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How Do You Empower At Risk Students To Become Active Citizens About The Environment, Through The Design And Implementation Of An Urban Environmental Science Curriculum Within An Alternative Education Setting?

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HOW DO YOU EMPOWER AT RISK STUDENTS TO BECOME ACTIVE CITIZENS ABOUT THE ENVIRONMENT, THROUGH THE DESIGN AND IMPLEMENTATION OF AN URBAN ENVIRONMENTAL SCIENCE CURRICULUM WITHIN AN ALTERNATIVE EDUCATION SETTING?

by

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CHAPTER ONE

INTRODUCTION

Introduction

Environmental education looks different when working with alternative students because many are from urban and suburban areas. Most of the students have not had many positive learning experiences, let alone outdoor learning experiences. A young person's experience at school is a powerful developmental factor, given that school is where much socialization and identity development occurs (Harter, 1999). Stigmatization, particularly in the developmental stages of adolescence, can negatively affect an individual's perception of self and, in turn, one's self-esteem. One of the first obstacles in alternative education is to get the students to view themselves through a different lens. Rather than viewing alternative schools as the "dumping grounds" where traditional schools send the "bad kids," alternative schools embrace second-chance opportunities for education completion and dropout prevention (Harter, 1999). Alternative high school students need opportunities to showcase to the community that they are not all "bad kids" and that they can truly be an asset in their communities as active-informed citizens.

When considering starting an urban outdoor environmental education class, balance is key to connecting students, community, politicians and others together to be stewards of the land. Environmental education is immersing students in the natural world and getting them to make observations and ask questions (Russ, 2015). In turn, questions lead to stating the problem and building the basis for scientific inquiry. Through scientific

inquiry students develop a deeper understanding of how all living and nonliving things in the environment are interconnected. Urban environmental education takes environmental education a step further beyond scientific inquiry by integrating the importance of understanding world geography, and the politics and laws associated with each country, state, county, and city (Russ, 2015).

As a teacher, I want to get my students out of the classroom and teach them about the life and elements just outside the door of the school. It is my duty to prepare students to be engaged and thoughtful about the environment within their communities as active citizens. This brings me to the main topic: *How do you empower at risk students to become active citizens about the environment, through the design and implementation of an urban environmental science curriculum within an alternative education setting?*

In chapter one, I share my journey that sparked my passion for the natural world and my willingness to share similar experiences with others. As a formal educator in science, I find myself reverting back to what I found important as a student in environmental education must be implemented into creating an urban outdoor environmental science class for my at-risk students to have some of the same opportunities to enjoy authentic experiences in nature. In addition, I explain how local parks, environmental programs, universities and other agencies will be factors in creating a successful curriculum.

Small Town Boy

As a kid, my brother and I were always playing outside, no matter the conditions. One of the most memorable times was when it was 50 degrees fahrenheit below zero and

Governor Arne Carlson cancelled all Minnesota schools. We took advantage of the day off from school by spending the majority of the day outside in our snow fort. We had two small entrances that could be closed off by a boulder of snow to better insulate it and keep out the cold winds. In the center of the room we had a small fire pit, and just above there was a small hole to let the smoke out. It got warm enough inside that we even had to shed a layer of clothing. It was so much fun pretending that we were explorers in the Arctic, because there was a sense of accomplishment bearing the bitter cold weather. This experience made me appreciate the natural world even more in how it can be harsh and beautiful at the same time, yet you have to respect it.

Years later we applied these same skills in boy scouts. I learned a lot in scouts, including winter survival, knot tying, basic first aide, canoeing, sailing, rock climbing, archery, leather work, team building, and other outdoor skills. Most importantly, I learned what it meant to be a steward of the environment. The Boy Scouts of America has embraced the conservation of the environment for over one hundred years. As scouts, we always made sure we left our sites cleaner than when we arrived, picking up all the trash we found as we explored. One time at Many Point Scout Camp, near our campsite three of us discovered one of the largest patches of pink lady slippers in Minnesota. We brought the flowers to the attention of the camp coordinator and naturalist, who verified our discovery and then marked off the area. After our stay they closed the campsite, and repurposed the site the following year into an educational interpretive trail for wildflowers. We could have easily picked a flower or two from over hundred of them, but we knew that we were observing something very special.

I was also fortunate to go to a high school that taught forestry and our school owned two forests. Every week we took a bus to one of the forests to make observations and record data about the trees and animals. For the first few times my teacher had us just sit out there on our own to quietly listen. Sitting there helped some of us expand our horizons through that novel experience, simply observing the environment with all your senses (Monroe & Krasny, 2015, pg 123). Simple observations evoked the basic understanding on how all mechanisms of the forest are interconnected and work together as an ecosystem. Understanding the mechanisms of an ecosystem was extremely important in managing the forest.

