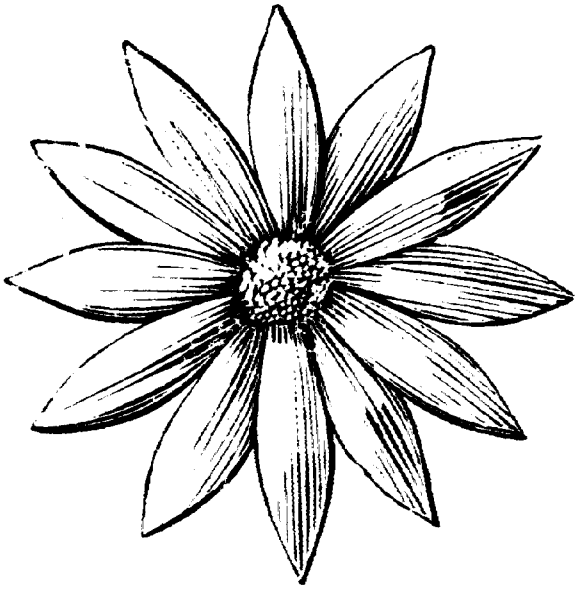
BC Agriculture in the Classroom

Textile Embellishment with Flowers and Plants

Mareile Hardy

Agriculture in the Classroom Summer Institute 2008



Summer Institute for Educators 2008

This document is the result of the author's participation in the BC Agriculture in the Classroom Foundation's Summer Institute for Educators in 2008. This third year level course in curriculum design (CUST 396) is offered every other year through the University of British Columbia's Faculty of Education's Office of External Programs.

In the summer of 2008 the Foundation partnered with the Teachers of Home Economics Specialist Association – THESA – and the Office of External Programs to make the Summer Institute a part of the Home Economics Education Diploma Program. This program consisted of 10 three credit courses that closely examined the Home Economics Curriculum IRP's and explored creative ways to address the learning outcomes.

Participants (30 educators from a variety of secondary disciplines and from many regions of the province) were based at Clarence Fulton Secondary in Vernon BC. As a result of visits to local farms and through intensive classroom work they developed a number of teaching strategies drawn from the agricultural, environmental, economic and nutritional concepts featured in the IRP's.

Participants taking the course for credit created teaching modules such as this to share with other educators around the province.

The BC Agriculture in the Classroom Foundation is supported by the BC Ministry of Agriculture and Lands as well as the agricultural community. Participants were sponsored for their farm tours as well as their meals (prepared by our Summer Institute chef using fresh and delicious local products).

Visit the BC Agriculture in the Classroom website at www.aitc.ca/bc for further information on this and our many other exciting programs or to order additional resources for your classroom.

Thank you for bringing agriculture to your classroom. We hope that you too will find it a great teaching tool to enhance your lessons.

www.atic.ca/bc

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Project Synopsis

This unit will introduce students to natural dyes and perfumes from foods in their fridge, flowers in their garden and plants in the wild. A magazine search of colourful textile items will be followed by a teacher–guided discussion on chemical dye methods and the problems associated with them, which will lead to brainstorming of possible natural dyes. Students will be instructed to find agricultural products which can be used as natural dyes and (if possible) to bring some samples to class. Students will prepare the dyes and dye pieces of pre-cut fabric. A flower pounding activity will further their understanding of pigments in plants. The culminating project for the unit will be to sew a sachet incorporating the naturally dyed fabrics and the flower pounding design. The sachet will then be filled with a suitable, dried local plants.

This topic is very appropriate for Agriculture in the Classroom because it will allow students to take a new look at native plants and local agricultural products, and to make connections between two seemingly very different things – fabric and farming.

Rationale for the Project

At the end of an enjoyable day of gardening, my hands tell a colourful story. Stained various colours, one can trace the journey through my garden – green from weeding the lawn, purple and yellow from deadheading irises and daylilies, or red to deep blue during raspberry and blackberry seasons. Some evenings, the preparation of red cabbage and beets leaves other stains – traces of which can still be seen the following day, even after numerous scrubbings. The evidence on my gardening clothes clearly illustrates why some of these plants were traditionally used to dye textiles. I begin to think about how I can bring students closer to the natural world in textile classes so they to can experience the wonder and beauty around them.

