

## **On Fire for Fashion!**

*Ellen Machado*

### **Overview**

“You are what you wear,” is a common expression people use. However, do you ever wonder where the clothes on your body and the shoes on your feet *really* come from? Or give a moment’s thought about how the fabric on the garment you are wearing was actually made? Most consumers simply purchase and wear what they aesthetically like; the average person is not concerned with knowing where that garment or pair of high tech sneakers originated, nor are worried with the potential danger of wearing certain items. However, everywhere today we hear more and more about how the effects of what we eat, how we live, and what appliances we use in our homes are doing to our environment. Our schools and cities are making serious attempts to recycle and many citizens practice the rule of “reduce, reuse and recycle.” However, there are still some glaring offenses when it comes to our consumer buying habits. It is my goal to have my students do three things: (1) truly think about the effects of what they wear/buy on our environment, (2) research some of the new trends in fiber development (including “nanotubes”), and (3) change their thought process about how fashion and science are intertwined when it comes to fiber and textile development.

I have taught Marketing Education on the high school level to students in grades 9 – 12 in a large urban school district in North Carolina for the last 18 years. Our high school population has approximately 2,200 students in four grades (9-12). We are a large urban school in one of the largest school systems in North Carolina. Our student population is fairly diverse: we have 70% African-American students, 20% Caucasian, and 10% “other” ethnic backgrounds (such as Indian and Hispanic). Forty five percent (45%) of our students receive free and reduced lunch. However, our graduation rate for seniors was one of the highest in the district, with almost 92% graduating from our school within four years.

One of the courses that I most often teach is called Fashion Merchandising. In this curriculum, students are taught six basic components of marketing and fashion. They are as follows: economics, business of fashion, merchandise information (including textiles), selling, promotion, and workplace readiness skills. All Marketing Education courses fall

under the realm of Career and Technical Education, which focuses largely on preparing students for a future career in different career clusters. The goal of these courses is to provide these students with a certain level of readiness to continue in a chosen career path. For example, once a student completes a Fashion Merchandising course, they may choose to study Merchandising, Textiles, or Design in a career college or university and then go on to eventually work in such fashion related fields as clothing design, manufacturing, retail sales and management or the textile industry. Some of my students are very serious about pursuing a future career in fashion; however, the majority is simply interested in fashion and wants to become more fashion savvy in their everyday lives. Therefore, the focus of this curriculum unit is to challenge students to complete a series of activities that will incorporate many of the major units, as well as be both a “real-world” learning experience. However, at the same time the activities in this curriculum unit will force students to see how fashion is not purely just about “style,” but it also involves a great deal of science. I intend to show them how the world of fashion merchandising is actually quite blended with the world of science, in particular, the field of chemistry. This will “force” my fashion students to investigate some of the ways in which the field of chemistry plays a vital role in fashion merchandising.

### **Rationale & Unit Plan**

The study of the fashion industry focuses on many different topics, ranging from product design, market segmentation, pricing, visual merchandising, selling, and distribution. Typically, a fashion student would not think that he/she would need to study chemistry. However, it is my intention to incorporate blending some of the science of chemistry into the fashion curriculum with this unit called “On Fire for Fashion!” It is my hope that this unit will bring together the seemingly “opposite” worlds of fashion and science closer together and show fashion students that the two subjects are actually fairly intertwined. One of the major activities for this unit is to conduct a burn lab. I plan to conduct my burn lab with my colleague, who is a chemistry teacher at my school. This will also help the two departments have an opportunity to co-plan and implement instruction among the Career and Technical Departments and Science Departments so that the students have a first-hand opportunity to see the real-life connection between the two content areas. My school district has also made taking and passing Chemistry a graduation requirement for all students, so I anticipate that many students will be taking both Chemistry and Fashion Merchandising at the same time.

