

Under the Big Top: Using the Hartford Circus Fire of 1944 to Teach Literacy Strategies to Connecticut's Content Area Teachers

An unusual topic and an interdisciplinary approach help secondary teachers realize that reading comprehension and literacy instructional strategies are critical, no matter what the content area.

M. Lynn Morse

Content area secondary teachers are a consciously diverse group. Many, focused on their various subject areas, believe that literacy is not their concern. With this in mind, it is not hard to imagine the feelings of newly minted teachers in Connecticut when they discovered that the state had mandated a 1.5-credit course in content area reading strategies for all teachers seeking state certification in grades 7–12. I was asked to teach this course at a Connecticut university with a large teacher-training program.

All subjects require the reading comprehension skills associated with literacy. Students in any classroom need to be able to understand word problems, comprehend complex texts, and even communicate their own emotions and ideas to lead healthy, productive, and well-adjusted lives. Therefore, literacy should figure in every teacher's lesson plans.

Before meeting the less-than-enthusiastic teacher candidates, I considered how I could teach literacy strategies in a meaningful way across subject lines. Modeling the strategy and then discussing how teachers in each subject could use it was not very productive. For example, when math teachers would try to use a strategy, they would spend much of their time explaining mathematical concepts to the non-math teachers. The class had no common subject matter, no shared experience. Without this, I believed, the teacher candidates were not getting all they could out of the class.

A New Spin

Content area literacy can be defined as the ability to decode and comprehend expository texts in math, science, history, art, foreign language, music, or physical education (Bean, Readence, & Baldwin, 2008; Swafford & Kallus, 2002; Vacca & Vacca, 2007). *Interdisciplinary* is defined as "a knowledge view and curriculum approach that consciously applies methodology and language from more than one discipline to examine a central theme, issue, problem, topic, or experience" (Jacobs, 1991, pp. 22–23). I have learned the value of using interdisciplinary units in my own teaching. This led me to wonder if

there was any way to benefit from interdisciplinary units in a class on content area literacy. What would happen if we learned how to use reading strategies in each subject within the context of an interdisciplinary unit? Could we apply our knowledge of a subject area to our new, shared knowledge—all the while using literacy strategies to guide our way?

I began designing my content area reading course with the following objectives in mind. First, I wanted to create a learning environment that allowed the teacher candidates to use their content area expertise to design lessons around a common theme. Second, I wanted them to design these lessons using the reading strategies they learned in our class. Third, I wanted them to work together in a way that they may not have in the past.

Teachers often learn only the standards and curriculum of their own subject area. By working together in groups, my students would learn about the content, standards, and benchmarks of other disciplines, come to understand the importance of literacy across subject areas, gain a sense of the wide variety of resources available on even the narrowest topics, and learn to replicate the process for their own classrooms.

A Three-Ring Circus: Content Areas, Literacy Strategies, and Interdisciplinary Instruction

Learning in real life is not compartmentalized, as it is in schools. In our day-to-day lives, there is no designated time for reading, for math, for science, for history, and so on. Instead, all of these interconnect to present “students of the world” with a complex combination of subject matter. Teachers who use an interdisciplinary curriculum can more easily create units of instruction that combine the subjects, allowing their students to gain critical thinking skills across common disciplines.

Often, the real world is left out of the classroom. Students frequently ask, “When am I going to use this *in the real world?*” One answer is to show them, in the classroom, how each subject relates to the others, and how concepts they learn in school can and will relate to their real-world experiences.

In traditional classroom situations, lessons and concepts are presented as if they were completely

independent. Students could be studying DNA in science, geometry in math, fiction in English, and World War II in history, never once realizing how to apply their knowledge in each of these subjects to their understanding of another. Interdisciplinary units encourage critical thinking skills that allow a student to see how these subjects are related to one another. Students are encouraged to see not just the minute details of cell biology or the life of Christopher Columbus; they can begin to see the big picture. Cross-curricular education actively shows students how different disciplines influence their lives and allows them to consider the strengths of each discipline in a connected way (Jacobs, 1989).

Effective Interdisciplinary Instruction

Interdisciplinary instruction is an important element of modern educational reform. Its many advocates attest to greater student involvement and interest, improved teacher morale, and increased achievement when it is put into practice (Fitzharris, 2005; Kerekes, 1987; Martinello & Cook, 1992; Strubbe, 1990; Willis, 1994). In addition to the growing popularity of interdisciplinary instruction, proponents of constructivist approaches to learning support student activities that address real-world issues and problems (Cawelti, 1989; Perkins & Blythe, 1994; Prawat, 1992).