Today's commercial dying methods are far removed and very different from historical ones. Dye production and the dying of textiles are very water intensive. In countries with many dye factories, such as China and India, there is growing competition between farmers and industry for water resources. As stated in *Feeding a World of Nine Billion*, "the demand for irrigation water is leading to its (water's) over-exploitation in many parts of the world. . . . In the Middle East, India and China farmers are taking ground water faster than nature can replenish it, and disputes over water are becoming increasingly common." It is "the ruthless exploitation of the earth's resources" which has resulted in a water crisis in some countries and has helped contribute to the current global food crisis. While the mis-use of water is only one contributing factor to the current crisis, it is an important factor which will be discussed in this unit.

The ecological balance of many areas in developing countries has been adversely affected by the textile industries. During the course of the activities in this unit, students will be encouraged to reflect critically on "the interdependence of their everyday living with that of other human beings and broader issues related to ecological sustainability." (Textiles IRP, pg 4) By the end of this unit it is expected that students will better understand and appreciate the connections between textile choices, the environment and our earth's ability to produce food.

References:

People and the Planet: Feeding a World of Nine Billion. http://www.peopleandplanet.net/pdoc.php?id=341

Links to Home Economics IRP

With a few modifications this unit can be adapted to most grade levels. However, because of the terminology, the discussions and higher level thinking skills, I designed this unit for Grade 11 Textiles.

The following are the selected Textiles 11 Prescribed Learning Outcomes that can be achieved in this unit.

Textile Foundations

A1- demonstrate the use of tools and equipment needed to produce textile items

A3 – select and use the appropriate sewing machine or serger settings as needed

A4 – select and use appropriate ironing/pressing equipment

A5 – manage time and resources in the classroom

Applying Creative Process

C1 – create textile items incorporating the elements and principles of design

C2 – experiment with basic processes used to colour and embellish fabric

Factors Affecting Textile Choice and Use

D1 – demonstrate an understanding of historical and cultural influences on fashion and textiles

D2 – demonstrate and understanding of influences on fashion and textile choices, including

- socio-economics
- media influences
- global and environmental considerations

From the Textiles 11 Integrated Resource Package 2007

Teacher Preparation for Unit

Depending on the grade level, class time, availability of foods/plants, and room availability, teachers may have to do any of the following in preparation for this unit. Such as:

- Cutting out pictures from magazines to illustrate and enhance the unit and/or create a bulletin board
- Photocopying "Dye Issues Discussion Cards"
- Shopping or "gleaning" for local fruits and vegetables to be used for natural dyes
- Picking local berries/fruits (depending on the season)
- Preparing the dye (if no access to stoves)
- Cutting (scrap) white cotton fabric into quilting squares as smaller pieces are easier to dye
- Find a source flowers for use in the flower pounding
- Having dried flowers/herbs available for the sachets

Colourful Clothes: But at What Cost?

Objective:

- To discuss the issues facing commercial dyes
- o recognize natural alternatives

Materials:

- magazines
- scissors
- Dye Issues Discussion Cards
- copies of Colourful Clothes, But at What Cost? – graphic organizer

Activities:

Magazine Search:

1. Students look through fashion magazines (in school or for homework) and cut out pictures of highly colourful fashions.

2. Students look at each others pictures and discuss different colours and speculate on how that colour might have been achieved.

Small Group Discussion:

1. **Explain to students:** Historically, fabrics were dyed using plants, animals or extracts from minerals. The most beautiful and exotic pigments were reserved for those of higher status. In the mid 1800's, scientists discovered how to make synthetic dyes. These synthetic dyes were cheaper to produce. Over time, brighter and more colour-fast dyes were produced. Soon dyed fabric was available to the general public and natural dyes came out of fashion. They are now going to explore some of the consequences of natural dyes falling out of favour and the rise of use of synthetic dyes.

2. **Hand out "Dye Issues Discussion Cards"** to small groups of students. Direct them to read the card, discuss the questions and decide if the issue is related to Health, the Environment, Laws, or Social/Economic considerations. They will be responsible for reporting back to the class. Consider assigning roles, e.g., reader, recorder, reporter.