This unit will be brought in towards the end of the year after the major units of study that cover such topics as market segmentation, promotion, selling, and economics have been covered. It will serve primarily as a supplement and “wrap up” project during the unit in which the students study textiles in depths. In this unit, students learn the basic characteristics of common textiles, major advantages and disadvantages of common textiles, basic care instructions, and common uses for each of the textiles studied. A *textile* can be defined as a material consisting of natural or artificial fibers often referred to as thread or yarn. Yarn is produced by spinning raw fibers of wool, flax, cotton, or silk to produce long strands. Textiles are formed by weaving, knitting, crocheting, knotting, or pressing fibers together with heat and friction. The words *fabric* and *cloth* are used in textile trades as synonyms for *textile*.<sup>1</sup>

After securing this basic textile information, students will be able to go much more in depth of how the fabric functions by completing a **burn lab** on ten commonly used fabrics. The students will be conducting three basic reactions: **the flame** (did it burn readily? Did it melt, Did it drip,); **the odor** (students will learn the difference between natural cellulose and protein-based fibers); and **the residue** (cellulosic fibers leave a light ash while manufactured fibers melt into beads that drip).

Teachers using this unit will have to have an understanding of the basic fibers being tested. The fabrics that I will be using in this lab include: **cotton, linen, wool, silk, rayon, acetate, acrylic, nylon, polyester, and spandex**. The following website [www.fabrics.net/fabrics-facts](http://www.fabrics.net/fabrics-facts) shows most of the basic textile information that a teacher and student should know to begin this burn lab.<sup>2</sup> It has detailed facts about all four of the natural and most of the manufactured fabrics that a teacher (and student) would need to know before beginning this unit. Another good source of basic textile information is the textbook called *The World of Fashion Merchandising* by Mary Wolfe, 2003. Chapter 6 is completely devoted to the explanation of textiles, characteristics of each major fabric, and also discusses in detail the process of manufacturing fibers.<sup>3</sup> An additional source to locate basic characteristics of textiles is [www.textileschool.com/schools](http://www.textileschool.com/schools)<sup>4</sup> I always give my students the following chart to help them understand the basic fiber characteristics, including the advantages, disadvantages, care instructions, and typical uses.

TEXTILE PROPERTIES					
FIBER	FABRICS	ADVANTAGES	DISADVANTAGES	CARE	USES
Cotton	Broadcloth, gingham, calico, seersucker,	Durable, cool, dyes well, absorbent, ease of laundry and	Shrinks and wrinkles easily (unless treated), color loss by “bleeding” and	First test for “bleeding,” machine wash, line	Blouses, skirts, dresses, pants,

	corduroy, denim, duck, chino, etc.	economical.	sunlight, damaged by mildew.	or machine dry. Iron while damp.	sports-wear, PJ's, aprons, children's clothing
Cotton /Poly Blend	As above. Gabardine, chino, duck, etc.	Fewer wrinkles, resistant to abrasion & tearing. Good crease retention. Laundry ease. Economical.	If high percentage of polyester, oily stains are a problem. Less cool and absorbent than cotton.	Machine or hand wash. Medium cool temperature, line dry, moderate temps. Pre-treat stains. Iron with heat.	As above. Suitable for jackets, suits, pants, jumpsuits, etc.
Linen	Damask, dress weight, slub fabrics, etc.	Cool, strong, absorbent, crisp	Wrinkles, shrinks, damaged by mildew.	Dry clean to retain crispness (suits, jackets, skirts)	Pants, jackets, suits, table linens, etc.
Wool	Worsted, woollens, felt, crepe, tweed, flannel, jersey	Absorbent, warm, durable, wrinkle and abrasion resistant, molds well and keeps creases, good insulator.	Shrinks, attracts moths.	Dry clean, some hand washable. Don't rub or agitate. Press with cool iron and cloth.	Coats, suits, skirts, blazers, dresses, felt crafts and decorations.
Silk	Raw silk, broad cloth, shantung, organza, chiffon	Absorbent, warm, lustrous, strong, drapes well, accepts dyes well.	Weakened by sunlight and perspiration.	Dry clean unless labeled. Hand wash. Press on wrong side.	Blouses, dresses, jackets, draperies.
Rayon	Linen, challis, suiting, matte jersey	Static resistant, absorbent, dyes well, can be bleached.	Wrinkles, shrinks, poor, abrasion resistant, loses strength when wet, holds body heat.	Dry clean or gently wash in machine.	Dresses, pants, suits, jackets, skirts.
Acetate	Taffeta,	Drapes well,	Weaker fibers,	Dry clean or	Lingerie,

