



## *A Journey Through Nanotechnology Using Graphic Design*

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This curriculum unit is recommended for:  
Multimedia and Webpage Design students; grades 9-12

**Keywords:** (nanotechnology, multimedia, graphic design, information graphics, infographics, magazine cover, multimedia and webpage design, adobe, Microsoft publisher, desktop publishing)

**Teaching Standards:** See [Appendix 1](#) for teaching standards addressed in this unit.

**Synopsis:** In this curriculum unit, students will learn about nanotechnology and demonstrate what they have learned through graphic design. They will learn about the transformation of small material into everyday nanotechnology products. In addition to learning about nanotechnology this curriculum is also designed for students to master advanced skills in the areas of adobe software, desktop publishing, and graphic image design. Through teacher guide and research, students will learn how nanotechnology plays a major part in our everyday lives. Initially, students will be given a lesson about nanotechnology which will lead students into researching a product of nanotechnology that they have an interest in learning more about. Students will work collectively to research and discuss products of interest as well as creative ideas on how to document and demonstrate their research. The curriculum is designed to teach students how to create information graphics (infographics) and a digital magazine cover based upon their nanotechnology product research within the classroom.

*I plan to teach this unit during the coming year to my grades 9-12 students who are in my Multimedia and Webpage Design class.*

*I give permission for Charlotte Teachers Institute to publish my curriculum unit in print and online. I understand that I will be credited as the author of my work.*

## **Introduction**

This unit will be designed for ninth through twelfth grade high school students who plan to take the Multimedia and Webpage Design class.

### Unit Goal Objectives

Unit goal will be based upon North Carolina state objectives as presented by the essential standards for multimedia and webpage design. The specific objectives that will be covered within this unit will teach students the essential standard. The unit will assist students: 1.01 Understanding typography, multiuse design principles and elements, 1.02 Understanding digital communication products by demonstrating how nanoscale particles transform into a recognizable product. This unit will best be demonstrated by teaching project based learning.

Lesson plan competencies and objectives will provide students with a breakdown of how the unit will be covered. In lesson 1-1 will consist of the following: Students will be expected to take notes as lessons are provided. Students will also be presented with a video and other resources that provides them with a visual demonstration of nanotechnology.

The curriculum will assist me with reinforcing common core elements that are taught in Multimedia and Webpage Design class. These common core elements will be based upon essential standards designed by the state of North Carolina.

This curriculum will define and demonstrate nanotechnology through graphic image design. It will focus on how nanotechnology affects our everyday usage of technology. The students will study nanotechnology and create visuals that will help master advanced skills in the areas of adobe software, desktop publishing, graphic image design, and multimedia production. Practical skills and critical thinking will be reinforced through adobe software application.

Students will demonstrate what they have learned through two final projects, which includes creating an information graphic (infographic) and a magazine cover.

### Rational

This unit was created to introduce nanoscience and nanotechnology to students while teaching them the North Carolina curriculum standards as it relates to multimedia and webpage design.

This curriculum will help students recognize through demonstration how very small particles that are invisible to the naked eye plays a direct role in many different materials and products that we see and utilize each day. This unit will allow students to learn about nanotechnology while demonstrating what they learn through graphic images. Students are always eager to learn about graphic design and how to create various designs while learning the software.

This curriculum unit was created as an assignment associated with teaching various North Carolina standards that directly tie into the multimedia and webpage design curriculum and its standards as designed by the state of North Carolina. The specific elements that the curriculum will cover will help students learn more about typography which teaches students about font usage as well as teach students about graphic design software. Students will utilize nanotechnology as their project of learning the various state required standards.

The curriculum has been divided into three modules to assist students with the development of their final project. The first module is a guide for students to conduct research on a product of choice. Module one is designed for the student to gain knowledge based on teacher guidance. Module two is geared towards student application of what was learned in module one and students will demonstrate their researched product by creating an information graphic. Module three is a final project that students will utilize modules one and two to create a visual application of what they have learned from the curriculum. This curriculum has been designed to teach students about nanotechnology through informative, fun and creative activities.

## **Demographics**

I teach at David W. Butler High School; which is a part of the Charlotte–Mecklenburg School System. In 2011-12 David W. Butler was recognized as a School of Distinction with High Growth. In 2014, “David W. Butler High School was recognized by *US News and World Report* as the #1 high school in CMS and the 5th highest rating in North Carolina”. The school is located in Mathews, North Carolina and has been operating since 1997. According to statistical data located on the Charlotte Mecklenburg School’s website, the current student enrollment is 2169 and the ethnic breakdown is as follows: 21.2%, African-American 31.4%, American Indian 0.5%, Asian 4.9%. Two or more races 3.8% and White 38.4%.