3. **Distribute Colourful Clothes, But at What Cost?** – graphic organizer. Direct students to make notes as each group reports.

Full-Class Discussion

- use the following questions to discuss the information from the Discussion Cards.
    - What is the current condition?
    - What is the ideal condition?
    - What actions would help us reach the ideal condition?

Summarize the Lesson

The use of dye stuffs, with all the health and environmental issues surrounding them has increasingly brought a new interest in natural dyes but the realistic solution to current toxic dyes is likely to be a combination of more responsible synthetic dye production, together with a sustainable development of natural dyes. So in our unit we are going to focus on using natural dyes and the colours in nature to embellish/decorate fabric.

Extension:

Textiles research: – Have students research other issues surrounding textile production, such as: - cotton production, child labour, danger to workers, organic methods, etc.

Dye Issues Discussion Cards

Discussion Card #1

Historically, little regard was paid to the safety and labour conditions of textile workers. However, it is very apparent that there are deadly risks to workers. Historical accounts include stories of terrible fires that took the lives of textile and dye workers and sometime fire fighters. In many cases, it was the dye chemicals that caused or fueled the fires. The chemical Anililine, for example, the basis for a popular group of dyes, is highly flammable. Even today industrial fires are still occurring. In addition to the risk of losing lives in fires, toxic vapours have resulted in long term health affects, and the water used to put the fires out often carries the toxic chemicals into water systems.

Discussion: What issues related to textile dying are identified in this account? Who/what is at risk? What could be done to reduce the risk?

Discussion Card 2

The majority of fabrics are dyed with synthetic dyes as they are comparatively less expensive and often have better uniformity and colorfastness characteristics. These dyes are produced in a laboratory from a variety of chemicals. Many of these chemicals are known carcinogens. In the United States, deaths amongst textile workers from several cancers, cerebrovascular disease, and lung disease are significantly higher – 40 times higher, for some diseases – than in the general population. In Japan, dye workers are at higher risk of tumors. The chemicals from dying and other processes often remain in the fabric. Because clothing comes into prolonged contact with one's skin, toxic chemicals can be absorbed into the skin, especially when one's body is warm and skin pores have opened to allow perspiration. This can cause chemical sensitivity and result in rashes, dizziness, difficulty breathing and hyperactivity.

Discussion: What issues related to textile dying are identified in this account? Who/what is at risk? What could be done to reduce the risk?

Discussion Card 3

Dyeing is a water intensive process. One kilogram of dye requires upwards of 20 litres of water. This poses a great demand for ground water in areas with factories. Water is becoming an increasingly scarce and therefore extremely valuable resource. The first consequences of water shortages and wastewater problems are already starting to be felt in the textile finishing industry. For example, new companies in China and India have not been granted approval to set up operations if they have not been able to present a convincing case to the authorities that their approach will help solve issues of water consumption. In Europe, companies face closure for the same reason. Textile centers in Asia are reporting rapidly dwindling groundwater reservoirs and heavily salinated groundwater and many companies face challenges that threaten their very existence.

Discussion: What issues related to textile dying are identified in this account? Who/what is at risk? What could be done to reduce the risk?

Discussion Card 4

Some of the dyes present in the wastewater are carcinogenic and harmful not only to human beings but also to plants and animals. But waste and chemical effluent treatment is very expensive. It's cheaper to dump the used water – dye effluent - than to clean and re-use the water in the factory. So even though there are water pollution laws they are often ignored or violated as companies try to save money. . One-half of the world's contaminated wastewater -- approximately 53 billion gallons -- flows from textile mills. For example, a river downstream from a factory producing dyed textiles for Gap, Target and Wal-Mart in India, became dark red and investigators discovered that untreated dye effluent was being dumped directly into the river. Villagers said that fish died, and the lifeless river turned to sludge. In Mexico untreated, unregulated dye effluent from factories dying denims for companies like Levi and Gap dump waste-water contaminated with synthetic indigo straight into the environment. Local residents and farmers report health problems and wonder if the food they are obliged to grow in nearby fields is safe to eat.

Discussion: What issues related to textile dying are identified in this account? Who/what is at risk? What could be done to reduce the risk?