	satin, silk like fabrics, tricot	accepts dyes well, silk like luster, dries quickly.	wrinkles, weakened by perspiration, fades, creates “static cling”	gently machine wash, tumble dry in low temps, iron at low temps.	sportswear, swimwear, rain wear, formal wear.
Nylon	Knits-sheers to heavy weights, cire, water proof fabrics, velvet.	Strong, elastic, durable, warm, resilient, abrasion resilient, wrinkle resistant, holds shape well, resists moths and mold.	Pills or snags easily, “static clings”, non-absorbent, holds body temperature.	Machine wash, line or tumble dry, iron at moderate temps.	Blouses, dresses, suits, jackets, sportswear, knits.
Polyester	Single or double knits, faux fur, pile, corduroy, taffeta, sheers, trims, laces.	Strong/durable, resilient, warm, abrasion resistant, wrinkle free, holds shape well, resists moisture and mold.	Stains are hard to remove, pills, creates “static cling,” holds body heat.	Machine wash, tumble dry, needs little to no ironing.	Sportswear, pile, jackets, coats, suits, and skirts.

Students may ask themselves, “What does fabric have to do with chemistry?” Each aspect of successful manufacturing of textiles involves some kind of chemical process. Synthetic fibers are refined from petrochemicals and then drawn into thread through a process called melt spinning. All synthetic textiles start in a molten liquid form. That liquid is then forced through a device called a spinneret, which resembles a shower head with hundreds of tiny holes. The liquid synthetic fabric strings are then cooled and dried, before they can be woven into textiles. (<http://www.angelfire.com/mech/fabric/>)<sup>5</sup> An additional resource can be found included in the show “Trash Inc: The Secret Life of Garbage.” The link is <http://www.cnbc.com/id/15840232?video=1620084176&play=1>. At 32 minutes into the show, there is a segment that features turning plastic bottles into fabric runs. It is approximately 5 minutes long and is a perfect jumping board activity for

the students. Additionally, it shows the students first-hand what a spinneret looks like, and how the process of taking used plastic water bottles, crushing them, and then turning the resulting polyester flakes into recycled fibers that are used in polyester fibers for tee shirts and carpeting really looks like.<sup>6</sup>

The **second activity** that students will be doing in this unit focuses on *nanotechnology*. To help students understand what nanotechnology involves, here is some background information. Visit [www.nisenet.org](http://www.nisenet.org) for more information and other activities involving nanotechnology. *Nano* is the scientific term meaning one-billionth of a meter, which is the width of about three to five atoms. It comes from the Greek word meaning “dwarf.” At the nanoscale, many common materials exhibit unusual properties, such as having faster chemical reactions, increased surface area, and different colors. *Nanotechnology* is the manipulation of material at the nanoscale to take advantage of these properties. *Nanoscience or nano* by itself are terms to refer to those activities applied to the nanoscale.<sup>7</sup> Nanotechnology takes advantage of different material properties at the nanoscale to make new materials and tiny devices smaller than 100 nanometers in size. Nanotechnology allows scientists and engineers to make things like smaller, faster computer chips and new medicines to treat cancer. They also allow scientists to mimic behaviors found in nature in order to obtain a desired outcome.<sup>8</sup>

Nanotechnology has begun changing products that we use in everyday life, mostly through surface treatments. One of the most influential applications in the fashion industry is called Nano-Tex<sup>™</sup> fabric, which is a brand of textiles that have stain-resistant capabilities. Nano-Tex<sup>™</sup> fabrics exhibit hydrophobic, which are water-repellant, properties. Nano-Tex<sup>™</sup> discovered how to use nanotechnology to transform the molecular structures of fibers to create fabrics that offer extraordinary performance and comfort.<sup>9</sup> Visit [www.nanotex.com](http://www.nanotex.com) for more information about this innovative company. In the second major activity of this unit, students will go on-line and research companies like Nano-Tex<sup>™</sup> to discover applications of nanotechnology within the fashion industry and then create their own mock prototype using this new scientific breakthrough technology.