Interdisciplinary instruction is most likely to be effective when the following conditions are met (Barab & Landa, 1997; Black, 1997; Brophy & Alleman, 1991; Gatewood, 1998; Vars, 1991; Willis, 1994):

- Units are carefully planned around relevant issues or problems that pique student interest
- Units are anchored by a common theme that crosses all participating disciplines
- Themes are broad enough to encompass each participating discipline without forcing any one discipline away from its curriculum
- The day-to-day activities and culminating events accommodate a variety of learning styles and ability levels

Teachers as Ringmasters

Students benefit from cross-curricular education, as they are encouraged to critically assess the lessons

learned in each discipline and to make connections across the traditional boundaries of formal subject matter. Teachers, too, can benefit from developing an interdisciplinary curriculum. It is not uncommon for teachers to immerse themselves in their subject area and to have little idea what other content area teachers are teaching. When teachers apply critical thinking skills to draw their own connections, they often become inspired to work with teachers in other subjects to create an interdisciplinary unit: “The process empowers teachers to make more efficient and effective decisions and moves them professionally to a level of being able to define a viable curriculum across the grade levels” (Fitzharris, 2005). My idea was to use interdisciplinary education as a tool to teach my teacher candidates how to value and encourage reading skills, regardless of discipline. I also hoped to promote teamwork across the curriculum.

A New Topic to Explore—In Our Backyard

Of all the interdisciplinary units I have taught over the years, the most effective ones had to do with historical events. Historical events involving some level of mystery are particularly effective because they naturally engage students’ interest and because investigating a mystery often requires students to employ skills from many disciplines. As I thought about what event to use, I considered the fact that my teacher candidates were Connecticut teachers, many born and raised here, who were about to start their teaching in classrooms all across the state. Perhaps if we focused on a regional event, enthusiasm for the underlying subject would inspire my students to focus greater-than-usual energy on learning content area strategies and interdisciplinary design.

As a child growing up in Connecticut, I remember my grandmother telling the story of a fire at a circus in Hartford during the Second World War. Her purpose was to caution us children to always look for the exit signs, no matter where we went. I wondered if I was the only child who heard those stories. I wondered if my teacher candidates had heard about the circus fire. An idea was born.

The Hartford Circus Fire

On the morning of Thursday, July 6, 1944, the Ringling Brothers and Barnum & Bailey Circus rolled into Hartford, Connecticut. Hartford was a city bustling with factories working to sustain the war effort. The train had arrived late, and the circus was unable to set up and perform the matinee. Missing a scheduled performance was considered a bad omen in the superstitious circus culture.

The circus set up in a large field on Barbour Street. It suffered a shortage of personnel and equipment due to the war. The tent, or big top as it was often called, had been coated with 1,800 pounds of paraffin and 6,000 gallons of gasoline, or possibly kerosene, which was a common waterproofing method at the time (Massey & Davey, 2001; O’Nan, 2000).

The fire began about 20 minutes into the show, on the southwest wall of the tent, just as The Great Wallendas, a high wire act, started their performance. As soon as the fire was visible, the band leader directed the band to play “The Stars and Stripes Forever.” This song is traditionally used by circus personnel to signal a problem. But it was already too late. In less than 10 minutes, 168 people, mostly women and children, were either dead or dying. Hundreds more were injured. Though many people were burned to death by the fire, many others died as a result of the panic and chaos under the tent. Some died in their seats waiting for the fire to be put out, while others died trying to escape in the direction from which they came. But just before the performance began, large metal chutes had been placed in the entryways to bring animals into the tent. These chutes now blocked two of the main exits (Massey & Davey, 2001; O’Nan, 2000).

The cause of the fire has never been officially determined. There was much speculation immediately after the fire that a carelessly discarded cigarette caused the blaze. Years later, in the 1950s, an Ohio man named Robert D. Segee confessed to setting the Hartford circus fire because he believed an Indian on a horse had come to him in a dream and told him to set the tent on fire. Although he was questioned by Hartford police, he was never charged in connection with the blaze (Massey & Davey, 2001; O’Nan, 2000).

The circus paid out US\$4 million in damages to the families of those who perished and to those who were injured. Four circus employees were arrested and served jail time for their role in failing to take adequate safety measures at the site that day.

The mystery surrounding the circus fire goes well beyond who or what caused the fire. The story of Little Miss 1565 continues to capture the interest of many. She was the most well-known victim of the circus fire. Unlike many of the other victims, who had been so burnt and charred that they had to be identified by jewelry or shoes, Little Miss 1565 (her morgue number) was surprisingly intact—she looked as if she were sleeping—and identifying her should have been an easy task. Yet no one claimed her. Her picture was sent around the globe and still no one identified her. She would become the symbol of innocence lost that day. Her true identity is still disputed.

On July 6, 2005, a permanent memorial was dedicated on the site of the fire.

The Circus Train Pulls Into the Station

To begin any process of interdisciplinary design, it helps to choose a book that gives the background of the story in a way that potentially engages all disciplines. Using a common text gives teachers in different disciplines a mutual point of understanding. As I began my research, I was surprised to find many titles about the Hartford circus fire still in print. I chose one middle school-level text titled *Worlds Afire* by Paul B. Janeczko (2004). This book tells the story of the fire through poems delivered in the voices of the people who were there. It is easy to read and impossible to put down. Along the same lines, I chose a high school-level text titled *Circus Fire Memories: Survivor Recollections of July 6, 1944* by Don Massey (2006). This book is a compilation of survivor accounts created for the 50th anniversary of the fire.