By the end of the year, we had the forest marked out for Potlatch, a paper company, to come in and harvest the trees. This relationship with the paper company brought revenue to our school and helped fund our class. We truly learned the importance of how to properly manage a forest, benefit from it economically, and how to work with other companies and private landowners. My science teacher truly taught us how to immerse ourselves in nature scientifically, economically, politically, and while connecting us with community members. Ever since that class, I have always wanted to create something very similar to what he developed for his students. My science teacher, planted the seed in me to become a science teacher focused on the community and environment.

Naturalist

At the University of Minnesota - Duluth I focused on teaching Life Science, and Earth and Space Science. I believe these two fields in the sciences are very important for

future students. Geologically and astronomically the Earth and its processes will affect how we live and decide where we live, especially when considering climate change and natural disasters. Further understanding of biological processes can help us make decisions in regards to the biome where we live. Knowing the biome can dictate which trees, flowers, and vegetables will grow in the yard or garden. In addition, students today are living in an era of new scientific advances in understanding all aspects of the Earth. Scientific advances bring on new technological advances and I am well prepared to help students keep up with those advances. My education prepared me to engage students to understand and care more about the environment within their community by teaching about ecosystems, edible plants, forest management, water quality, and proper land usage of public spaces.

I got my first chance to teach about the natural world as a naturalist educator at the Hartley Nature Center in Duluth, Minnesota. Students who visit the center are already engaged to go outside and learn about nature, which makes it easier to motivate the students to observe, relate, and care about the environment. The big take-away from this experience was the importance to have fun and play in nature, which helped students connect with nature. Just like myself growing up, the students learned so much about the environment from just playing outside and exploring the woods. When taking students outside they first want to explore and observe, but as the day goes on students became more aware of their surroundings and how everything is interconnected. Everything has a purpose, and everything, in time, can benefit something else, hence the circle of life. Just getting students out to explore the natural world is the first step for students to connect

with nature. The term "urban environmental aesthetics" suits Hartley's model very well, "the environment as the places where we live, work and play" (Blanc, 2012).

Science Educator

A few years later, I accepted my first full time science position at an alternative high school in northwest central Minnesota. I taught students who did not have much connection with the natural world. There were plenty of natural areas around, yet students were unaware of their own surroundings. On a field trip to a state forest park, I was surprised that some students were hesitant to walk the trails because it was the first time they had been in the woods. At that moment, students' ability "to perceive and understand environmental aesthetics" was skewed (Blanc, 2012).

There is a fear factor with nature, students can be afraid of aspects associated with the natural world (de Sousa Vianna, 2002). Those students viewed the forest as a place to fear and be wary, instead of a place for play and exploration. Once students became comfortable to enjoy themselves and play, the sense of fear and hesitation diminished. This can take several visits outdoors for some students to become comfortable. For example, one time before going out we talked about fears. I had one student who was fearful that a bear would eat one of us. We spent a day discussing a black bear's diet, bears eating more berries and roots, rarely taking down big game like deer. Generally, black bears are scared of humans and hide from us even upon smell. Since a bear can smell scents ten to twenty miles, people are unlikely to see them in the wild. Once the student feels safe the real questions, learning, and understanding begins.

Environmental Science Educator

After teaching a few years in rural Minnesota I taught at a traditional junior high school and middle school, each for one year, I found myself longing to teach in an alternative program again. Just when I thought I would be a substitute teacher for a year, a position opened at an alternative high school on the northern edge of the twin cities. Ironically, before I taught there the educational teaching strategies were more project based; they even took students to the Boundary Waters Canoe Area Wilderness every year for awhile. That all changed when the grading policy changed from a pass/fail system to actual grades. All the focus shifted to teaching the core classes and raising test scores. In turn, the school became more traditional and all the fun alternative aspects were phased out. Now students are eager to have more electives that are engaging and relevant to their lives.

Despite our school being located in an urban setting, the school sits next to an oasis of a green spaces within our city. Just outside the classroom door we have a city park used by many people, including dog owners. There is a space within the park that is not used very often and this could be a great project for students to build a designated dog park area. There is also the a creek nearby and it would be great to create a sustainable area for stream studies. Yet just adjacent from the stream there is the clay pit pond, so it would make sense to build a dock and an observation area between the stream and pond. In addition, students could conduct a citizen science project with the local watershed district with helping to monitor the stream.