## **Content Research**

What is Nanotechnology?

In order to understand nanotechnology, we must first understand the word Nano; which comes from the greek word dwarf. Nano is extremely small and is used widely by scientist to measure for something that requires a special microscope in order to see them.

The size of a Nano is smaller than a cell in your body. It's smaller than the head of a pin or a thin piece of hair on your head. Nano is so small, it cannot be seen by the naked eye. Imagine 10 million points between 0 and 1 centimeter. A nanometer is the space in between two of those points. Nanotechnology is when scientist take nanometer size particles like atoms, and mix them with other particles; which in turn, creates and enhances nanotechnology products. Image atoms, molecules all at a nanoscale size and you mix them all together and they create new material and enhance products at a nanoscale size that make brand new items like new medicine, faster computer chips, brighter colors for television, etc.

In summary, nanotechnology deals with the creation of materials devices and systems using the particles of nano-size ceramics or metals that are smaller than 100 nanometers; which becomes very strong materials. These nano-scale materials react different from properties of individual atoms and molecules. The properties react on various scales physical, chemical and biological. Nano particles affect various different particles as well as the structure of materials; which changes in size.

One of the most interesting explanations that I read was a book entitled "Engines of Creation by K. Erick Drexler. He explains the process of nanotechnology creating structures by physically manipulating individual atoms and by doing so, scientist can create the construction of larger objects and create new material.

### **History of Nanotechnology**

The history of nanotechnology started with the concept that was proposed by the Nobel Prize Laureate in chemistry winner, Richard Zsigmondy in 1925. He came up with the term nanometer to define the characteristic of a particle size. He was the first person to measure small particles using a microscope. In 1965, another Nobel Prize Laureate in physics winner was a scientist by the name of Richard Feynman. He introduced the concept of changing matter at the atomic level and his concept proved to be correct. Scientist Norio Taniguchi was the first scientist to come up with the name nanotechnology and defined its process on the order of nanometer.

### **The Effects of Nanotechnology**

Nanotechnology affects different industry sectors which includes but is not limited to; technology, healthcare, medicine, environment, electronics, energy, fuel and transportation. Nanotechnology within these sectors is not only rapidly growing but also revolutionizing.

The list below has only a few examples of ways that nanotechnology affects different sectors. The list is as follows:

### Technology

- The ability to store larger amounts of information and to create faster, smaller and more portable systems.
- Increase energy efficiency among technology.
- The ability to expand memory, create effectively, save more data in the event of system malfunction or accidents.
- Utilizing OLED and quantum dots in television and other technology for brighter images and wider viewing angles
- Improved displays for TV's, computers, cell phones and digital cameras
- Creating lighter and better picture density
- Expanding the lifetime of technology

### Healthcare/ Medical

- The ability to create fluorescent labels to help improve biological markers and molecules for research and diagnosis of diseases
- Drug delivery systems
- Gene therapy
- Destruction of tumors
- Quantum dots are being used to enhance images for medical diagnostics.
- Nanotechnology has been used in the early diagnosis of atherosclerosis, or the buildup of plaque in arteries.
- Genetic and tissue engineering
- DNA structuring probing
- Imaging technology to help measure complicated plaque issues
- The development of new drugs

### Electronics

- The improvement of flash memory chips
- Improvement of hearing aids
- Cell phone cases and water proof coating
- Life like video games
- Flexible displays for e-books

#### Environment:

- Generating steam into energy
- Producing high efficient light bulbs
- Increasing windmill efficiency
- Electricity generated by waste
- Nanotechnology in batteries (creation of paper batteries)

#### Energy/Fuel

- Reduction of energy consumption
- Converting sunlight into electricity
- Cheaper nanostructured solar cells
- Lightweight flexible solar cells
- Possible paintable solar cells
- Improving fuel efficiency
- Utilization of wood chips and corn stalks to convert into fuel

#### Transportation

- Lighter, smaller vehicles
- Efficient and greener vehicles, aircrafts and ships
- Transportation infrastructure improvement
- Transportation cost reduction
- Monitoring transportation conditions
- Improved sensors and devices in transportation
- The ability to generate and transmit energy
- Improve travel routines such as lane positions, avoiding collisions and congestion
- Luggage location chip devices

#### **Future of Nanotechnology**

The future of nanotechnology is endless. A few of current developments include: The ability to monitor health by wearing outfits, creating self-healing structures, faster technology, paper batteries and the list goes on and on. The challenge that scientist face is creating reliable nanoscale devices that will continually improve the effectiveness of performance. The goal is to master technology with the mindset of quality improvement for areas of modern life.

