Secret Agent Engineering- Curriculum Exchange

Katheryn Kennedy, Stevens Institute of Technology, CIESE

Kathy Kennedy is a Program Manager at CIESE, the Center for Innovation in Engineering and Science Education at Stevens Institute of Technology. Kathy serves as the Program Manager for PISA2, and 11.5 million dollar NSF-sponsored MSP program. Kathy is also responsible for conducting teacher training and workshops; and developing Internet-based curriculum materials for Math Science Partnerships with K-12 school districts. Prior to joining CIESE, she taught biology at the high school and college level and has taught earth and physical science at the middle school level. Kathy received a B.S. in Biology from Siena College and a M.S. in Biomedical Science from Baylor University. Currently she is pursuing a PhD through Walden University.
Secret Agent Engineering provides a context for students to apply understanding of wave behavior and patterns while designing a code and device to transmit location information to rescue their classmates from “disaster”. Elementary students, in the role as Secret Agents, engage in NGSS wave transfer thinking while applying knowledge of light and/or sound waves. Designed codes and devices are presented to promote and demonstrate understanding of science and engineering.

Context: Students are introduced to this design challenge after science exploration and investigations with the behavior and characteristics of light and sound. These explorations introduce the concepts of reflection, refraction, and also develop a model to represent wave characteristics using Slinkys and ropes. Students are placed into teams of four for the challenge.

Differentiation of requirements and materials by teachers facilitates scaffolding to meet varied population needs. Materials used during two forty-five minute classes dedicated to this challenge range from flashlights, colored paddles, rubber bands, straws and shoe boxes.

Scaffolding includes guiding the teams with explicit prompts to consider the following points. A Secret Agent packet facilitates “seeing student thinking” and promotes team processing of each component of the process:

1. Determine what the code should be
2. Determine how the information can be transmitted.
3. Utilize the Engineering Design Process to elaborate the following points:
   - State the problem
   - Generate ideas
   - Select a solution
   - Build the device
   - Test and evaluate the device
   - Present/share your device
4. Reflection

For resources that include the lesson plans with instructor notes and student secret agent packets contact:
Katheryn Kennedy
Stevens Institute of Technology, CIESE, Castle Point on Hudson, Hoboken, New Jersey 07030  Katheryn.Kennedy@stevens.edu