

NDT Externship – Application in the Home School Acknowledgement*

1. Educator Name: **Timothy R. Re, Ed.D., NBCT**
2. School District and School: **Elizabethtown Area SD/Elizabethtown Area MS**
3. Date(s) of NDT Unit: **Fall/Winter 2023/2024**
4. Length of lesson or unit: **1-2 days each**
5. Number of students: **300** (100 by myself and 200 more through shared lesson with other two Physical Science teachers (**7th grade**)) and **40 (grades 10-12)**
6. Grade level of students: **7th** and presentation to 40 HS students (grades 10 – 12)

Description of Activity: **3 Activities: (1) Mousetrap Powered Vehicles; (2) Physical Properties of Matter unit; and (3) HS Materials Science Presentation**

(1) MOUSETRAP POWERED CARS:

- a. **NDT portion of this S.T.E.M. project focused simply on FLUORESCENT TESTING of wheel integrity. Students use CDs for at least two of their wheels. Many of the CDs were cracking easily (used CDs). I decided to do a short lesson on NDT: Fluorescent Testing and use highlighters to cover the CD wheels, wipe them off, then use a blacklight to locate the small cracks using a magnifying glass.**

(2) PHYSICAL PROPERTIES OF MATTER:

a. NDT Portion of Unit:

i. Introduction to NDT:

1. **Ask students if they have ever heard of NDT and what it might mean.**
2. **Ask students what they think the advantage to NDT would be?**
3. **Explain what NDT is and share examples/video clips on NDT in use.**

ii. Share a variety of materials (wood, plastics (several types), metals) and instruments (magnet, magnifying lens, conductivity meters, spring scales, rulers, Mohr's Hardness testing tools), etc.

1. **Students rotate through stations to test the varied materials with the equipment provided at each station.**
2. **Students were asked to predict which piece of NDT equipment would be most helpful for the given material provided.**

iii. Slide Presentation of NDT Externship 2023 from Pennsylvania College of Technology

iv. Assignment:

1. **Students are to create one slide for ONE of the NDT processes that most interested them. Slide is to include a description of**

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what the test is; how it is used; what industries might use the test; and 2-4 images.

- a. Slide uploaded via Schoology and shared next day
- b. Exit Ticket: Ask students what they learned and discuss potential career paths in the NDT field.

(3) PRESENTATION TO HS MATERIALS SCIENCE STUDENTS CLASS (190^h to 12th grade elective course)

- a. Slide presentation from NDT Externship 2023
- b. Emphasis placed on applications and career pathways
- c. Highlight opportunities at Pennsylvania College of Technology

What elements from your NDT Externship were used in the preparation or delivery of the unit? (i.e. PPTs provided, information gathered from discussions or activities, etc.)

Mousetrap Powered Cars	Physical Properties of Matter	HS Materials Science Presentation
Limited slide show created from images and information gained at Summer 2023 NDT Externship	Slides and content created based on Summer 2023 NDT Externship. Focus on Welding, testing of welds, ultrasonic testing (sound unit), and alloys (microscopic assay of metal alloys and tensile/compression testing). Presentation also includes information gained through tour of Lycoming Engines Aviation Factory Tour	Presentation of complete slide show to HS Materials Science students. Presentation also includes overview of Pennsylvania College of Technology programs

How were students engaged with the unit? What hands-on activities occurred?

Mousetrap Powered Cars	Physical Properties of Matter	HS Materials Science Presentation
<p>Each year, all 7th grade Physical Science students are assigned a large S.T.E.M. project using a single mousetrap to create a car capable of completing a set challenge. This project covers the topics of Newton's Laws of Motion, Energy, Simple Machines and Mechanical Advantage.</p> <p>Since most students use CDs for wheels, and many of the CDs were starting to break due to small fractures in the CD, I decided to introduce students to a modified version of NDT to check for wheel cracks prior to selecting the best CDs. The technique that seemed to most easily apply was a modified version of fluorescent testing using simple highlighters and a filtered light source to help show off the highlighter ink.</p>	<p>Lesson described above.</p> <p>In addition to digital assignments, students were physically tasked with using basic scientific tools to test different properties of a variety of materials and then decide which NDT techniques would be most suitable for further testing. This is a middle school science course, so lesson is geared for that age group (13-14 years old)</p>	<p>Group Discussion and Presentation.</p>

Explain connections that were created/discussed between NDT careers and higher education. **The Physical Science lesson included an assignment/discussion on careers and high education required to these types of careers.**

Presentation to HS Materials Science Elective students (grades 10-12) included information highlighting programming at Pennsylvania College of Technology. Information was also shared with school counselors.

How did students respond to the unit?

The response from students was overwhelmingly positive, although some students were disinterested (to be expected for any career lesson) and I personally spoke with some students that might not see a traditional college pathway in their futures.

Were parents involved or aware of the unit? What was their response to the activities?

Parents were made aware of the lessons, but not directly involved.

A goal of this program is to make NDT education and information available to high school students. As such, Penn College is attempting to build a repository of activities that can be used across the K-12 environment. In the subsequent pages, please provide additional information on the lesson/units you implemented so that others can implement similar activities in their classrooms. Please be sure to include any material lists, photos/evidence of student work (not of student participants), and any other relevant information required to implement in another school.

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