#### **Instructional Implementation**

## Program Overview

This unit will be designed for ninth through twelfth grade high school students who plan to take the Multimedia and Webpage Design class. The development of A Journey Through Nanotechnology using Graphic Design curriculum will assist with reinforcing common core elements that are taught in my Multimedia and Webpage Design class. These common core elements will be based upon essential standards designed by the state of North Carolina.

This curriculum will define and demonstrate nanotechnology through graphic image design. It will focus on how nanotechnology affects our everyday usage of technology. The students will study nanotechnology and create visuals that will help them master advanced skills in the areas of adobe software, desktop publishing, graphic image design and multimedia production. Practical skills and critical thinking will be reinforced throughout the lesson.

The program is organized into three module topics:

- Module 1: Size Matters - Understanding Nanotechnology
- Module 2: The Nanotechnology Process through Information Graphic Design
- Module 3: Demonstration of Nanotechnology Products through a Magazine Cover

## How to use the Curriculum

The content within this curriculum is designed to be used in an interactive classroom setting. The format of the program materials gives you flexibility within your classroom to meet the needs of your students. Each module targets a learning competency with strategically planned activities that are lined up with essential standards related to multimedia and webpage design classes. The learning process guides students through guided practice and application activities so that they are empowered to transfer what they learn.

### Materials Needed:

- 1) Teachers and students will need access to computers that have design software (Adobe Photoshop, Microsoft Publisher or other software of similarity)
- 2) Preview the teaching strategies, activities, vocabulary and assessments
- 3) Outline a plan for the lessons you will facilitate in the time frame available 4) Share the lesson plan with students to guide learning experience

## Program Goals and Learning Outcomes

As a result of taking this class, students will learn about nanotechnology and how it relates to the development and improvement of products. In addition, students will learn how to demonstrate what they have learned through visual design elements using graphic design software. The overall learning objects are as follows:

- Develop a basic understanding of nanotechnology
- Apply foundational knowledge through graphic image demonstration by creating a nanotechnology information graphic and magazine cover
- Demonstrate learning objective graphic layout design by creating a magazine cover

### **Module 1: Size Matters; Understanding Nanotechnology**

Objectives: Students will learn about nanotechnology, its discovery, various associated products and how it is a part of everyday life.

Teaching Strategies:

Teacher will inform students that module one will lead up to two design projects which consist of creating an information graphic (infographic) and magazine cover. Teacher will provide students with nanotechnology associated vocabulary words, provide them with a PowerPoint lesson that gives students an overview of nanotechnology, show videos that demonstrates nanotechnology and provide them with a list of products that have been developed and or enhanced by utilizing nanotechnology. [See appendix 2](#) for lessons associated with teaching strategies.

Additional strategies include helping students understand different properties as it relates to different products. Below are a few examples of products affected by nanotechnology.

Industry Areas	Example Products
Technology	Cell phones, Television, Computers, etc.
Healthcare/Medical	Medicine, images, robots, etc.
Environment	Batteries, solar cells, etc.
Transportation	Cars, airplanes, trains, etc.



Activities:

This activity has two parts and the worksheet can be found in the appendix. Part 1 Instructions: Through guided instruction and lessons, students will research the internet for a nanotechnology product in which has been developed or enhanced. Once the students have researched the product, they will complete a typed one-three paragraph report about what they have learned. [See appendix 4](#) for the activity sheet. The report must include the following information:

- 1) A summary of nanotechnology in their own words
- 2) A product of interest in which nanotechnology has developed or enhanced,
- 3) Four important facts about their product of choice
- 4) Future outlook about their product
- 5) Any additional information that may be interesting (statistical data, who discovered it, advantages and disadvantages, etc.)
- 6) Students must include source (s) in which they located their information

Part 2 Instructions: Utilizing your research paper, complete a storyboard by pulling out four interesting facts about your findings and four pictures to demonstrate your facts. ([See appendix 4](#) for storyboard activity worksheet)

Assessments: Review completed research projects

Vocabulary: nanotechnology, nanoscience, atom, nanoscience, nanoparticles, nanotube, nanometer, quantum dots

## **Module 2: The Nanotechnology Process through Information Graphic Design**

Prerequisite: Module one must be completed

The objectives and essential questions for module two are directly from the North Carolina Essential Standards from course BD10 Multimedia and Webpage Design. However, the activity is directly related to the research discovered from nanotechnology in module one. The goal of this module is to incorporate the required North Carolina essential standards

1.0 and 1.01, 2.0 and 2.01 with the information that students have learned from their nanotechnology research.