In addition to the main texts, I chose two supplementary texts for teachers who wished to learn more about the fire. The first, *A Matter of Degree: The Hartford Circus Fire and the Mystery of Little Miss 1565*, was written by Don Massey and Rick Davey (2001). Davey is an arson detective who spent years researching the case trying to find the cause of the fire and the identity of the unclaimed child. The other, *The Circus*

Fire: A True Story of an American Tragedy by Stewart O’Nan (2000), offers competing theories for the cause of the fire and the identity of Little Miss 1565.

I also searched for other forms of media that addressed the circus fire. I was able to locate two good documentaries. The first is from the History Channel’s Wrath of God Series (2000) and is titled *Fire Under the Big Top*. This documentary uses actual archived footage and interviews with Mr. Massey, Mr. O’Nan, and various survivors. The second documentary is from Connecticut Public Television’s Connecticut Collection (2000) and is titled *The Circus Fire*. This documentary is more detailed and features useful information about the city of Hartford, the lawsuits, the jail sentences of the circus managers, and the fire laws put into effect after the fire, as well as firsthand accounts of the day’s events from eye witnesses.

In addition to books and documentaries, I was also able to locate 22 *New York Times* articles about the event spanning the years 1944–2006. A Google search disclosed four informative websites. The first, www.hartfordhistory.net/circusfire.html, provided a good basic history of events surrounding the fire as well as titles of books, videos, and websites with additional information. The second site was www.hartfordcircusfire.com, which is sponsored by the writers of the two books *A Matter of Degree* (Massey & Davey, 2001) and *Circus Fire Memories* (Massey, 2006). The site provides background information on the fire and an opportunity to buy the two books. The third site, www.cslib.org/circusfire.htm, is a research guide about the Hartford circus fire put together by the Connecticut State Library. The site contains book titles, authentic public records, and archives. The last site was www.historybuff.com/library/refcircus.html. This is a good site for a variety of historical topics. It contains a firsthand account of the day from a survivor, as well as bibliographies of books on the topic.

Perhaps my best find related to the Hartford circus fire was a folk song written by a duo named John and Mary. On their 1991 *Victory Gardens* album they included a song titled “July 6th” (Lombardo, 1991). The haunting melody and chilling refrain paint a picture of the day in a way that no book can.

Step Right Up to See “The Greatest Show on Earth”

The prevailing approach to interdisciplinary instruction comes in large part from the work of Jacobs (1989, 1991) and Fogarty (1991). Based on their work, my teacher candidates developed webbed instructional units. These units, which are realistic and manageable for beginning teachers, help teachers introduce literacy skills across the curriculum.

In webbed units, teachers share planning and teaching, and overlapping concepts emerge. For example, a group of science, history, health, and art teachers could develop a unit around the Hartford circus fire. Although the focal point of the fire would overlap each content area, the disciplines would maintain their individuality. A science teacher might teach about the combustibility of the paraffin and the kerosene. An art teacher could teach about the beautiful iconography of highly stylized circus posters and advertisements. A health teacher could teach fire safety and home evacuation plans, while a history teacher could employ students as history detectives, helping them to use primary and secondary sources to identify possible causes of the fire. The webbed design presents

a multifaceted view of a general theme. Individual teachers make connections to this theme within and among the disciplines.

Although the class is a 1.5-credit course that lasts only eight weeks, I had a lot to teach during that time. I began the first class without a mention of the fire. Instead, I focused on teaching my students content area literacy techniques that they could apply to interdisciplinary units for their own students. I had the class complete a Frayer Model for vocabulary development (see Figure 1), working in teams of two. A Frayer Model (Billmeyer & Baron, 2002) is a graphic organizer that can be used in a variety of content areas. It has four boxes to complete: essential characteristics, examples, nonessential characteristics, and nonexamples. Teachers can use this organizer as a prereading activity to assess what students know about particular vocabulary words they will encounter in a unit of study. The Frayer Model also assists students in thinking of attributes and non-attributes of a concept.

The next reading and writing activity was called a freewrite. I asked my teacher candidates to write about “A Trip to the Circus” (see Figure 2). To complete this activity the teacher writes a topic on the