I envision the students developing an educational working relationship with the regional park as well, since that is also within walking distance to our school. Many people use the trails in the park every day, unfortunately the ecological integrity for many of the unpaved trails are not intact. These trails allow sediment and other chemicals like nitrogen and phosphorous to enter the a major river, which can unhealthy for people downstream. I would like to see a plan of action to develop a sustainable trail system for future generations.The long term goal is to help manage the existing trails in the floodplain forest within the park boundaries. The trails need to be widened, rerouted, and a few trails need to be closed for those trails promote erosion and degradation. In addition, there are many trails without signage, which makes it unsafe for hikers, runners, and bikers. Managing the trails will be a full time commitment throughout the entire school year.

Furthermore, the National Park Service is a part of the park as well. Students would have the opportunity to work with the National Park Rangers identifying and clearing invasive species like garlic mustard and buckthorn from early spring to late fall. Other seasonal work would include working with the park's naturalist building pollinator gardens. In the winter, again students would work with the park's naturalist managing the diseased oaks. In the spring students would have the chance to work with the University of Minnesota grad students to study Eurasian milfoil and weevils. If this relationship between the park and school flourishes, students will be invested in problem solving, environmental stewardship, and in youth and community development.

When teaching students in grades 11-12, it is important to set clear and rigorous expectations every time when outdoors (Monroe & Krasny, 2015, pg. 123). Over time students will be accustomed to the routine, eventual being capable of starting projects on their own. Additionally, Maslow mentioned taking time to establish routines provides students with structure and a safe place to work, overtime students feel safer and develop a sense of belonging to a larger group (Maslow, 1943). This is true for urban and suburban students who may have some fears about the outdoors (Russ, 2015, p. 17). Once the student feels safe and they belong to the group, internally they are motivated to contribute in class projects. The more chances students get to contribute, the easier it will be to challenge students with any environmental project.

Work must be fun and "work can be play" when teaching students to be active productive citizens of the environment (Schusler & Krasny, 2010). This changed my thinking about timelines and deadlines for outdoor projects. At the beginning of every year, the students are going to be excited the first few trips to the park and trails. I must guide that enthusiasm for play into work that can be enjoyable. By working slower and making it more enjoyable each project will take double to triple the time to complete. It is important that other organizations working with the students know this as well, all being committed to a "good use of time" educating the students (National Research Council, 2002). Many professionals will want to come in and get the job done quickly. As the educator, I must inform others that the educational process for the students has priority over completing the project sooner. The goal is to get students devoted to working outside, and developing youth as active citizens (Monroe & Krasny, 2015, pg. 116).

Summary

Positive youth development refers to "an asset-based and integrated approach to promoting young people's well-being" (Monroe & Krasny, 2015, pg. 108). It is important to get the students to feel connected to their surroundings and encouraging them to be involved with improving their local communities and environment. This is important for their psychological and emotional development; "commitment to civic engagement" (National Research Council 2002). Generally, students who are involved with their communities have a positive individual's perception of self and, in turn, one's self-esteem.

In the early 1970s, Glasser advocated and lectured how students need a sense of belonging and connectedness (Glasser, Stapp, & Swan, 1972). Creating such classes would encourage some students to set more short-term goals. In turn, those students would be motivated and encouraged to finish their core classes the first time so they can take an elective class like urban outdoor environmental science.

I believe it is beneficial to create well-rounded individuals.Through an outdoor environmental science class I will foster inquiry-based learning, teaching students both hard and soft skills, so they can make proper decisions about their environment. In turn, connecting subject matter to student's lives, so the material is more meaningful (Glasser et al., 1972). My teaching will help students to develop meaningful methods of thinking, because I want to challenge them to think about their thinking (Costa and Kallick 2008). At the same time it is essential to encourage and challenge my students to be aware of their thoughts and actions, and how individual choices can affect the environment. This

"participation" will give the students a sense of empowerment and ownership (Simovska, 2008).

This brings me to my question *How do you empower at risk students to become active citizens about the environment, through the design and implementation of an urban environmental science curriculum within an alternative education setting?* I was fortunate to have learned as much as I did throughout the years directly and indirectly about environment. Today, many students in or near urban areas have little meaningful experiences interacting with nature in a positive way, and especially for at-risk students around urban areas. I want my students and others to be able to have some of the same experience as I, which have given me the insight and knowledge to develop a curriculum that can do so. This capstone will explore three main topics, alternative education, urban environmental education, and instructional strategies when creating curriculum for an outdoor urban environmental education class for at-risk students. Included within each topic are few supporting subtopics; outdoor education, adventure education, citizen science, choice theory, understanding by design, inquiry based learning, and project based learning. Chapter Two will look closer into the supporting research on all the topics listed.

CHAPTER TWO

LITERATURE REVIEW

Introduction

A young person's experience at school is a powerful developmental factor, given that school is where much socialization and identity development occurs (Harter, 1999). Stigmatization, particularly in the developmental stages of adolescence, can negatively affect an individual's perception of self and in turn, one's self-esteem. All students need validation, but at-risk students in alternative settings need opportunities to showcase to the community that they are not all "bad kids" and that they can truly be an asset in their communities as active-informed citizens.