**Objectives:** Students will select the one product that they researched in module one and visually demonstrate what they learned by creating an information graphic (infographic) design. The North Carolina common core elements that students will learn in this module are the demonstration of typography and multiuse design principles and elements. The goal of this objective is for students to create a visual design presentation that makes their nanotechnology product clear and easy to explain at a glance.

**Essential Questions:**

How does typography affect multimedia design?

How do you use desktop publishing software and graphic design features to develop digital communication products?

**Teaching Strategies:** Brief review of modules one and two; explanation and instructions of how to create information graphics using Microsoft Publisher, Adobe Photoshop, or any related graphic design software.

**Activities:**

Design an Information Graphic (Infographic) explaining the information that was learned in module one. [See appendix 5](#) for an example.

**Definition of Information Graphic (Infographic) -** A visual presentation of information in the form of a chart, graph or image. Information graphic is designed to make complex information clear and easy to understand, at a glance.

**Instructions:**

**Step 1:** Select the nanotechnology product that was researched from module one.

**Step 2:** Google other example information graphics on the internet to get a visual idea of what other information graphics look like. See example in appendix.

**Step 3:** Prior to stating the information graphic, students must sketch their information graphic on paper. Information graphic format ideas may include: graphs, diagrams, flow charts, timelines, maps, graphics and size comparisons. This is the time for students to

determine the information as well as the type of photo images, graphics or charts they would like to demonstrate their information.

Step 4: Students can download free images at [www.iconarchive.com](http://www.iconarchive.com). Students must be careful not to download images that have been copy written.

Step 5: Utilizing Microsoft Publisher or Adobe Photoshop, students will create their information graphic (infographic).

Step 6: Save the file name as: Nanoinfograph and the file format as: jpeg

Resource: [See appendix 3](#)

Assessments: Completed Information Graphic (Infographic)

Vocabulary: Information Graphic (Infographic), Typeface, Serif, Sans Serif, Ornamental, Script, Font, Space, Shapes, Form, Mass, Texture.

### **Module 3: Demonstration of Nanotechnology Products through Magazine Cover Design**

Prerequisite: Module two must be completed.

The objectives and essential questions for module three are directly from the North Carolina Essential Standards from course BD10 Multimedia and Webpage Design. However, the activity is directly related to the research discovered from modules two and three. The goal of this module is to incorporate the required North Carolina essential standards.2.0 and 2.01 with the information that students have learned from their nanotechnology research.

Objectives: Students will create a professional magazine cover using the nanotechnology product that they selected to research. They will apply layers, text and demonstrate their understanding of digital image and raster graphic design.

Essential Questions:

What are the appropriate units of measurement, color mode, and resolution for raster graphics?

How can you utilize raster graphics to demonstrate illustrations?

How do you manipulate layers when creating using raster graphics?

Teaching Strategies: Brief review of modules one and two, explanation and instructions of how to create a magazine cover utilizing Adobe Photoshop, technology based instructions.

Activities:

Design magazine cover utilizing the nanotechnology product that was researched in module one and two. This product must be demonstrated on the cover of the magazine. In addition, students must utilize typography (name plate, headlines, inside of the cover) on the magazine cover. [See appendix 6](#) for an example that I created.

Step 1: Select the nanotechnology product that was researched from module one.

Step 2: Google other example magazine covers on the internet to get visual ideas. In addition.

Step 3: Students must create a name for their magazine that is associated with their research.

Step 4: Prior to stating the magazine cover, students must sketch their information on paper. The magazine cover format ideas must include the photo of their nanotechnology research, as well as text. This is the time for students to determine the layout of their magazine.

