Understanding by Design

6-Page Template, Page 1

Unit Title: _Nanotechnology_________________ Grade Levels: _____10-12_____
Topic/Subject Areas: __Application of Biotechnology__
Key Words: _______________________________________________________
Designed By: ____Twila Durden  Time Frame: ____8 days
School District: _______Candler____ School: _____Metter High School

Brief Summary of Unit (including curricular context and unit goals):
Will be in power point.

Big Idea – Tools and Instrumentation
The development of new tools and instruments helps drive scientific progress. Recent
development of specialized tools has led to new levels of understanding of matter by
helping scientists detect, manipulate, isolate, measure, fabricate, and investigate
nanoscale matter with unprecedented precision and accuracy.

Unit design status:   
☐ Completed template pages – stages 1, 2, 3
☐ Completed blueprint for each performance task   ☐ Completed rubrics
☐ Directions to students and teacher   ☐ Materials and resources listed
☐ Suggested accommodations   ☐ Suggested extensions
Status: ☐ Initial draft (date: ____________)   ☐ Revised draft (date: ____________)
☐ Peer Reviewed ☐ Content Reviewed   ☐ Field Tested ☐ Validated ☐ Anchored
Established Goals:

HS-AB-3 Demonstrate how advanced techniques in biotechnology contribute to our quality of life.

HS-AB-6 Assess current trends, ethical, legal, and regulatory issues related to the development of biotechnology products.

What understandings are desired?

Students will understand how nanotechnology products have infiltrated just about every aspect of our lives, such as medicine, agriculture, transportation, communication, and energy sources.

What essential questions will be considered?

What solutions could nanotechnology provide for society’s problems?

What key knowledge and skills will students acquire as a result of this unit?

Students will be able to...

1. Relate the scale of nano as compared to other metric units.
2. State pros and cons of the use of nanotechnology.
3. Apply knowledge of nanotechnology to create a new product.
4. Evaluate new product for advantages, disadvantages and impact on society.
Stage 2 – Determine acceptable Evidence

What evidence will show that students understand?

*Performance Tasks* (Summary in GRASPS form):

**Goal** - Create, design and evaluate new nanotechnology based product.
**Role** - Member of Research and Development team at Dow.
**Audience** - CEO of Dow
**Situation** - Possible loss of job if you don't win the contest.
**Product** - You will create a new nanotechnology based product or suffer possible loss of job.
**Standards** - Follow the rubric attached.

*Complete a Performance Tasks Blueprint for each task (next page)*

Other Evidence (quizzes, tests, prompts, observations, dialogues, work samples)

1. Answers to pros and cons of nanotechnology article.
2. Building Small research

Student Self-Assessment and Reflection:

Part of the new product project will require students to self-evaluate their own product.
Performance Task Blueprint

What understandings and goals will be assessed through this task?

Student understanding of impact of nanotechnology products on different areas of society.

What criteria are implied in the standards and understandings regardless of the task specifics?

What qualities must student work demonstrate to signify that standards were met?

1. Demonstrate contribution of biotechnology/nanotechnology to quality of life.
2. Assess legal, ethical, regulatory issues pertaining to biotechnology and nanotechnology products.

1. 3 minute oral presentation with good eye contact.
2. Power point free of grammatical errors that includes: sketch of product, purpose of invention, area of research, advantages/disadvantages of product, impact on society and which consumers would buy.

Through what authentic performance task will students demonstrate understanding?

To: Members of Research and Development Department

From: CEO of Dow

Due to the economic downturn, we are sorry to say that we will be trimming our staff. To offset recent economic losses, we really need an influx of ideas for new nanotechnology products. We want to encourage creativity so we have designed a contest. Your department members will be divided into groups of 3 or 4. Each group will create, design and evaluate a new nanotechnology based product for the company. Each group will present their idea in powerpoint format. As an incentive, the group that wins the contest will be assured that their jobs will be safe from the economic cuts. Good Luck!

What student products and performances will provide evidence of desired understanding?

1. Power point with presentation.
2. Building small activity
3. Pros and cons article activity

By what criteria will student products and performances be evaluated?

1. Building small activity and pros and cons activity will be graded on completeness.
2. Power point has a rubric to grade it.

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Points Possible</th>
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<tbody>
<tr>
<td>Presentation</td>
<td>3 minute minimum</td>
<td>30</td>
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<td></td>
<td>Good loud voice</td>
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<td>Good eye contact</td>
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<tr>
<td>Slides of Powerpoint</td>
<td>5 slide minimum must have the following information:</td>
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<tr>
<td></td>
<td>Title</td>
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<td>Sketch of invention</td>
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<td>Purpose of invention</td>
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<td>Area of research this invention belongs to</td>
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<td>Why is this considered to be a nanotechnology product?</td>
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<td>Advantages/disadvantages of this invention</td>
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<td>How does this invention impact society?</td>
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<td>Who would buy this product?</td>
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<tr>
<td>Grammar</td>
<td>Slides must have correct spelling and grammar</td>
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1. Building small activity and pros and cons activity will be graded on completeness.
2. Power point has a rubric to grade it.
<table>
<thead>
<tr>
<th>Stage 3 – Plan Learning Experiences and Instruction</th>
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<td>Consider the WHERETO elements</td>
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Stage 3 – Plan Learning Experiences and Instruction