## **Strategies**

The unit will incorporate a variety of strategies to help students gather information on fashion trends happening in the world of sustainability. These will include, but not limited to:

Brain storming (keywords, concepts, etc)

Connecting (to experiences, texts, authors)  
Constructing  
Reading  
Writing  
Outlining  
Listening, Viewing, Evaluating  
Working independently and cooperatively  
Discussion  
Oral Presentation  
Use of technology (creating charts & graphs, word processing, researching databases)  
Scientific method  
Lab investigation  
Researching  
Application

### **Classroom Activities/Lessons**

#### **Activity #1: Burn Lab**

**This is a proposed burn lab that should take 1 ½ 90-minute class periods to complete.**

**Purpose:** To observe various types of fabrics, and note their reactions under heated conditions.

**Hypothesis:** Describe what you think will happen with each type of fiber when placed in a flame.

**Materials:**

- compound light microscope - glass slide/cover slip
- forceps - white paper
- candle/match - unknown fiber sample
- sample fibers: cotton, nylon, wool, acetate, polyester, rayon, silk, blend

**Safety Precautions:** There will be an open flame for this activity. Students should wear protective eye wear. It is best to try to use a Bunsen burner flame (borrowed from the Chemistry lab) to get a hotter flame than from a candle.

**Procedure:**

1. Study the unknown fiber sample. Make a wet mount slide of the unknown fiber by using the forceps and placing it on a slide, adding a drop of water, and covering it with a cover slip.
2. Examine the sample using the scanning objective (4x), low power (10x), and high power (40x) on your microscope. Sketch what you see. Note any **pits** or **striations** on the fiber. Sketch and make notes about the fabric on the data table.

***Descriptive Terms for Texture: smooth, rough, coarse, fuzzy, soft, sheer, slippery, etc.***

3. Repeat this procedure for each of the known samples.
4. Light your candle and note the burning characteristics of each of the known fibers as well as the unknown fiber. Record your observations in the data table.
  - a. Holding the fiber in the forceps, bring it close to, BUT NOT TOUCHING, the flame. Describe the fiber's behavior as it approaches the flame: does it begin to ignite, melt, or curl?
  - b. Holding the fiber in the forceps, touch the fiber to the flame: does it ignite quickly or slowly?

***Descriptive Terms for Flame Tests: scorches, smolders, burns, shrinks, sputters, sizzles, flame color, glows, sparks, smoke color, soot, afterglow, fused, feathery ash, beads, etc.***

- c. Remove the fiber from the flame and describe how it behaves: does it self-extinguish, continue to burn, or glow?
- d. Note any odor associated with the fiber in a flame. Does it smell like vinegar or hair?
- e. What kind of residue is left after the fiber is removed from the flame? Does the fiber leave a white, fluffy ash, a hard bead, or a melted blob?

### **Results:**

#### **Data Table 1**

##### **Examination of Fibers Under a Microscope**

**Type of Fiber    4x Sketch & Description    10x Sketch & Description    40x Sketch & Description**

***Reminder of 8 samples to test: unknown, cotton, nylon, wool, acetate, polyester, rayon, silk***



<b>Data Table 2</b>				
<b>Behavior of Fibers in a Flame</b>	<b>Texture</b>	<b>Behavior Near Flame</b>	<b>Behavior After Flame</b>	<b>Odor</b>
<b>Unknown</b>				
<b>Cotton</b>				
<b>Nylon</b>				
<b>Wool</b>				
<b>Acetate</b>				
<b>Polyester</b>				
<b>Rayon</b>				
<b>Silk</b>				

**Conclusion:**

1. From your observation of the fibers under a microscope, which type of fiber is most like the unknown fiber? Describe the similarities of these two fibers.
2. From the burning tests, which type of fiber is most similar to the unknown fiber? Describe the characteristics they have in common.
3. Why might a researcher want to identify unknown fibers?
4. From where do we get the materials to make natural fibers?
5. How are man- made fibers classified? Give examples of each type.
6. Many manufacturers make pajamas from polyester, even though cotton clearly would feel more comfortable to an infant’s skin. Why do you think this is so?

Students will then be required to answer the following questions once the burn lab has been completed.

1. Which fiber(s) reacted to the flame by burning readily and leaving a glowing ember when the flame was extinguished?  


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2. Which fiber(s) reacted to the flame by self-extinguishing with no ember?