Technical Instructions for Adobe Photoshop:

Step 1: Open Adobe Photoshop and go to file, new

Step 2: Name the design: Nanomagcover

Step 3: Change the file dynamics to the following: 8.5” wide x 11” height (inches), Resolution 72, Color mode RGB, Background Contents should be transparent

Step 4: Upload a clear picture that demonstrates your nanotechnology research product. This photo will be the main focus of the magazine

Step 5: Using the type tool, colors that correlate with the theme, various fonts as well as layer styles to enhance the design

Step 6: Include a copy of an ISB code from the internet to create a realistic looking magazine cover.

Step 7: Save the file as jpeg

Assessments: Completed magazine cover

Vocabulary: Advertisement, Magazine, Graphics, Bleed, Caption, Nameplate, Main Heading, Subheadings

## **Appendix**

Appendix 1 Implementing Teaching Standards

Appendix 2 Teacher Resources

Appendix 3 Student Resources

Appendix 4 Module 1 Nanotechnology Product Research Worksheet

Appendix 5 Module 2 Example of Information Graphics (Infograph)

Appendix 6 Module 3 Example of Magazine Cover

## Appendix 1: Implementing Teaching Standards

North Carolina Multimedia and Webpage Design Essential Standards: Based upon teacher experience with the multimedia and webpage design curriculum, some of the essential standards may be a review while others may be first introduction. The students will learn about nanotechnology while being taught the following standards as provided by the state of North Carolina:

1.01 Understand Design and 1.01 Understand typography, multiuse design principles and elements.

Students will learn about typography and various design elements first by utilizing the letters within the subject and visual products associated with nanotechnology. This curriculum covers nanotechnology as a final visual product and it's a great way for students to learn about element design through visualization. This standard will teach students visual definition terms as well as provide a demonstration of typographic and design elements in different ways. The essential standards that will be demonstrated are: lines, shapes, texture, patterns, space, shapes (geometric and organic), 3 demission, mass and various color elements, schemes and designs (tones, warm and cool colors, color matching, analogous and monochromatic color scheme as well as specific color definitions).

2.0 Understand Digital Raster Graphics

The final project for this curriculum involves students drawing and creating a magazine cover utilizing the various stages of a nanotechnology product. The essential standards that will be demonstrated under unit 2.0 has three different sections in which each section offers different skill sets that are taught to students. The sections are as follows:

Graphic Format Factors – This section teaches students about two major graphics (raster and vector graphics), factors that affect graphic formats (pixels, aspect ratio, cropping), layers, transparencies, compression (lossless, lossy), layer styles and layer mask, fills and gradients, color depth, common formats, compression, adjustments layers, cloning and blend modes.

Image Editing - This section teaches students about aspect ratio, cropping, layers, selections, transparency, layer styles and mask, fills and gradient, adjustment layers and cloning.

## Appendix 2 – Teacher Resources

Lesson Plan Resources & Websites	Resource- Link
<b>PowerPoint:</b> Nanotechnology By: Sauragh Chawla XII Faith Academy	<a href="http://www.slideshare.net/makadelhi/nanotechnology-11514618">http://www.slideshare.net/makadelhi/nanotechnology-11514618</a>
<b>Video:</b> Nanotechnology devices HD National Geographic Discovery HD Channel HD History Channel 720p	<a href="https://www.youtube.com/watch?v=MkLKjIh2mZM">https://www.youtube.com/watch?v=MkLKjIh2mZM</a>
<b>Website:</b> History of Nanotechnology	<a href="http://sge.wonderville.ca/nanotech/history.html">http://sge.wonderville.ca/nanotech/history.html</a>
<b>Website:</b> National Geographic Encyclopedia Entry Nanotechnology	<a href="http://nationalgeographic.org/encyclopedia/nanotechnology/">http://nationalgeographic.org/encyclopedia/nanotechnology/</a>
<b>Website:</b> List of Nanotechnology Products and other resources	<a href="http://www.nanotechproject.org/cpi/products/">http://www.nanotechproject.org/cpi/products/</a>
<b>Website:</b> National Nanotechnology Initiative	<a href="http://www.nano.gov/nanotech-101/what/definition">http://www.nano.gov/nanotech-101/what/definition</a>
<b>Website:</b> Are Quantum Dots the Next Big Thing in TV Tech?	<a href="http://televisions.reviewed.com/news/are-quantum-dots-the-next-bigthing-in-tv-tech-2">http://televisions.reviewed.com/news/are-quantum-dots-the-next-bigthing-in-tv-tech-2</a>
<b>Website:</b> Sample of Information Graphics	<a href="https://venngage.com/templates/">https://venngage.com/templates/</a>