Chapter two outlines the literature relating to the research question: *How do you empower at risk students to become active citizens about the environment, through the design and implementation of an urban environmental science curriculum within an alternative education setting?*

The first section covers research regarding the target audience of the area of focus: alternative high school students. There are many factors that affect an alternative high school student's ability to learn. Alternative education programs assist the student and family in accessing support systems necessary for the student to be successful in school and community (Foley & Pang, 2006). In addition, choice theory plays a strong role when working with at risk students in alternative education. Choices provide much needed freedom that instills intrinsic motivation for students to learn.

In the next section, urban environmental education focuses more on students being involved with "hands-on environmental stewardship" (Russ, 2015, p. 16).

Correspondingly, this section also looks to integrate citizen science, outdoor education and adventure education. Together these approaches connect at risk students with the professionals within in the community, all committed to promoting sustainable change within the local environment. Historically, urban environmental education focuses on individuals within their local community with a goal of creating citizens that can understand environmental issues and take action.

The last section connects instructional theories universal by design, inquiry based learning, and problem based learning. These strategies are crucial methods when teaching alternative students the skills necessary to become active citizens toward the environment within their communities. Therefore, considerations must be taken into account in order to develop learning structures that foster growth mindset, such as inquiry-based and project-based instruction while incorporating adventure educational opportunities. Conclusively, this chapter explores the connections among alternative education, choice theory, urban environmental education, citizen science, outdoor education, adventure education, understanding by design instructional methods, inquiry-based learning, and project based learning concludes this chapter.

Alternative Education

Increasingly, the public views the programs as a place for disruptive youth who do not belong in traditional schools (Lange, 1998). Alternative education programs often appear to be site-based programs, operating in physical facilities with limited access to academic supports compared to traditional schools (Foley & Pang, 2006). However, alternative education programs are a perfect fit for some students, while many with great

effort get caught up to go back to their traditional school and graduate with their classmates. Foley and Pang (2006) describe that alternative education programs are designed to meet the educational needs for at-risk students, those likely of graduating high school after their formal graduation date. Many students are at risk of not graduating on time for a number of reasons, which include circumstances within and out of their control, and alternative settings can generally address those within in one's control. Alternative programs can benefit many students depending on each student's needs.

Alternative education programs either emphasize discipline or focus on an innovative education program that seek to meet individualized student's needs. Most alternative programs aspire to focus on both aspects (Lehr & Lange, 2003). In doing so, Alternative education is successful when it provides structure and a caring environment for the students, in turn gaining student trust (Noddings, 2005). Many students lack stability in their lives, and alternative schools can provide that much needed structure and flexibility a student needs. Incongruence, many students in alternative education settings have little parental support in their educational process, yet parental involvement is one of the key factors in students persisting in school and graduating (May & Copeland, 1998).

Seeking innovative ways to involve a positive adult role model in the student's education is crucial in supporting the student to complete his or her secondary education, generally just one adult can make the difference in a student's life. Alternative education programs assist the student and family in accessing support systems necessary for the student to be successful in school and community (Foley & Pang, 2006). Ultimately,

alternative programs hope that each individual connects with at least one positive adult role model. Although, one person can make a difference in another person's life, in the end it is the individual who makes the choices in his or her own life.

Choice Theory. Freedom of choice plays an important role in most people's lives. Other research concurs, suggesting that choice is an important determinant of interest, cognitive processing, motivation, and even long-term health (Glasser, 1986). In congruence, self-determination theory states that choice has a positive impact on cognitive and affective engagement, because it increases intrinsic motivation (Deci, 1992) Intrinsic motivation is what most alternative students lack. Most of the time there was an event in the student's life that affected their intrinsic motivation. Alternative settings provide the flexibility and needed time for students to gain that motivation back. When students are intrinsically motivated to learn, positive behavioral changes take place within the individual student.

According to choice theory, five basic needs drive motivation to change behaviors: survival (fight or flight), love (conditional or unconditional), belonging (socialization), power (ownership), freedom (of choice), and fun (Erwin, 2003). Choices provides much needed freedom for students to learn. Providing at risk students choices will aid in maintaining a positive classroom environment, because student needs are conscientiously met when planned correctly (Beaman & Wheldall, 2000).

Giving students a choice is crucial for success (Glasser, 1986). In turn, planning lesson that includes " Differentiation allows students to develop their own interests and pursue deeper learning" (Bell, 2010, p 3). Incongruence, working in teams accentuates

multiple intelligences to flourish allowing each student's strength to be a vital component in the team's overall success (Gardner, 2006). Being a part of team instills acceptable social pressure to motivate individuals in completing their responsibilities and becoming a contributor to their team and/or community. When students feel connected with their community, they are more opt to help their community with local volunteer projects like cleaning the park or adopt a highway.