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3. Which fiber(s) reacted by melting, dripping, and forming a hard mass?

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4. Which fiber(s) produced a smell similar to burning paper or wood?

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5. Which fiber(s) produced a smell resembling burning hair?

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6. Which fiber(s) reacted by leaving a soft white ash resulting in a smudge when rubbed?

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7. Evaluate the answers to each of the previous questions. You will find that the fibers you listed for each question have a common factor. (Ex. The most likely answers to the first question will be cotton and flax) What is the common factor for answers to each of the other questions?

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## Activity #2

**This proposed activity should take three to four 90 minute 4X4 block periods to complete, depending on the size of the class.**

The second activity will first require that the students read the article entitled “*Super Fibers: Carbon nano tubes could be the key to spinning the future’s hottest threads*” by Christen Brownlee. Students should log into the [Chem Matters](http://portal.acs.org/portal/PublicWebSite/education/resources/highschool/chemmatters/archive/CNBP_025144) publication found at [http://portal.acs.org/portal/PublicWebSite/education/resources/highschool/chemmatters/archive/CNBP\\_025144](http://portal.acs.org/portal/PublicWebSite/education/resources/highschool/chemmatters/archive/CNBP_025144)<sup>10</sup> and read the article, or it could be printed out by the teacher.

Some of the information contained in the article refers to the advances in the use of fibers commonly known as “super fibers” which are made from powerful carbon nano-tubes. These ultra-thin threads that measure less than one thousandth the diameter of a human hair, come with a bevy of interesting chemical properties such as super strength, and super electrical and thermal conductivity. Woven into a fabric, these fibers can turn any article of clothing into extraordinary wired attire.<sup>11</sup> One practical and plausible application of these nano-tube super fibers will be making clothing for the futuristic soldier. They could also play a major part in building stronger vests for police officers, and even have possible medical applications for the wearer.

A second article found in Article Alley, called “*Advantage of Nanotechnology in Textile Industry*” will be assigned to the students to read prior to starting the second major activity of this unit.<sup>12</sup> This article explains the role of nanotechnology in the textile industry and how it has accelerated with a positive momentum during the recent past years. Nanotechnology has versatile applications in the textile chemicals industry in manufacturing garments that have stain resistance, flame retardant finishes, wrinkle resistant finishes, moisture management, antimicrobial qualities, UV protection, and soil release properties, etc. Students will log onto [www.nanotechproject.org](http://www.nanotechproject.org)<sup>13</sup> to discover more about the uses of nanotechnology. They should follow the website to investigate some of the consumer products currently being marketed.

Another good article that discusses some practical applications of nanotechnology in the textile industry is found in the site called Article Alley, [www.articlealley.com](http://www.articlealley.com)<sup>14</sup> Once they get into the site, they should search for Super Fibers to find more examples of current uses on nanotechnology. Students may also refer to the Nano Tex™ website mentioned earlier in the unit for ideas and information. Scientists have duplicated an effect called the “Lotus Effect” which is self-cleaning, and a water repellent property found in some plants. This property allows the leaf of some plants to create nanometer-sized bumps on the surface of each leaf to form to prevent water and dirt from adhering to it. There are applications of the Lotus Effect in the fashion industry. Fabrics can also be coated with nanometer-sized “whiskers” that protect them from stains. These nano-whiskers repel water just like the lotus leaf. Nano fabrics are an example of how nanotechnology mimics the water-repelling “lotus effect” of some plant leaves. Visit [www.nisenet.org](http://www.nisenet.org) for more information.<sup>15</sup> After students read the assigned article and visit the NISE website to find more information about what scientists are discovering about nanotechnology, they will be asked to create a mock product that uses this nano tube technology in the textile industry. Students will then be tasked to create a mock

prototype of a textile using nano tube technology and then present their project ideas to the rest of the class in the form of a software presentation.

In this activity, students will identify the potential customers for their product. Students should be sure to indicate each type of market segmentation used to describe their customer in terms of their demographics, psychographics, geographics, and behavioral responses that are applicable to their target market. Students should have already studied units 2 and 3 in the Fashion Merchandising course, where the meanings of these terms have been taught. (Standards include the Marketing Mix and Market Segmentation,)

Students will identify the marketing mix, discussing each of the 4 P's of Marketing to include:

**PRODUCT:**

- a. Describe the desired image of the product/product line.
- b. What are the name(s) of the product?
- c. What makes the product useful and/or unique to the consumer?
- d. How should it be packaged? (keeping in mind the eco-friendliness of it)
- e. Create a prototype or sample of the product.