Figure 1 Frayer Model for Circus

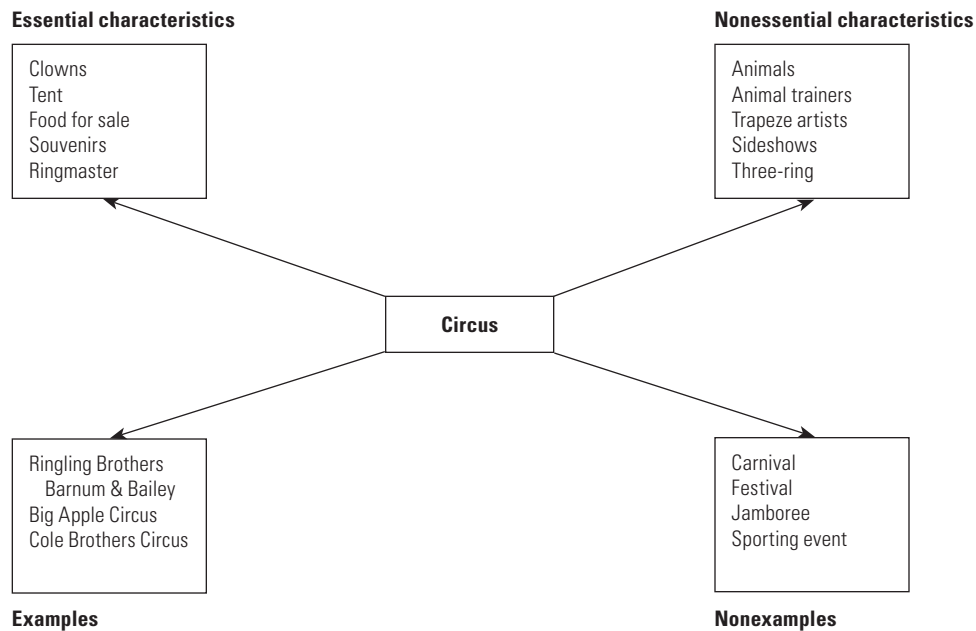
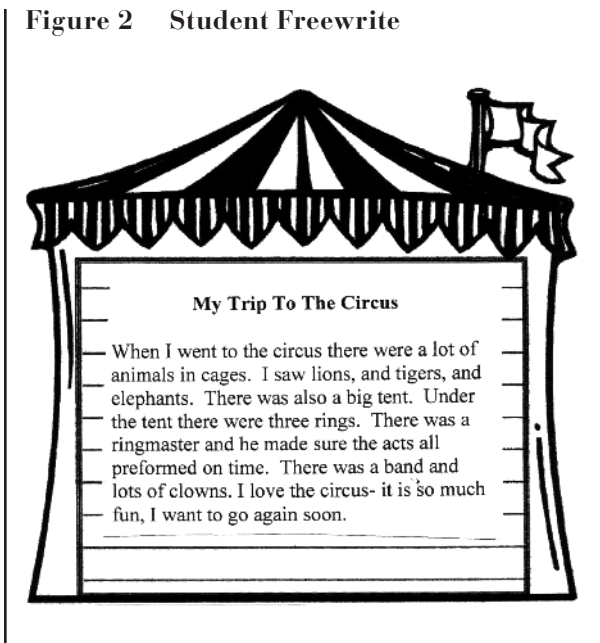


Figure 2 Student Freewrite



board and sets a timer to run while the students write. The idea is to be quick—spelling and punctuation do not count. This is simply an exercise to help students commit their ideas to paper, a critical skill for standardized tests. I usually set the timer for two minutes for elementary students and five minutes for middle and high school students. This, too, is a great prereading activity to help a teacher quickly assess knowledge before teaching a topic. A freewrite can also be used as a jumping-off point for an essay or research project. Additional information about the use of freewrites can be found in Murray (1985) and Ede (2001).

We ended the class with an Anticipation Guide (see Figure 3). This prereading activity is simple to create, piques student interest before a topic is introduced, and can be used with almost any source (Duffelmeyer & Baum, 1992; Merkle, 1996/1997). To create an Anticipation Guide, the teacher writes four to six statements about the topic. These can be yes or no questions or true or false. Students circle the answers they think are correct. These are not graded. At the end of the unit, students are invited to revisit the guide and change their initial answers. This strategy keeps the students guessing as to what they will be learning.

I mentioned the Hartford circus fire for the first time at the beginning of the second class. I introduced

Figure 3 Anticipation Guide

The Hartford Circus Fire 1944		
Yes	No	Nothing bad ever happens at the circus.
Yes	No	Circus tents never catch on fire.
Yes	No	People go to the circus to have fun.
Yes	No	People can die in a fire even if they are not burned.
Yes	No	Dead people's identities are always discovered.
Yes	No	Sometimes it is difficult to determine if a fire was caused by arson or a lit cigarette.

the books we would be using and discussed why we had completed the activities we did on the first day of class. I explained how and why the topic was chosen and spent part of the class describing interdisciplinary unit design. For an overview of the fire, I showed the History Channel documentary *Wrath of God: Fire Under the Big Top*.

Most content area standards include benchmarks about critical viewing. We discussed as a class the importance of bringing quality television programs and documentaries into classrooms and how to teach critical viewing to students. One way is by using graphic organizers, which help students to catalog and process the visual information being presented. A critical viewing organizer (see Figure 4) allows students to comment about the program's topic before, during, and after the program. The questions require viewing the program through a critical lens and offering suggestions for improving the program. I have found critical viewing organizers beneficial because they give students a reason to be attentive while watching an informational program such as a documentary.

For the third class, the teacher candidates read *Worlds Afire* (Janeczko, 2004) and the *New York Times* articles. At the beginning of the class, teams of two were each assigned one of the newspaper articles. Each team read its article and completed a Five W's Chart, detailing what happened, who was there, why it happened, when it happened, and where it happened. This reading strategy is excellent for students who need help summarizing information. I have used

Figure 4 A Critical Viewing Organizer

Before Viewing

1. What do you already know about the topic?

There was a big fire at a circus, the tent went up in flames. It happened in 1944.