Discussion Card 5

Children have been working in textile companies since the Industrial Revolution in the 1800's. Companies are constantly looking for ways to reduce production costs. Children are preferred to adults because they are cheap, submissive, uneducated and nimble. Child labor is one of the leading social concerns for the apparel industry. According to official sources, the number of children working in India alone is 12 million, while unofficial sources speculate the number in fact reaches 60 million. Many popular North American fashion companies have had their reputations tarnished by exploiting children as labour. What ones have you heard of?

Discussion: What issues related to textile dying are identified in this account? Who/what is at risk? What could be done to reduce the risk?

Discussion Card 6

Textile factories are often good examples of sweatshop conditions. These conditions include excessive working hours, forced overtime, poverty wages, unsafe working conditions, discrimination, verbal and physical abuse. Workers who want to lobby for better working conditions and a living wage that enables them to meet their needs for nutritious food and clean water, shelter, clothes, education, health care and transport often encounter severe obstacles. If they try to organize a union, they are often threatened, intimidated, fired, and sometimes physically beaten by their company security guards or police.

Discussion: What issues related to textile dying are identified in this account? Who/what is at risk? What could be done to reduce the risk?

Name _____

Colourful Clothes, But at What Cost? Graphic Organizer

Colours from your Garden: Natural Dyes

Objective:

- To experiment with basic processes to colour textiles
- To experiment with a variety of plants to dye textiles

Advanced preparation:

- See if you can make arrangements to use the foods lab or bring in hot plates for making the dye.
- Discuss with students the various materials that can be used to make natural dyes and ask them to bring any materials that they may have at home.
- Consider contacting the local gardening club to see if they have flowers that could be deadheaded for classroom use; contact the local florist and ask if they would save materials that are normally discarded for you to use.

Materials:

- A variety of foods/flowers/plants suitable to make dyes, such as:
  - Yellow onions (skins)
  - Spinach (canned)
  - Beets
  - Blackberries
  - Cherries
  - Red cabbage
  - Marigold (blossoms)
  - Dandelions
  - Cosmos
  - Zinnia
  - Carrot peels
  - Purple Grapes/juice
  - Red onions
  - Cranberries
  - Blueberries
  - Strawberries
  - Raspberries
  - Irises
  - Grass
  - Daylily (old blossoms)
  - Yellow Yarrow
  - Parsley
  - Carrot tops
  - Pine cones

- Pans - Stainless steel works best. Enamel or galvanized iron will work. (Iron, copper and aluminum can affect the color of the dye.)
- Stirring utensils - a wooden spoon or glass rod or chops sticks
- Colander or sieves for straining
- Soft water or rain water has the least effect on color. If your water is very hard consider treating it with Calgon.
- Natural fibre fabric – woven cotton recommended [note: only natural fibres can be dyed with natural dyes] – either the teacher can pre-cut or students can cut into the sizes outlined below.
- A plastic tarp and rope for a clothesline and clothes pins for handing the fabric samples to dye.

Activities:

Making the dye solution:

1. Chop plant material into small pieces and place in a pot.
2. Double the amount of water to plant material.
3. Bring to a boil, and then simmer for 1 to 3 hours or until most of the colour is drained from the fruit or plants.
4. Strain. Compost plant material. Return the dye to the pot.

Preparing the Fabric:

1. Prewashing the fabric in washing soda will assist with dye absorption.
2. The fabric will have to be soaked in a fixative before the dye process. This will help the color set in the fabric.
3. Color Fixatives:

   a) Fixative for berry dyes
   - put 1/2 cup salt to 8 cups cold water in a large pot

   b) Fixative for plant dyes
   - put 4 parts cold water to 1 part vinegar in a large pot

   c) Add fabric to the fixative and simmer for an hour.

   d) Rinse the material and squeeze out excess.

   e) Rinse in cool water until water runs clear. Dry.
4. Cut the following cotton fabric pieces:
   - a) minimum 4 pieces of 8.5cm x 8.5cm per student (if there are more than 4 per person it will provide for greater variety/flexibility/creativity when sewing sachet)
   - b) minimum 1 piece of 15cm x 15cm per student (if there is more than 1 per person it will provide for greater variety/flexibility/creativity when sewing sachet)

   [Note: you can cut the fabric first and then do the fixative step.]