**PLACE:**

- a. Where will customers buy this product? Brick and mortar locations and/or websites?
- b. Why is this is the best place to market these products?
- c. Where is the best place to have this product manufactured and why? (keeping in mind the eco-friendliness of the process it requires to manufacture the product, etc.)

**PRICE**

- a. What is the correct manufactured suggested retail price for this product?
- b. How does this price compare to other (fairly) similar products price? Will it be able to remain competitive against other products? Will it be higher or lower priced? How does the cost of sustainability factor into the price?
- c. Will this price allow for profitability?

**PROMOTION**

- a. What specific information do customers need about this product?
- b. What is/are the most effective form of communication for this product— advertising, personal selling, sales promotion, &/or publicity? Explain the reasons certain forms were chosen and take into consideration the costs involved in using this form of promotion.
- c. Provide two examples of forms of promotion to be used in promoting this product.
- d. Discuss promotional activities aimed at taking advantage of the changing consumer attitudes toward an eco-friendly brand.

This part of the project will take the students approximately two to four 90-minute blocks to complete. Each part should be written out, in business format, and in enough detail to completely answer each section. See appendix 1 for the project outline and grading rubric.

**Activity #3:** Once the students have completed the prototype and finished each section in Activity #2, they will prepare a software-based presentation such as Power Point, Windows Movie Maker, Prezi, or Photo Story that outlines their proposed product or product line. It will discuss each section in Activity #2, and should be creative and engage the “audience,” which will be the other classmates. Each person in the small group should have an active part in presenting their proposed product in front of the class. In essence, the group will be “pitching” their new product to the class, in hopes that the class will accept their idea.

Each group will be assessed using a grading rubric (see appendix) Depending on the size of the class, this final part of their project (Activity #2) will take approximately 2 -3 class periods.

Students will be asked to evaluate themselves as well as the other group members, and we will “vote” on the product that we feel is most realistic, will most likely to be accepted by consumers, will make the best use of nano technological products, and is the most original and creative. Students should prove to the best of their ability how their potential product would affect both the fashion industry as well as the overall economy.

When this curriculum unit is complete, it is my hope that my Fashion Merchandising students will see the benefits of using cross-curricular activities in accomplishing a goal. I hope to show them that the content of fashion is closely intertwined with the subject of

chemistry and that chemistry is indeed a part of their everyday life, since it is most likely that the very fabrics that they wear on a daily basis involve complex chemical polymers and such. I hope that my students' eyes will be opened to the fact that fashion is not simply something that you "look at" or "like," but that they will gain a greater appreciation for the science that it took to create that special garment and that they will realize the very far reaching applications that future technology will enable our super fibers to do spectacular things for us, including protect the wearer better.

While writing this unit, it was my intention to find a hands-on way for my fashion students to delve into the topic of chemistry and stretch the focus from simply selling the "hottest new fashion trends" to incorporate those hot new trends that include fabrics with nano technological applications that are both sound in chemistry but will also potentially be profitable to the textile manufacturers and the retailers that sell these new super fibers. Additionally, after going through the burn lab, my intention was to demonstrate to the fashion students the differences between the basic fibers so that they could apply sound and safe applications regarding using certain fibers in particular situations. Students will be forced to be **on fire for fashion!**

#### **Partial Reading List for this Unit:**

1. Albert, Mark *Galen's Lectures: A Novel about Chemistry* A novel, written about a chemistry professor who teaches different lectures regarding applications of chemistry in everyday life.
2. Brownlee, Christen *Super Fibers: Carbon nano tubes could be the key to spinning the future's hottest threads*. Chem Matters, February 2006. Gives the students a full overview of the nature of nano tubes and practical uses in the textile industry.
3. Callsibetta, Charlotte M. & Tortora, Phyllis. *Fairchild's Dictionary of Textiles*, 7<sup>th</sup> edition, 2008. Great overview of basic textile facts, for those who need some background knowledge of textiles.
4. Kean, Sam *The Disappearing Spoon: and Other True Tales of Madness, Love, and the History of the Periodic Table*. A novel, written in the style of focusing on the periodic table, but using practical everyday applications. Another great overview of chemistry in our everyday lives.

