Wing Structures

LEARNING AREA: Inquiry & Research
EDUCATIONAL LEVEL: High School
CONTENT STANDARD: New Product Development

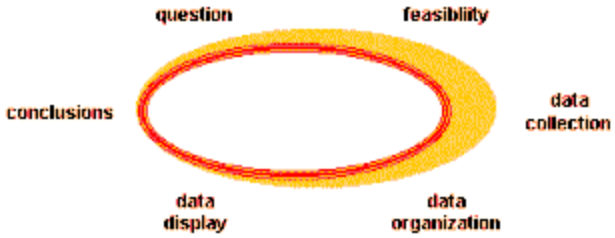
A student shall research, develop, and test a new product to demonstrate an understanding of needs analysis; specific material or technologies; material processing of design techniques, or both, by;

1. Researching the need and the market;
2. Designing a new or improved product that meets criteria;
3. Creating the new or improved product;
4. Testing and evaluating the product; and
5. Assessing the impact of production, use and eventual disposal of the product on the environment, society, and health, as applicable.

STANDARD:

1. Designing a new or improved product that meets criteria
2. Testing and evaluating the product; and
3. Assessing the impact of production, use, and eventual disposal of the product on the environment, society, and health, as applicable.

LARGE PROCESSES/CONCEPTS:



NEXT STEP: **Assessment Task**

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Wing Structures

Assessment Task------

Description:

Wing structure, will be examined via several testing stations. Insects will give students a personal connection to their environment. Vocational topics of interest will be examined.

Products/Evidence of Learning:

Student will:

1. Research information about flight, specifically wing vortices, using insects.
2. Utilize several pre-assembled testing stations to gain data.
3. Analyze wing data, make conclusions, create a blueprint for assembly.
4. Construct man made models based on this data, utilizing the top research results, include an environmental study.
5. Present all findings and models in a local competition. Include discussion of potential careers, and scholarships.

OVERVIEW:

Objective: Discover winged flights, research it on a small scale, build a comparable structure and advertise results.
Problem: To discover the vortices and basic structural designs that make winged flight possible, a historical aspect, and the personal importance of that information.
Solution: Use insects and testing stations, along with analytical skills to analyze, improve and create personal wing designs based on the analysis, compare some design history, and final testing competition.

PROCEDURE: (Note to instructor)

1. View the TLC, (The Learning Channel) VCR tape about flight, the movie will be self-explanatory and tutorial in nature. Focus for students should be the realization of contemporary research, the analyses of natural structure and subsequent implementation into student's creative engineering.
2. Use a small winged insect such as a moth mounted on a stick with mild glue for study.
3. Give students the questionnaire, which will serve to narrow the students focus.
4. Testing stations should consist of the following cubical area; magnifying lens, pocket lasers, protractor, 1/32" rule, and tube small amounts of smoke and wind available (such as a stick match and a puff of human air to move the current past the insect).

NEXT STEP: Assessment Task cont.

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Wing Structures

Assessment Task continued----

WORKSHEETS FOR STUDENTS:

1. What is the length of the wing?
2. What is the height of the wing?
3. What is the thickness of the wing?
4. Draw the architectural pattern of the wing.
5. Indicate with arrows the angle of movement by the wing.
6. What is the contact area for the majority of wind on the wing?
7. Draw three possible wing patterns, with similarities to your original design.

RESOURCES:

Available flight software is inexpensive and a good resource, for sparking students interest. CAD drafting software is also a good way of documenting student blueprints. Many historical reference tapes and books are available on the origins of flight. The Learning Channel and Discovery.com provide a nice segment on flight based on the study of flies. It is also helpful if students have a previously created classroom project to view for a good visual possible outcome.

Check list---

FOR STUDENT:

1. Student will show evidence of initial research by completing a worksheet, after viewing TLC video covering the topic.
2. Each student will work with a different insect model setup, to ultimately discover a new or improved design.
3. Student will record data, which answers specific questions that they have initialized on the worksheet.
4. Student will compare findings with the rest of the group, the most improved wing structures will be re-created with man made materials.
5. A cross-referencing of data will be examined for equivalencies in performance, both between the initial insect, and the man made structure, this data will be recorded. Justification for production, and environmental impact will be included.
6. Students will compete in local community competition, with their best wing structure, and research presentation.

FOR TEACHER:

1. Teacher will provide the TLC video covering the topic of flight.
2. Teacher will provide a two-part worksheet, the back will contain the procedure.
3. Teacher will then present a box of mixed insects for students to work with.
4. Teacher will provide testing stations for the students to collect data.
5. Teacher will provide a forum for discussion of findings, and groups will be formed.
6. Man made materiel kits will be given to each group, and data recorded.
7. Information on local competition, scholarships, careers, and clubs will be offered.

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