Dye the Fabric:

1. Have students put an identification mark (their initials) in a corner of their fabric samples with an indelible ink pen. Wet the fabric samples. Put the fabric samples in the desired colour pots.
2. Slowly bring the dye pots to a simmer. Continue simmering for up to an hour and begin checking to see if the fabric sample is the desired colour. The color should be a little darker than the desired colour as since some will wash out in the rinse and the colour is often lighter when dry.
3. Once the fabric samples have enough color, rinse first in a bucket of hot water. Then move to a bucket of warm water and rinse some more. Finally, rinse in a bucket of clear cold water. Now you can hang it out to dry and admire the results.

[Note: typically the dye is set with a mordant but for this project this step in not included]

Evaluation:

- Reflective journal. What did you notice? What did you learn? What were you surprised about? Which ended up being your favourite dye? Why? Were the results what you expected?

Extension:

- To produce differing shades: -Add vinegar (acid) in small amounts until the solution turns lighter
    - Add baking soda (base) in small amounts until the solution turns darker. -Students will then have three separate shades to dye materials over a range of colour.
- Posters: -Students create small poster including sample of dyed fabric, picture of plant and a short description of where it is grown, if it is commercially grown, and how the dye was prepared and fixed.
- Organize a field trip to a local artisan who dyes using natural dyes.

Creating Designs with Flowers: Flower Pounding

Objective:

- To select appropriate flowers for flower pounding
- To recognize differing pigments in flowers
- To create a design with flowers

Pre-preparation:

- ask students to bring in flowers or arrange a field trip to a flower grower or a nearby garden so students can select flowers or make other arrangements to bring flowers to the class
- book an LCD projector and a computer if you have internet access otherwise book the computer lab so that students can view the YouTube video.
- cut fabric into 15cm squares, one for each student
- find a supply of small hammers (borrow from tech ed or art teacher or purchase or ask students to bring from home)

Materials:

- Wax paper
- Flowers/Foliage
- Scissors
- Small hammers
- *Pounded Flower Art* from youtube.com (if available)
- Cotton fabric 15cm x 15cm (either light colour or naturally dyed sample from previous activity)

Activities:

Video Presentation:

1. Show "YouTube" video (3 mins) *Pounded Flower Art* (if available).

Preparation:

1. Lay out flower/foliage design on paper.
2. Pinch off stems. Flowers/foliage should be as flat as possible.
3. Cut out wax paper into small pieces – one for each flower.

Pounding:

1. Starting from center of design, lay first flower right side down on fabric.
2. Cover with wax paper.
3. Gently pound the flower with the hammer so the natural dyes bleed onto the fabric.
   Pounding too hard will splatter the dye
4. Remove wax paper.
5. Repeat steps #1-#4 with all remaining flowers/foliage until design is complete.

Finishing:

1. Gently blot/wipe entire design with paper towel to remove any flower pieces and excess dye.
2. To set colours, place press cloth or scrap piece of fabric over design and press on medium to high heat.

Extension:

- Pounded Flower Stationary: -Using the same method, students create greeting cards with water colour paper.
- Have students read and discuss the Floriculture industry in BC p. 102 to 105 in Grow BC. (available from BC Agriculture in the Classroom Foundation, http://www.aitc.ca/bc/resources/resource-order-form)

Garden Scents in your Closet: Make a Sachet

Objective:

- To create a sachet from naturally dyed fabric and local dried plants
- To incorporate the elements and principles of design

Materials:

- Naturally dyed fabric (from previous lesson or fabric scraps)
- Flower pounded square (from previous lesson or fabric scrap)
- A variety of dried scented plants, such as:
  - Rose petals
  - Cedar chips or shavings
  - Thyme
  - Rosemary
  - Lavender
  - Chamomile
  - Sage
  - Lemon balm
- Flax seeds
- Sewing supplies
- Embellishments; i.e. ribbon, beads (optional)
- Criteria/Marking Sheet

Activities

Smell test:

1. Put out a variety of scented dried plants for students to "sniff." Can students guess the plant?
2. Write names of plants on board. Can students now match names with plants?
3. Discuss (most/least favourite, comparisons, etc.).