2. What do you want to learn from viewing this work/presentation?

I would like to know how the tent caught on fire, and why people could not escape.

During Viewing

1. As you view this work/presentation, write below THREE interesting and new ideas or visual elements that you observe.

The song "Stars and Stripes Forever" is used in a circus to signal the workers that there is a problem.

In order to make the tent waterproof, they had to use flammable materials.

It took 10 minutes for the tent to catch on fire and burn to the ground.

After Viewing

1. What was the most interesting idea or visual element?

The story of Little Miss 1565 and why she was not identified.

2. What made the visual work/presentation effective?

The narration, which was supplemented with personal accounts, video footage, and actual pictures taken on the day of the fire.

this chart as a starting point for essays and as a study skills technique. This graphic organizer and a variety of different uses for it can be found at the Education Place website, www.eduplace.com/graphicorganizer/pdf/5Ws.pdf.

And in the Center Ring

Although most of the estimated 8,000 people who attended the circus on July 6 survived the blaze, it never crossed my mind that we would find a survivor willing to speak to the class. But one of my teacher candidates put me in contact with a New London, Connecticut, native who was 5 years old the day of the fire. He had attended the performance with his older sister, three cousins, and his mother.

During our fourth class, this man shared his harrowing experience with the class, including how he and his extended family had escaped the fire. As luck would have it, they were seated near two gentlemen who belonged to a circus enthusiast group and knew how to drop the sides of the tent to help people escape. Not only had our guest lived to tell about the

fire, he had grown up to become a volunteer fireman and an avid circus watcher. Through his storytelling, my teacher candidates were able to see history come alive. They were able to tie an event to a flesh-and-blood person. As a class, we talked about ways that teachers can use guest speakers as a supplement to textbooks. Guest speakers and other oral presentations are yet another way to encourage students to think critically while honing their listening skills. This is important because literacy is not just about reading. A truly literate student is able to analyze auditory information and formulate questions based on what he or she hears. Any situation in which students must process information is an opportunity to strengthen their literacy skills.

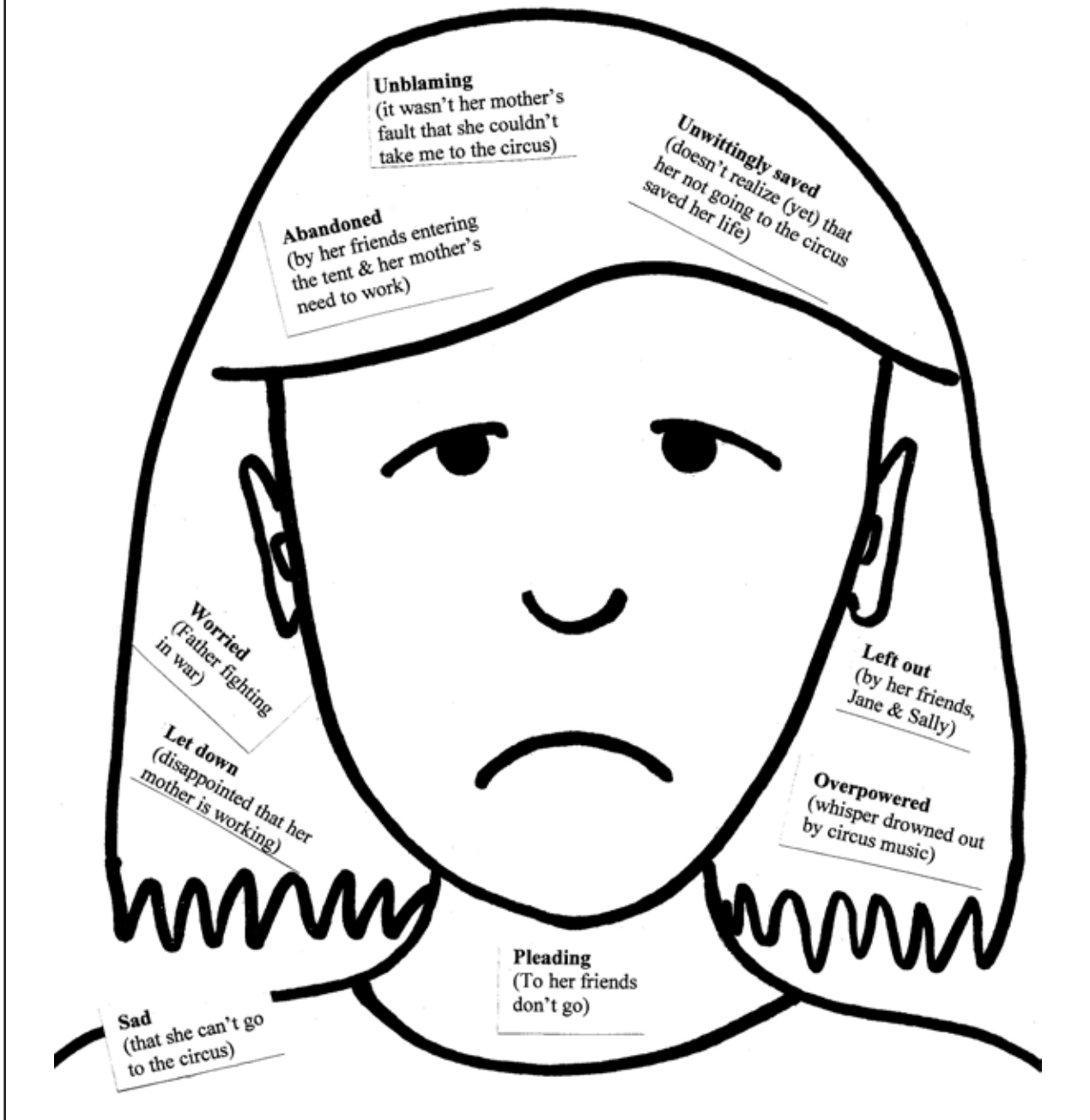
In an effort to extend the concept of humanizing an event, each student completed an open mind activity (see Figure 5). In an open mind activity, a student chooses a character from a book—in this case from *Worlds Afire* (Janeczko, 2004)—or a person from real life to analyze. The student draws and colors a picture of what he or she thinks the person looks like (usually a portrait of the head), then writes words or phrases that have been written about the character to describe him or her. This is a valuable postreading activity because it requires students to search the text for clues to a character's appearance and personality. I have also used this technique as a study tool to help students remember political figures, scientists, or literary characters.