### Appendix 3: Student Resources

Resources & Websites	Resource- Link
<b>Website:</b> National Geographic Encyclopedia Entry Nanotechnology	<a href="http://nationalgeographic.org/encyclopedia/nanotechnology/">http://nationalgeographic.org/encyclopedia/nanotechnology/</a>
<b>Website:</b> List of Nanotechnology Products and other resources	<a href="http://www.nanotechproject.org/cpi/products/">http://www.nanotechproject.org/cpi/products/</a>
<b>Website:</b> National Nanotechnology Initiative	<a href="http://www.nano.gov/nanotech-101/what/definition">http://www.nano.gov/nanotech-101/what/definition</a>
<b>Website:</b> Are Quantum Dots the Next Big Thing in TV Tech?	<a href="http://televisions.reviewed.com/news/are-quantum-dots-the-next-bigthing-in-tv-tech-2">http://televisions.reviewed.com/news/are-quantum-dots-the-next-bigthing-in-tv-tech-2</a>
<b>Website:</b> Sample of Information Graphics	<a href="https://venngage.com/templates/">https://venngage.com/templates/</a>



**Appendix 4: Activity Handout Module 1 Nanotechnology Product Research  
Worksheet (Page 1 of 2)**

Directions: Research and select a product that has been created and or affected by nanotechnology.

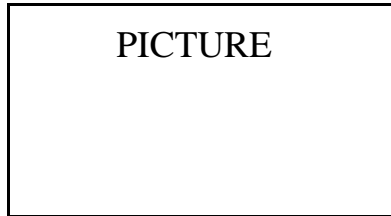
- 1) Begin your research by taking notes and writing three paragraphs about your research.
- 2) Complete the storyboard by pulling out four interesting facts about your findings and four pictures to demonstrate your facts.

# 1) Complete three paragraphs utilizing the below space

**Activity Handout - Module 1 Nanotechnology Product Research Worksheet (Page 2 of 2)**

Directions: Utilizing your research paper, complete the storyboard by pulling out four interesting facts about your findings and four pictures to demonstrate your facts.

#2) Storyboard Nanotechnology Product \_\_\_\_\_

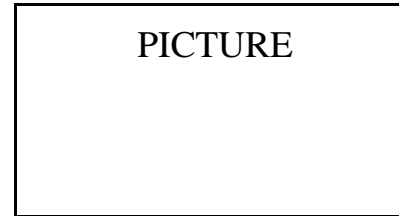


**Interesting Fact:**

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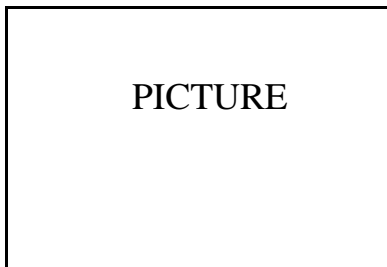


**Interesting Fact:**

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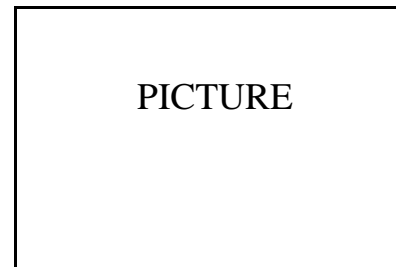


**Interesting Fact:**

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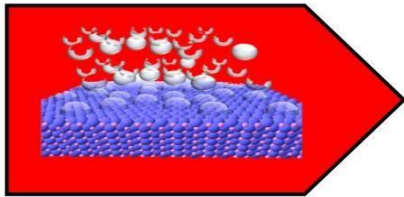
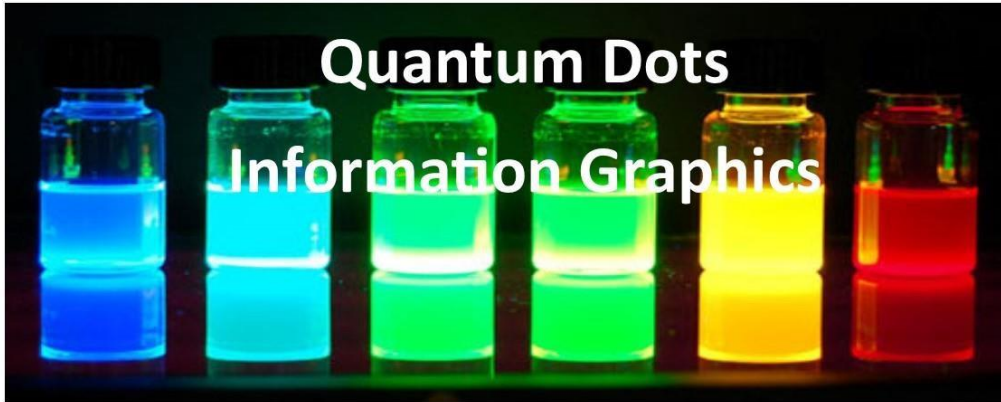
**Interesting Fact:**