Choosing/cutting fabric:

- Choose 4 pieces of naturally dyed fabric from previous lesson or cut 4 pieces 8.5cm x 8.5cm.

Assembling:

1. With right sides together, sew 2 squares together using 1cm seam allowance. Press seam. Press seam open.
2. Repeat #1 with 2 other pieces.
3. With right sides together, sew pieces created in #1 and #2 together. Ensure that seams match up in center. Press seam. Press seam open.
4. You should now have a 15cm x 15cm patchwork square.
5. Optional – Add embellishments, remembering to leave room for 1cm seam allowance on all edges.

6. With right sides together, sew "patch worked square" to "flower pounded square" on 3 sides and around the corners of the fourth side leaving an opening in the middle of the fourth side to insert the fragrant material. Use a 1cm seam allowance. Press seams. Reduce bulk by cutting across the corners. Turn right side out. Press.

Filling and finishing:

1. Loosely fill (do not overstuff) sachet with dried flowers/herbs.
2. Add approximately 1 Tbsp flax seeds (for weight).
3. Hand-sew 4th side closed using a slip stitch.
4. Optional – Add more embellishments.

Extension:

- Have students read p. 122/124 Grow BC to learn about growing herbs as an agricultural industry in BC. (available from BC Agriculture in the Classroom Foundation, http://www.aitc.ca/bc/resources/resource-order-form)
- Arrange for a field trip or bring in a guest speaker from a local herb farm. See the BC Herb Growers directory at: www.bcherbgrowers.com/membersdir/index.php?page=2&t=1
- Have students research "value added" products produced by lavender and herb farmers (e.g., perfumes and fragrances, cosmetics and bath products, medicines, etc.)
- Start a herb or lavender garden in the school yard.

Evaluation: Criteria Sheet (next page)

Name: _____

Sachet
Criteria/Marking Sheet

Criteria	Self	Teacher	Comments
Front - Patchwork Straight seams Seams match at center	/5	/5	
Back – Flower Pounding Flowers are clear Not over/under-pounded	/5	/5	
Filling Not overstuffed Filled with potpourri Flax is added	/5	/5	
Construction Straight seams Neat hand sewing	/5	/5	
Finishing Neatly pressed Excess threads trimmed Embellishments	/5	/5	
Management Good use of time Respectful Responsible	/5	/5	
Total	**/30**	**/30**	

References:

Natural Dyes

- *Emerging Global Regulatory Environment Impacting Dye Industry*, by Dr. Pankaj Desai. http://209.85.141.104/search?q=cache:sdO3Mbr9CkYJ:www.ficci.com/media-room/speeches-presentations/2006/sep/dyestuff/Day1/SessiononEmergingGlobalRegulatoryEnvironent%2520Impacting/MrPravinKabutarwal.ppt+commercial+textile+dyes+%2B+harmful&hl=en&ct=clnk&cd=9&gl=ca
- *Environmental and Ethical Cost of T-Shirts Tiruppur, South India* http://www.xlweb.com/heritage/asian/jacob.htm
- Dyeing and Finishing Hemp http://www.hempusa.org/articles/dying-and-finishing-hemp.html
- *Natural Dyes from Plants.* http://www.pioneerthinking.com/naturaldyes.html
- *Natural Dye Lesson Plan.* http://www.umaine.edu/nsfgk-12/images/PDFs/natdye.pdf
- *Synthetic Dyes.* http://greencotton.wordpress.com/2008/06/18/synthetic-dyes-a-look-at-the-good-the-bad-and-the-ugly/
- *Maiwa Handprints – Information and Instruction in Natural Dying* http://www.maiwa.com/stores/supply/instructions.html
- *Buy Wild BC Publication – has a section on natural dying* http://cntr.royalroads.ca/files-cntr/BuyBCwild2007.pdf

Pounded Flowr Art

- *Pounded Flower Art* (date: August 31, 2007) http://www.youtube.com/watch?v=8MtBF0HXvwQ
- *How to Make Pounded Flower Stationary* www.wonderhowto.com
- *Directions and pictures of making pounded flower art* http://davesgarden.com/guides/articles/view/167/