Get on the Bandwagon

During the fifth class, all teacher candidates participated in a gallery walk (see Figure 6). Large sheets of paper were placed on walls around the room, each with a different subject area listed. Each student was given a different colored marker and told to walk around the gallery and write an interesting idea or topic inspired by the Hartford circus fire that could be taught in the subject area listed on the paper. This activity allowed the teacher candidates to brainstorm outside of their subject and share their ideas with the whole class before being divided into groups.

After the gallery walk, I divided the teacher candidates into groups. Their assignment was to create lesson plans based on the Hartford circus fire, representing each of their content areas. The groups could

Figure 5 Open Mind Activity



use any of the ideas generated by the class during the gallery walk, or come up with ideas of their own.

An English teacher, math teacher, science teacher, history teacher, business teacher, and a foreign language teacher or “special teacher” (art, music, gym, home economics, or shop) were selected for each group. Separate groups were created from middle and high school teachers. Teacher candidates had four weeks to work

on their group units. Their first task as a group was to decide on a grade level for their lesson. The second task was to find the state curriculum for their subject area and grade level. These units had to be aligned with both content standards and literacy strategies.

Each of my teacher candidates contributed to the overall project by creating three supporting lesson plans in the appropriate content area, using the literacy

Figure 6 Completed Gallery Walk Chart

<p>English</p> <ul style="list-style-type: none"> ■ Character journals ■ Descriptive paragraphs about the fire ■ Discuss and read circus stories ■ Create a character sketch from the circus's point of view ■ Write a newspaper article from the day it caught fire ■ Write a poem about the circus ■ Write a final dialog between a mother and child caught in the blaze ■ Create journals of the family members who stayed behind ■ Autobiographies/biographies ■ Obituaries ■ Classified ads for people to work at the circus to set it up ■ Safety manual for first-time circus employees 	<p>Math</p> <ul style="list-style-type: none"> ■ Chart/plot course from Florida where circus started to Hartford, CT ■ Rate of time it took the tent to burn ■ Compare size of tent in 1944 to today's tents ■ How much money did it cost to fireproof—equate to today's costs ■ How many people could the tent hold—capacity ■ Calculate speed and rate for fire ■ Calculate how many gallons of paraffin and gasoline it took to paint the tent ■ Percentages/ratios ■ Dimensions of the grounds where the circus was set up ■ Scale drawing of the tent ■ Area/perimeter of the tent 	<p>Technology</p> <ul style="list-style-type: none"> ■ Compare technology used to create a circus then and now ■ How was the circus run then and now? ■ Why was there not enough time to put out the fire? ■ Why did the fire department get there too late? ■ Make an interactive PowerPoint presentation ■ Use the web to gather research on the fire and other circus fires ■ How does waterproofing work? ■ Create a website ■ Design a newsletter
<p>Science</p> <ul style="list-style-type: none"> ■ Weather forecast for July 6, 1944 ■ How does skin burn? ■ How does gasoline catch on fire? ■ What is paraffin? ■ How do people die in a fire? ■ DNA and the process of identifying burnt bodies ■ Technology in fire rescue ■ Did the weather help or hurt the rescue efforts? ■ Geography of the site as it was and how it is today 	<p>History</p> <ul style="list-style-type: none"> ■ History of the circus in the world through the ages ■ Compare other circuses ■ Compare to other fires ■ History of Barnum and Bailey Circus ■ History of fire safety and legislation passed after the fire ■ How were the legal issues settled? ■ History of Hartford's memorializing of the event ■ Events of 1944 ■ Map of where the tent was put up and how the seats were configured 	<p>Gym</p> <ul style="list-style-type: none"> ■ Fire safety ■ Burn treatments ■ Smoke safety ■ Learn about how a fire spreads ■ Create a fire escape route in your home

strategies I had taught. A sample lesson plan can be seen in Figure 7. Each group created a poster display of its unit, and I also required my teacher candidates to complete all of the lessons and projects assigned within their culminating activity. Many teachers are not aware of how long some of their assignments take to complete, so I wanted my teacher candidates to complete the projects from a school-age student's perspective to gain a sense of time spent per assignment

Ladies and Gentlemen, Children of All Ages...