5. Wolfe, Mary *Fashion!* 2005 A textbook about the fashion merchandising industry
6. Wolfe, Mary *The World of Fashion Merchandising*, 2003. A thorough overview of textiles, and all things involving the fashion industry. Especially helpful for those who need background information regarding textiles and/or marketing concepts.
7. [www.ncstate.edu/textiles](http://www.ncstate.edu/textiles) For an overview of how this college blends fashion and chemistry
8. [www.nisenet.org](http://www.nisenet.org) Thorough resource for more information about nanotechnology. NISE is the Nanoscale Informal Science Education network and this site has many hands-on activities that are appropriate for many age levels
9. [www.TextileSchool.com/schools](http://www.TextileSchool.com/schools) Excellent reference for a thorough summary of all things involving textiles.

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## Notes

<sup>1</sup> [www.textilemuseum.org/TextileTerms](http://www.textilemuseum.org/TextileTerms)

<sup>2</sup> [www.fabrics.net/fabrics-facts](http://www.fabrics.net/fabrics-facts)

<sup>3</sup> Mary Wolfe, *The World of Fashion Merchandising*, 2003, Chapter 6

<sup>4</sup> [www.textileschool.com/schools](http://www.textileschool.com/schools)

<sup>5</sup> [www.angelfire.com/mech/fabric](http://www.angelfire.com/mech/fabric)

<sup>6</sup> [www.cnn.com/id/15840232?video=1620084176&play=1](http://www.cnn.com/id/15840232?video=1620084176&play=1)

<sup>7</sup> [www.nisenet.org](http://www.nisenet.org)

<sup>8</sup> [www.nisenet.org](http://www.nisenet.org)

<sup>9</sup> [www.nanotex.com](http://www.nanotex.com)

<sup>10</sup>

[http://portal.acs.org/portal/PublicWebSite/education/resources/highschool/chemmatters/archive/CNBP\\_025144](http://portal.acs.org/portal/PublicWebSite/education/resources/highschool/chemmatters/archive/CNBP_025144)

<sup>11</sup> Brownlee, Christen. *SuperFibers*, Chem Matters, February 2006

<sup>12</sup> [www.articlealley.com/print\\_790731\\_45.html](http://www.articlealley.com/print_790731_45.html)

<sup>13</sup> <http://www.nanotechproject.org/inventories/consumer/browse/products/6894/>

<sup>14</sup> Ravidner, Kumar *Advantage of Nanotechnology in Textile Industry*, February 19, 2009

<sup>15</sup> [www.articlealley.com](http://www.articlealley.com)

<sup>16</sup> [www.nisenet.org](http://www.nisenet.org)

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## Appendix 1. Implementing District Standards.

“On Fire for Fashion!” curriculum unit addresses the following district standards for the Marketing Education course called Fashion Merchandising:

Objective 4.01 Identify basic textile fibers, fabrics, and their characteristics

Objective 3.01 Explain the concept of marketing in fashion.

Objective 6.02 Discuss fashion advertising.

## Appendix 2. Handouts

### Activity #1. Burn Lab Handouts

#### Examination of Fibers Under a Microscope

Type of Fiber 4x Sketch & Description 10x Sketch & Description 40x Sketch & Description

*Reminder of 8 samples to test: unknown, cotton, nylon, wool, acetate, polyester, rayon, silk*

<b>Data Table 2</b>				
<b>Behavior of Fibers in a Flame</b>	<b>Texture</b>	<b>Behavior Near Flame</b>	<b>Behavior After Flame</b>	<b>Odor</b>
<b>Unknown</b>				
<b>Cotton</b>				
<b>Nylon</b>				
<b>Wool</b>				
<b>Acetate</b>				
<b>Polyester</b>				
<b>Rayon</b>				
<b>Silk</b>				

### Conclusion:

1. From your observation of the fibers under a microscope, which type of fiber is most like the unknown fiber? Describe the similarities of these two fibers.