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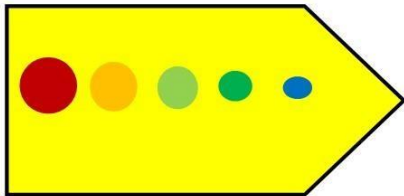
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## Appendix 5 Module 2 Example Information Graphics (Infographics)



A quantum dot is a tiny (nanoscale) particle that glows when stimulated by an external source like ultra light. They are 2 to 10 nanometers in size.



Quantum dots made from the same material gives out different colors of light, depending on its size. The bigger dots make red while the smaller make blue.

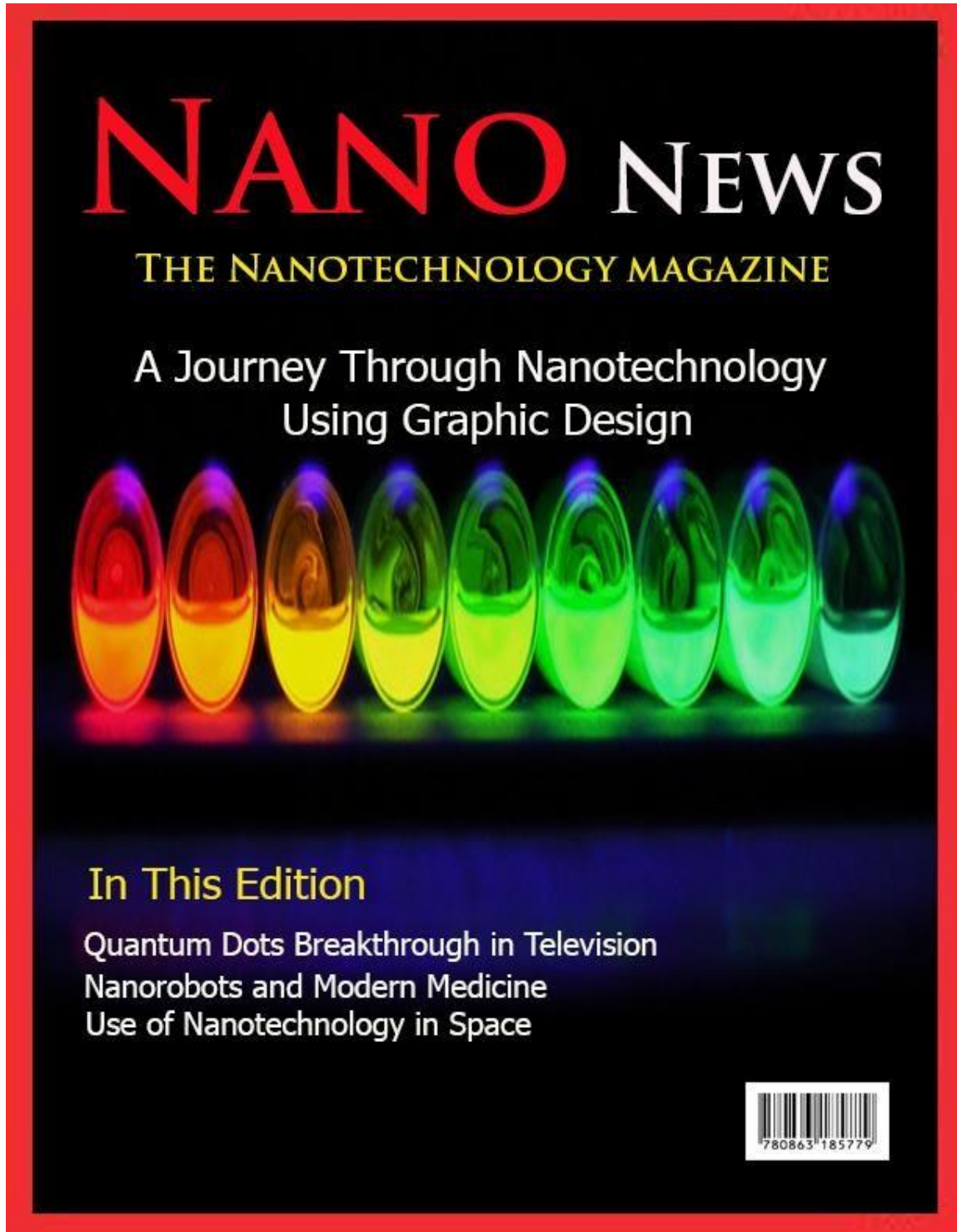


In 1980, quantum dots were discovered in a glass matrix by scientist Alexey Ekimov.



Quantum dots are used in many products because of its ability to produce precise controlled colored light. They are being used as a breakthrough in the enhancement of technology (TV, computers, cell phones, batteries, medical devices and much more).

Appendix 6: Module 3 Example Magazine Cover



## Bibliography

Pozhar, Liudmila A. *Virtual Synthesis of Nanosystems By Design: From First Principles To Applications*, Waltham, MA: Elsevier, 2015.

This is a great book that explains nanosystems from its conception to application. It provides an approach that focuses on experimental data analysis in comparison to theoretical approaches to nanosystem and its discoveries.

Hornyak, G. Louis., H. F. Tibbals, and Joydeep Dutta. *Introduction to Nanotechnology*. Boca Raton, Fla: CRC, 2008.

This book offers a wide variety of different aspects of nanoscience which includes biology, physics and chemistry. This book is helpful in understanding the discoveries of nanotechnology.

Ventra, Massimiliano Di, Stephane Evoy, and James R. Heflin. *Introduction to Nanoscale Science and Technology*. Boston: Kluwer Academic Publishers, 2004.

This book provides an overall view of nanoscale science as well as technology and how it impacts out everyday lives. The book helped with terminology and provided a basic understanding of how small particles transition into modern technology.

Drexler, K. Eric. *Engines of Creation*. Garden City, NY: Anchor Press/Doubleday, 1986.

This book has a unique way of explaining how nanotechnology impacts modern medicine, the environment as well as the economy.