After eight weeks of study in content area literacy strategies, the groups were ready to share their units. On the last day of class we celebrated with "A Night at the Circus." We set up the classroom to look like a circus midway. Each group had a table on which to

display its units and make a group presentation to the class. Every student in the class brought a type of food one would find for sale at a circus.

The teacher candidates in my class included preservice teachers from different disciplines and grade levels. With such diversity, the projects resulted in a wide variety of lesson plans that ranged from special education to accelerated learning. Many commented that they had never had the experience of working with teachers in other disciplines. The results exceeded my original expectations; they represented a wide range of topics including carnival and circus poster art, the anatomy of fire and how paraffin can be used as an accelerant, human anatomy and what happens to the body when skin burns, circus culture around the world, fire safety, and even a statistical analysis of data related to the fire.

Figure 7 Sample Lesson Plan

ANATOMY OF A FIRE

Name: Jen Stauffer

Discipline: Science

Grade Level: 7

Time frame: 1-1/4 hour block schedule period

Lesson Objectives

- Students will be able to *explain (verbal and written)* the process of starting and maintaining a combustion reaction.
- Students will be able to *organize* their *written* observations of demos into an observation journal.
- Students will be able to *read* and *verbally share summaries* of article excerpts read in class.
- Students will *apply* arson forensic science principles to a computer simulated case via *reading, discussing, and writing*.

Prior Knowledge

- Students are familiar with chemical reaction and formula vocabulary.
- Students are familiar with how to maintain an observation journal.
- Students are familiar with various types of group work protocols.
- Students are familiar with using computers and the Internet as a learning tool.
- Students are familiar with taking notes.

Connecticut Science Standards

Content Standard

- Scientific literacy includes speaking, listening, presenting, interpreting, reading, and writing about science.

Expected Performances

- Provide explanations to investigated problems or questions.
- Communicate about science in different formats, using relevant science vocabulary, supporting evidence, and clear logic.

Content Standards

- Energy provides the ability to do work and can exist in many forms.
- Describe the effect of heating on the movement of molecules in solids, liquids, and gases.

Expected Performances

- Provide explanations to investigated problems or questions.
- Communicate about science in different formats, using relevant science vocabulary, supporting evidence, and clear logic.

Materials

- Candle, matches, beaker, paper, Parafilm (paper coated in paraffin)
- Hartford circus fire article excerpts, Forensics of Fire PowerPoint, computer access for webquest

Lesson Overview

- Demo: Students determine the “ingredients” for a fire.
- Students discuss fire vocabulary and forensic fire investigation basics via a PowerPoint presentation.
- Students break into small groups and read excerpts from various Hartford circus fire articles (that mention canvas dipped in paraffin and gasoline or the arson investigation) in like-ability groups.
- Students analyze the Hartford circus fire demo.
- Students analyze evidence to determine if a simulated fire was caused by an accident or arson via a Web simulation.
- Students complete a homework assignment that links the presentation, readings, and webquest.

Lesson Outline

1. Students determine the “ingredients” for a fire. (10 min)
 Demo: Light a match. Let it burn out. Ask students what they observe, with the teacher writing key vocabulary on board (flame, fire, heat, smoke). Light another match and light a candle. Hold it under the bottom of a glass beaker. Black soot and moisture deposits should be observed. Ask students where soot and moisture came from, writing key vocabulary on the board (soot, fuel, chemical). Place a beaker over the candle and let the flame slowly die out. Ask the students what has happened, writing key vocabulary on the board (oxygen, air).
2. Students discuss combustion vocabulary and forensic fire investigation basics via a PowerPoint presentation. (15 min)
 Presentation includes definitions for those words compiled on the board. Presentation also includes some additional vocabulary and basics of forensic arson investigation. Case studies/field photos included. PowerPoint launches into a graphic personal account from the Hartford circus fire to spark student interest—they'll really want to know what happened and why!!! Students are given guided notes consisting of the PowerPoint slides as presented, but missing words or definitions—these are to be filled in as the teacher progresses through the presentation.
3. Students break into small groups (by ability) and read excerpts from various Hartford circus fire articles. (10 min)
 Article excerpts should be those that specifically mention canvas dipped in paraffin and gasoline or the arson investigation, as well as enough basic storyline pieces so the students can get a feel for the overall event. Students are grouped by like ability, so shorter and less vocabulary intense article excerpts are given to weaker students and longer, more rigorous articles are given to upper ability students to ensure that all students are able to contribute to discussion and that upper level kids don't finish early.