Choice theory plays a strong role in urban environmental education when working with at risk students in alternative education.Giving students the choice in their own learning increases a variety of measures of cognitive engagement variables such as deeper processing and creativity (Kohn, 1993). Given the chance, students love to use their strengths and creativity, those students are more apt to participate in projects and contribute within their communities (Russ, 2015).

Urban Environmental Education

In order for at risk students to become environmentally literate, individuals must "climb the environmental literacy ladder" (Elder, 2007). First, one must be connected to nature, not just aware of one's surroundings, but actually immersing one's self in nature and being a participant in it. Once the connection between person and nature is established one becomes more aware of all the aspects that are interconnected, throughout the environment, locally and globally. The more time spent in nature, individuals tend to make more thorough observations, and begin to understand how biotic and abiotic factors contribute to the local environment. However, at the same time, one may see one's self as not being a big part of the ecosystem until the question arises,

"How am I connected, and what is my impact on these animals, plants, streams, and everything else connected to my local environment?"

It is hard for students to be aware of and understand the impact he or she can have on the environment. Generally, students have an awareness and understanding of environmental impacts on larger scales like power plants, dams, mines, factories, and commercial farms. Students need to make the connection and realize that they and their neighbors use these resources and cumulatively every one in the community has a large impact on the local environment. Individuals can have more positive impact on the environment at the community level, because the group is small enough that all involved feel they can contribute equally (O'Donoghue et al. 2007).

Positive youth development refers to "an asset-based and integrated approach to promoting young people's well-being" (Monroe & Krasny, 2015, pg. 108). Urban environmental education emphasises the importance to get students to feel connected with their surroundings, and encourage them to be involved with improving their local environments. This is important for their psychological and emotional development, otherwise known as "commitment to civic engagement" (National Research Council 2002). The goal is to get students devoted to working outside, and developing youth as citizens (Monroe & Krasny, 2015, pg. 116).

Once there is a change in attitude towards the environment, students can become a little more concerned about their local environment. Unfortunately, most students will want to make these big changes to save the environment, but really will not know how to do it. Through education the student will learn more about how little changes made by

each individual will have a large positive impact as a whole on the environment. That is when students start to make small changes in their own lives to help their local environment. From there the educator hopes that each individual will continue to share his and her values with others, even if it is just with his or her relatives, friends, and neighbors.

Russ defines urban environmental education as any environmental education that occurs in cities (2015, p. 12). Urban environmental education is different from ordinary environmental education in that "urban" environmental education includes active participation that integrates social and ecological concerns (Jensen and Schnack, 1997). When students and community members make the choices they become more connected with the project, with nature itself, and with other community members. Students are able to develop a sense of belonging which causes a rise in self-esteem. In addition, this "participation" gives the students a sense of empowerment and ownership (Simovska, 2008). This sense of belonging propels individuals from just caring about the environment, to doing more for the environment and community through action.

Stapp (1969) said "...not to underestimate student potential and how students can become active citizens" (p. 33). In correspondence, urban environmental education focuses more on students being involved with "hands-on environmental stewardship" (Russ, 2015, p. 16). Students who take on the stewardship roles within nearby parks through study or cleaning natural areas not only enhance local ecosystems, but will also create social networks and contribute to community well-being (Svendsen and Campbell 2008). When students learn traditional knowledge alongside community members, both

the student and adult develop a working relationship and a sense of renewed respect for one another and enhanced pride in their work (O'Donoghue & Strobel, 2007). Managing that work on large environmental projects for sustainability requires resilience, the capacity to self-organize, and the ability to learn and be prepared to adapt with change for future development (Folke et al. 2002, p. 51). Educators must be flexible in making changes to curriculum for these unseen authentic educational experiences.

Students must look at "the environment as the places where we live, work and play" (Blanc, 2012). When reclaiming natural areas the work should never feel like a job, rather an achievable project. This is especially important for students to maintain an "I can do anything" mindset, creating realistic goals for them to achieve. Once achieved, convincing students and community members to commit to larger projects becomes easier. Over time more individuals take notice, including politicians who want to showcase those who are actively making positive-sustainable changes for the environment.