[Http://www.dpi.state.nc.us/docs/cte/programareas/business/programs/blueprint/mwd.pdf](http://www.dpi.state.nc.us/docs/cte/programareas/business/programs/blueprint/mwd.pdf).

This link provides information on how this curriculum directly connects with North Carolina's career technology education standards and objectives.

Society, National Geographic. "Nanotechnology." National Geographic Society. 2013.

Accessed November 12, 2016.

<http://nationalgeographic.org/encyclopedia/nanotechnology/>.

This link provides extensive vocabulary terms and provides excellent video demonstrations related to nanotechnology.

"Nano." Nano. Accessed October 11, 2016. <http://www.nano.gov/>.

This website provides excellent information pertaining to education, news, research and current events surrounding nanotechnology.

David Green Professor of Information Technology, Monash University.

"Nanotechnology to Outer Space: Ten Top Tech Innovations of 2014." The Conversation. 2014. Accessed September 5, 2016.

<http://theconversation.com/nanotechnology-to-outer-space-ten-top-techinnovations-of-2014-35258>.

This website shows how nanotechnology has helped with the advancement in space exploration. In addition, this website presents ten amazing nanotechnology inventions that will help students select their project within this curriculum.

"Quantum Dots and Their Applications." Quantum Dots and Their Applications.

Accessed November 22, 2016. <http://www.understandingnano.com/quantum-dotsapplications.html>.

This website provides information about how quantum dots are created and explains how they react to light illumination.

KANNAN, PRINCIPAL at FAITH ACADEMY Follow. "Nanotechnology." Share and Discover Knowledge on LinkedIn SlideShare. 2012. Accessed November 22, 2016. <http://www.slideshare.net/makadelhi/nanotechnology-11514618>.

This link is a slideshare that provides a basic understanding of nanotechnology. This is a great tool to utilize when teaching the basic understanding of nanotechnology, its history, materials and product development.

10 Tips for Designing Infographics." San Fran Beat. 2010. Accessed November 22, 2016. <https://digitalnewsgathering.wordpress.com/2010/04/24/10-tips-fordesigning-infographics/>.

This link provides information on how to design infographics. This will assist students with the selection and development of their infographic project.