Strategy Scenario

Strategy: **Frame, Type Two** ***Content:*** **Genetics**

Title: **"Genetics Made Easy"**

Time Required: **approximately two hours**

Target Audience: **advanced high school biology students; average to above average undergraduate biology students**

Goal of Activity: **Students will be able to determine probability ratios of the genotypes and the phenotypes among the offspring of a cross involving one and two traits**

Purpose of Script: **to use a type two frame for students to compute the probability of recessive and dominant genes**

Learning Outcome(s), Gagne's Taxonomy: **(intellectual skills): higher order rules; problem solving**

Learning Outcome(s) HEO Taxonomy: **(Bloom's taxonomy): comprehension, analysis, and synthesis of genetic probability**

Learner Characteristics: **no special characteristics other than enrolled in biology class; they high school students should be above average, college students average to above average**

Entry Skills: **Students must have a working knowledge of algebra and previously studied cell theory/Mendel's experiments**

Setting: **classroom or computer lab**

Media: **either live instruction (with a chalkboard) or a well developed CBT that reviews cell theory, the laws of probability, genotypes and phenotypes, incomplete dominance, and Punnett's square.**

Process:

1. **Instructor begins with an advanced organizer bridging cell theory with the new unit's topic, genetics**
2. **Instructor presents the law of probability by flipping a coin**
3. **Instructor gives the student the product rule of probability; works serveral examples on the chalkboard, asks students to complete several examples on scratch paper, then provides immediate feedback**
4. **Instructor then relates genetics and breeding to the laws of probability**

5. **Instructor provides the following formula for probability distribution**

1/2R + 1/2r (for both parents)
and probable combinations
1/2R + 1/2r
X1/2R = 1/2r
1/4RR + 1/4 Rr
+ 1/4 Rr + 1/4rr

Genotypes:

1/4RR + 1/2Rr + 1/4rr

Phenotypes:

3/4 round: 1/4 wrinkled

6. **Instructor reviews each step with students, and gives sample problem for two traits using Punnett's square**
7. **Instructor works sample on board, or CBT provides sample**
8. **After review, instructor passes out blanks frame with only the traits and asks students to work on the frames independently for ten minutes at their seats**
9. **After ten minutes the instructor allows students to get into groups of three and compare their answers**
10. **After five or ten minutes, the instructor has several volunteer students work their answers on the boards**
11. **A question and answer sessions follows**

TtRr

	TR	*Tr*	*TtRR*	*TtRr*
TR	*TTRr*	*TTRr*	*TtRR*	*TtRr*
Tr	*TTRr*	*Ttrr*	*TtRr*	*Ttrr*
tR	*Tt RR*	*TtRr*	*ttRR*	*ttRr*
tr	*TtRr*	*Ttrr*	*ttRr*	*ttrr*

Strategy Assessment: **Students will be observed using the frame two cognitive strategy when they encounter a genetics problem**

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References: **Oram, R. F. (1976). Living Systems Biology. 2nd ed. Columbus, Ohio: Charles E. Merrill Publishing Company.**