Citizen Science. Ultimately, the goal is to encourage at-risk students to become active citizens for the environment within their community. Urban environmental education can easily integrate citizen-science projects within the curriculum. Most citizen science projects are assessed with two criteria in mind, to assess students' knowledge of the scientific process, and their behavioral changes toward the environment (Brossard, Lewenstein, & Bonney, 2005). In addition, citizen science invites and encourages the public to participate in both data collection and to think scientifically (Cooper et al. 2007). Therefore, understanding the basics of scientific concepts is insufficient for the

average citizen to be able to make informed decisions about the environment (National Science Board, 2002). In turn, it is encouraged that individuals be prepared to be able to make informed decisions regarding scientific issues that affect their personal lives and the well-being of their communities (Brossard et al., 2005).

Often, colleges, universities, and government do not have the resources and capital to generate the minimum budget for the on-going data collection required to address complex environmental issues because environmental issues are expensive, labor intensive, and time consuming (Pattengill-Semmens and Semmens 2003). Therefore, the need for citizen science projects and student involvement are very valuable in monitoring the environment and the ecological systems (Lee, Quinn, & Duke, 2006). This is beneficial to at risk students, for individuals will have the opportunity to connect with colleges and universities in a positive way.

In the process, citizen science influences conservation in residential ecosystems from being a "science of discovery" to a "science of engagement" (Meffe 2001). It is important to engage students with scientists and to participate as non-scientists in data collection for scientific investigations (Trumbull, Bonney, Bascom, & Cabral, 2000). In turn, citizen science projects interconnect students with professional partnerships that provide opportunities for them to participate in real-world scientific research and to interact with scientists in the process (Cohen, 1997). In real-world scientific research and interaction , students engage in authentic scientific studies, explore real research questions through scientific inquiry, and identify answers which will most likely be

reported in scientific articles (Trumbull et al., 2000). Indirectly, recognition raises students self-esteem and confidence.

Citizen-science projects are designed to be experiential education (Messmore, 1996). In the experiential model, students progress from action to understanding the benefits and consequences of those actions and then to a broader understanding of environmental issues on a community level to global level (Tuss, 1996). Through the process, citizen science projects educate students to be active and informed citizens. Plus, those students who were invested in citizen science projects are more likely to volunteer with similar projects in the future (Bonney et. al. 2009).

Outdoor Education. Most citizen science projects take place outdoors, therefore teaching outdoor education is inevitable. A study by McRoberts (1994), revealed significant increases in self-esteem amongst 10 out of 14 participants when engaged in outdoor activities. Farnham and Mutrie (1997), in a study involving a group of 19 attending a special school found positive outcomes when students' were engaged in interpersonal activities, anxiety levels and self-perception improved after attending a short outdoor development program.

Many at risk students near urban areas have little experience in the outdoors. However, getting students outside the classroom doors and in natural environments can have many benefits. In 1955, Julian W. Smith, founder of the National Outdoor Education Project, made the connection between outdoor education and the school curriculum in his definition: "Outdoor education means learning "in" and "for" the

outdoors. It is a means of curriculum extension and enrichment through outdoor experiences" (Hammerman, 1980, p. 33).

Donaldson and Donaldson took the definition a bit further to define outdoor education as, "education in, about, and for the outdoors" (Donaldson and Donaldson 1958, p. 63).

> The word *in* referring to the location; taking place *in* the outdoors. The word *about* referring to the subject matter; learning *about* nature. The word *for* referring to the purpose of outdoor education; *for* the future benefit of our planet's finite resources (Priest, 1986, p. 13).

Donaldson and Donaldson's definition of outdoor education support how students learn outdoor interpersonal skills mainly through observation and interactions with the environment. Similarly, Priest (1986) states outdoor education is "an experiential process of learning by doing, which takes place primarily through exposure to the out-of-doors" (p. 13). Whereas, Hammerman, Hammerman, and Hammerman (2001) have simply stated that outdoor education is "education which takes place in the outdoors" (p. 5). Today, outdoor education not only includes outdoor experiences, but the curriculum is designed to meet objectives in many areas as an enjoyable "context" for learning. (Richardson & Simmons, 1996).

Incongruence, Russ (2015) states that outdoor education is about getting students outside and having fun (p. 13). At the same time, work must be fun and "work can be play" (Schusler & Krasny, 2010). Students can learn so much about the environment from just playing outside and exploring. While playing outdoors, students need to take

time to sit and observe, for this helps to expand understanding of the natural world through the novel experience, simply observing the environment with all the senses (Monroe & Krasny, 2015, pg 123).

In order to develop students to be active citizens, outdoor education benefits students by implementing course structures that facilitate leadership development.

> National Outdoor Leadership School (NOLS) targets six learning objectives for its students: communication skills, leadership skills, small group behavior, judgment in the outdoors, outdoor skills, and environmental awareness (Gookin, 2006).