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2. From the burning tests, which type of fiber is most similar to the unknown fiber? Describe the characteristics they have in common.
  3. Why might a researcher want to identify unknown fibers?
  4. From where do we get the materials to make natural fibers?
  5. How are man- made fibers classified? Give examples of each type.
  6. Many manufacturers make pajamas from polyester, even though cotton clearly would feel more comfortable to an infant's skin. Why do you think this is so?

Students will then be required to answer the following questions once the burn lab has been completed.

1. Which fiber(s) reacted to the flame by burning readily and leaving a glowing ember when the flame was extinguished?

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2. Which fiber(s) reacted to the flame by self-extinguishing with no ember?

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3. Which fiber(s) reacted by melting, dripping, and forming a hard mass?

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4. Which fiber(s) produced a smell similar to burning paper or wood?

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5. Which fiber(s) produced a smell resembling burning hair?

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- 
6. Which fiber(s) reacted by leaving a soft white ash resulting in a smudge when rubbed?
- 
- 

7. Evaluate the answers to each of the previous questions. You will find that the fibers you listed for each question have a common factor. (Ex. The most likely answers to the first question will be cotton and flax) What is the common factor for answers to each of the other questions?
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## Activity #2 Project Sheet-Use as a Handout



### On Fire for Fashion Project!

**Assignment:** You are marketing consultant for an apparel manufacturer who wants to develop a national campaign to sell an innovative fashion line that incorporates nano technology (super fibers). You are to develop a written marketing proposal for the manufacturer and present your proposal to its board for approval. Be sure to follow the instructions as outlined below.

#### **Identify a target market**

Who are the customers for the fashion products? Explain the demographics, psychographics, geographics, and behavioral responses that are applicable to your target market. Be sure to indicate the type of market segmentation you use. Example: The demographics of my target market are . . . and the psychographics of my target market are . . . etc.

#### **Identify the marketing mix**

- Product**
- Describe the image you want the products to have.
  - What are the names of the products?

- 
- c. What makes the product useful?
  - d. How should they be packaged?
  - e. Provide a prototype of your package.

- Place**
- a. Where will customers buy the textile products?
  - b. Why do you think this is the best place to market these products?

- Price**
- a. What is the right price?
  - b. Justify your prices based on costs to produce and if there is any similar products on the market currently. Should prices vary?

- Promotion**
- a. What specific information do customers need?
  - b. What is/are the most effective form of communication for these products – advertising, personal selling, sales promotions, publicity? Explain.
  - c. Provide an example of the promotion(s) you plan to use.

**Presentation**

You are to prepare a presentation to the manufacturer regarding your proposal. The software presentation should be businesslike, organized, informative, and well prepared.

EVALUATION-ON FIRE FOR FASHION PROJECT

NAME(S) \_\_\_\_\_

<b>Target Market</b>
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Segmentation variables identified	5	4	3	2	1	0
Specific	5	4	3	2	1	0
Appropriate	5	4	3	2	1	0

<b>Marketing Mix</b>
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<b>Product</b>	Detailed, clear description	5	4	3	2	1	0
	Appropriate, creative name	5	4	3	2	1	0
	Appropriate, distinctive packaging	5	4	3	2	1	0

	Prototype provided	5	4	3	2	1	0
<b>Place</b>	Place appropriate for product/target market	5	4	3	2	1	0
<b>Promotion</b>	Information to consumers complete	5	4	3	2	1	0
	Promotional mix described thoroughly	5	4	3	2	1	0
	Promotional mix consistent	5	4	3	2	1	0
	Promotion example provided	5	4	3	2	1	0
<b>Price</b>	Price consistent with product uses	5	4	3	2	1	0
	Price consistent with place decisions	5	4	3	2	1	0

<b>Presentation</b>
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Preparation	5	4	3	2	1	0
Organization	5	4	3	2	1	0
All members participate	5	4	3	2	1	0
Spoke clearly and distinctly	5	4	3	2	1	0
Use of visuals enhances presentation	5	4	3	2	1	0
Answered questions	5	4	3	2	1	0

**TOTAL POINTS EARNED\_\_\_\_\_**

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**COMMENTS :**