models using the _____software. My plan of assessment would probably be a group model so they would gain more confidence in using the software in a meaningful way. After the second or third lesson, I would ask them to choose from a list of thematic or topic areas that fit the software nice and develop a model using the technology. As a product, I may have partners share their model and describe to other small groups how it works. The rubric I design would be general at first so that I might see the kinds of the products the student were capable of creating. From the prototypes, I would hone my rubric to make the modeling product as challenging as possible without making it too difficult." Etc…

For all lesson plans and within the context of the lesson plan(s) you develop, design (add) a rubric that addresses your objectives AND "guides" your students to success in the modeling arena you choose (AS, Stella, GSP, TI, IP). The rubric should have three or four levels or mastery with the highest level [TARGET], which should detail what you might initially expect of the capabilities from a student doing the best s/he can do. **(etc…)**

Ex:

Target	Acceptable	Unacceptable
Model *uses at least 5 functions* of Agent Sheet Software.	?	?
Math / Science Concept thoroughly addressed. Described (*written*) in rich detail.		
Graphs are neat, accurate and based on data from the model.	?	?
Student is very capable of *describing the model to a small group of peers* and is able to respond meaningfully to questions about the model.	?	?
Defines exactly how the modeling software "helped" solve the problem.		