Literature supports NOLS six learning objectives in the concept that outdoor skills are learned through practice and experience (Wells, 2005). There is a clear distinction between the way students learn outdoor skills, specifically technical skills and interpersonal skills. Technical skills, such as outdoor skills, judgment in the outdoors, and environmental ethics are learned largely through one on one instruction (Gookin, 2006). In comparison, interpersonal skills are learned through a variety of ways. Often, students reported learning interpersonal skills from their observations and interactions with the environment, from working and communicating with other students, or from the structure of the course (Gookin, 2006). Some aspects of outdoor education can take place indoors, however, the personal connection and socialization with the environment are equally important to outdoor education learning experiences (Priest, 1986).

Adventure Education. Adventure education is different from outdoor education for it challenges a student both mentally and physically. The common features of

adventure education include natural environments, small groups, mentally and physically challenging tasks, and relevancy for life long skills (Hattie et al., 1997). In addition, a number of studies have shown that the combination of challenging activities, mastery of skills, and experiencing success also lead to participant growth (Witman, 1995). For example, snowshoeing, mountain biking, and canoeing can all be used as tools to inspire participant growth (Marsh, Richards, & Barnes, 1986). In turn, students are more likely to live active healthy lives.

Most adventure education programs build up to at least one multi-day adventure experience toward the end of the curriculum, which involves doing mentally and physically demanding activities away from the student's normal environment (Hattie et al., 1997). Kurt Hahn, the founder of Outward Bound claimed that "Expeditions can greatly contribute towards building strength of character" (Neill and Dias, 2001). Also, Walsh and Golins (1976) mention how an unfamiliar environment can help individuals gain new perspectives on other familiar environments, and vice versa use their knowledge from known environments to help guide them in decision making in the new environment.

Leading up to such adventure challenges, there must be incremental increases in the degree of challenge in the activities to enable student growth throughout the educational experience (Walsh & Golins, 1976). A study by Bisson (1998) supports the need for incremental increases when learning a skill and indicates that the sequence of activities included in a program is related to program effectiveness. Much philosophy on adventure education highlights how humans need to incrementally push the limits and set

new goals in regards to their physical and psychological possibilities in order to become more persistent and resilient with challenges in everyday life (Neil, & Dias, 2001). Most at risk students who deal with everyday challenges can greatly benefit from adventure education, for adventure education can harness student resilience and raise one's self esteem and outlook.

Instructional Theories

Understanding by Design (UbD). Designing urban environmental education curriculum for at-risk students can be challenging, yet very possible when considering ultimately what students to get out of the experience. Teachers must focus on three steps when designing an effective curriculum: first, identify the desired results, second, determine adequate evidence that shows the desired results, and the third, align instruction with desired results (Roth, 2007) Incorporating a curriculum that starts with the end in mind allows teachers to facilitate an active classroom that motivates students to build on their knowledge (Austreim, 2011). The universal by design framework makes it easier for teachers to cover standards and benchmarks more efficiently, and simultaneously lead to increased student motivation and an emphasis on lifelong learning skills (Austreim, 2011).

> According to McTighe and Wiggins (2012) the UbD framework is based on seven key tenets:
>
> 1. Learning is enhanced when teachers think purposefully about curricular planning. The UbD framework helps this process without offering a rigid process or prescriptive recipe.

2. The UbD framework helps focus curriculum and teaching on the development and deepening of student understanding and transfer of learning.

3. Understanding is revealed when students autonomously make sense of and transfer their learning through authentic performance. Six facets of understanding: the capacity to explain, interpret, apply, shift perspective, empathize, and self-assess can serve as indicators of understanding.

4. Effective curriculum is planned backward from long-term, desired results through a three-stage design process (Desired Results, Evidence, and Learning Plan). This process helps avoid the common problems of treating the textbook as the curriculum rather than a resource, and activity-oriented teaching in which no clear priorities and purposes are apparent.

5. Teachers are coaches of understanding, not mere purveyors of content knowledge, skill, or activity. They focus on ensuring that learning happens, not just teaching (and assuming that what was taught was learned); they always aim and check for successful meaning making and transfer by the learner.

6. Regularly reviewing units and curriculum against design standards enhances curricular quality and effectiveness, and provides engaging and professional discussions.

> 7. The UbD framework reflects a continual improvement approach to student achievement and teacher craft. The results of our designs—student performance—inform needed adjustments in curriculum as well as instructed so that student learning is maximized. (p. 1-2)

Wiggins and McTighe (2008) describe how Universal by Design framework is "not to help students get 'good' at school, but rather to prepare them for the world beyond school... to enable them to apply what they have learned to issues and problems they will face in the future" (p. 36).

Scientific inquiry based learning. Many students are still inspired by awe and wonderment. At risk students especially need opportunities to experience those 'aha' moments, which will indirectly inspire more wonderment. An at-risks students educational experience is most beneficial when the education is more guided towards exploratory, in turn creating well-rounded individuals. Inquiry based learning teaches students both hard and soft skills, so they can make proper decisions about their environment.