(continued)

Figure 7 Sample Lesson Plan (continued)

4. Students share main ideas and the class discusses the circus fire story. (15 min)
Teacher calls on students from each group to share the relevant findings from each group's article excerpts in three sentences or less. At the end of sharing, the class tries to formulate a general story and postulates causes of the fire. Class should arrive at paraffin coating on tent top as the cause for the accelerated burning, while the exact source of the fire is a mystery. Teacher should also ask driving questions that relate to specific vocabulary gleaned from the PowerPoint presentation.
5. Teacher performs the Hartford circus fire demo. (5 min)
Demo:
Light a piece of paper on fire (similar to canvas)—it doesn't burn rapidly or intensely. Light a similarly sized piece of waxed paper or Parafilm (commercial paraffin/paper product) on fire (similar to canvas dipped in paraffin)—it burns very quickly and intensely. Ask students to explain their observations using relevant vocabulary. Ask students to relate demo to Hartford circus fire.
6. Students complete a computer simulation webquest relating to fire forensic science. (15 min)
Students work in assigned pairs (upper level with lower level) at computer stations or laptops. Students access the website www.pbs.org/wnet/secrets/case_rome/rome_pop/index.html.
Students will collect simulated evidence and look at forensic analysis to determine if the simulated event was arson or an accident. Students will complete a portion of a worksheet entitled *Anatomy of a Fire* while progressing through the brief simulation.
7. Students' homework is to finish *Anatomy of a Fire* worksheet.
All students will complete the worksheet, though they worked as partners in class.

Note. This lesson was used with permission of the student and reflects the unique lesson plan format required for her subject area.

Hold Your Horses—Strengths and Weaknesses of the Project

I consider the project to have been a success. Empowered with critical thinking skills, literacy strategies, and creative approaches to their own disciplines as well as others, teachers are better able to understand their own instruction within the context of the school as a whole (Fitzharris, 2005). I also helped my teacher candidates see their lessons from the perspective of the school-age student.

The most important outcome was an attitude shift in my teacher candidates with regard to literacy. At the beginning of the course, many of them were unwilling or unable to see how literacy was important to their discipline. They did not see that the literacy skills required to deconstruct and understand any subject, whether it is math or English, are vital to a student's success in that class. Through our research and classroom practice, the teacher candidates were able to see the validity of using these strategies in their own classrooms. By the end of the semester, they were actively engaged in cross-curricular conversations, eager to seek advice from other subject area teachers, and best of all, looking to find new and innovative techniques that they could use to help their students decode and comprehend the material in their content area.

However, the project did have a few weaknesses. Because of the required teamwork in building the teacher candidates' units, the amount of planning time was almost double what it would usually take a teacher to create a lesson on his or her own. Groups were given plenty of time to work in class, yet some teacher candidates complained that they wished they had been given more time, often commenting that it took them a while to "get the hang of working together."

While watching the teacher candidates work in groups, I realized that many teachers reading this article may not have the ability to collaborate with a team of other content area teachers. When I raised this issue to the teacher candidates, one noted that the unit does not have to be on a large scale to be effective, noting that even two teachers have the ability to design a unit that would spark students' interest.

The materials also became a challenge. Although many books have been written about the Hartford circus fire, some are difficult to understand, poorly written, or focus too much on one specific aspect of the fire, such as the ensuing lawsuits. I believe my teachers would have benefited from a greater diversity of quality materials about the event. The Holocaust, which I have used in interdisciplinary work in the past, is a good example of an event that has produced a substantial and academically appropriate body of literature and media. However, I do feel strongly that

the Hartford circus fire's place in Connecticut history contributed to the interest, imagination, and enthusiasm of my teacher candidates.

Comprehension Skills Are Necessary in All Subjects

In the end, I believe the Hartford circus fire taught these teachers more than any standard textbook. The units they designed, in very different subjects such as math, business, and home economics, seamlessly applied content area literacy skills to an interdisciplinary curriculum built around the dramatic story of a circus fire. Course evaluations confirm my conclusion that the teachers in my class learned to appreciate the value of content area literacy strategies and gained valuable experience in cross-departmental collaboration.

Most important, my class learned that student reading skills are every teacher's responsibility. In the process of deconstructing a unifying subject matter and then building individual lesson plans to create one cross-curricular unit, my teacher candidates came to see that reading comprehension is a necessary skill for every subject. No matter how different biology and home economics may seem, both require reading comprehension and critical thinking skills. I believe this case study can be a motivating illustration to administrators struggling to impress upon teachers the importance of student literacy in all subjects. Reading education is not confined to a reading class, or to books. It should play a part in art, history, economics, math, science, and physical education, and in the creative minds of teachers with drive and inspiration.

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- Morse teaches content area literacy strategies to preservice and inservice teachers throughout Massachusetts, Connecticut, and Rhode Island, USA; e-mail professor .reading@yahoo.com.