Inquiry-based learning allows the teacher to be more of an observer and facilitator, rather than an instructor, the responsibility is put more on students to direct their own learning and make decisions about in their own explorations (Savery, 2015, p. 16). In science inquiry-based learning, students use skills that provide opportunities to develop plans to explore solutions to problems and questions while self-reflecting on their own process used in investigations (Chen & Howard, 2010). Students communication and social skills increase as well, because inquiry learning requires

students “to collaborate with peers, think deeply about the concepts, relate new science content to their lives inside and outside school, and self-regulate their behavior and thinking across the weeks that an inquiry project might unfold” (Marx, Blumenfeld, Krajcik, Fishman, Soloway, Geier, & Tal, 2004).

Furthermore, inquiry-based learning focuses on building on prior knowledge or a common experience (Witt & Ulmer, 2010, p. 272). In addition, connecting subject matter to student’s lives so material is more meaningful (Glasser, Stapp, & Swan, 1972). Students are able to explore the questions while creating connections between prior knowledge and new learnings (Chen & Howard, 2010). The combination of learning new content and using inquiry skills is important for students to ask critical questions through actively participating in investigations (Krajcik et al., 1998). Questioning leads students to repute findings, and develop abilities to respectfully disagree and use evidence to support claims (Krajcik et al., 1998). In turn, inquiry-based teaching methods help students achieve scientific literacy because they provide students with the opportunity to discuss and debate scientific ideas (American Association for the Advancement of Science, 1993).

Ultimately, inquiry-based learning gets the student to think about their own thinking (Costa & Kallick, 2008). Watson and Glaser (Watson, 1980, p.l) define critical thinking,

> Critical thinking is a composite of attitudes, knowledge, and skills which includes: (1) attitudes of inquiry that involve an ability to recognize the existence of problems and an acceptance of the general need for evidence

> in support of what is asserted to be true; (2) knowledge of the nature of valid inferences, abstractions, and generalizations in which the weight or accuracy of different kinds of evidence are logically determined; and (3) skills in applying and applying the above attitudes and knowledge.

Critical thinking involves a variety of skills needed for inquiry-based learning, such as the individual identifying the source of information, analysing its credibility, reflecting on whether that information is consistent with their prior knowledge, and drawing conclusions based on their critical thinking (Linn, 2000).

Project based learning. The project based learning approach has students investigate a real problem in order to learn science content and allows them to positively contribute to their community (Harmer & Cates, 2007). Just like scientific inquiry, project-based learning also instils critical thinking. Project-based learning's history goes back to the early 1900s, John Dewey supported "learning by doing" (Grant, 2002, p. 2). This is similar to constructivism, individuals construct knowledge through interactions with their environment, and each individual's knowledge construction is different (Perkins, 1991). Therefore, by conducting an investigation students can learn to construct new knowledge by building on their current knowledge. Constructionism takes constructed knowledge one step further by incorporating reflection, for students best learn when communicating and reflecting upon a project which cultivates personal meaning for each student (Kafai & Resnick, 1996). Additionally, while focusing on the individual learner, project based learning strives for "considerable individualization of

curriculum, instruction and assessment-in other words, the project is learner centered" (Moursund, 1998, p.4).

Similarly to inquiry based-learning, “project based learning is a student-driven, teacher-facilitated approach to learning” (Bell, 2010, p. 1). Generally, “Students flourish under a ‘self’ driven approach to learning and gain valuable skills that will build a strong foundation for their future” (Bell, 2010, p.1) Project based learning helps students “become intrinsically motivated,... when learners work on a task motivated by their own interests” (Hmelo-Silver, 2004, p. 7). Therefore, students are increasingly motivated when they believe that they have control of the outcome of their own learning (Bandura, 1997).

Congruently, students are more motivated when they value what they are learning and when they can personalize the learning experience (Ferrari and Mahalingham, 1998). During these experiences, students learn the steps of basic problem-solving, such as making observations, collecting and analyzing data, examining all variables, and drawing conclusions. Hmelo & Silver (2004) argues, “as students understand the problem better, they generate hypotheses about possible solutions.”(p.2) Throughout, students continue to develop critical thinking skills to be able to make moral and ethical decisions while solving real-world problems (Caskey & Anfara Jr., 2007).

Evidence shows that project-based learning supports the development of reasoning skills, problem-solving skills, and self-directed learning skills (Hmelo & Lin, 2000). In addition, social skills are improved through student discussions. Collaboratively, students make connections to relevant prior knowledge while processing

new information . In turn, students are better able to develop new knowledge when they can relate the information to what they already know (Bransford & McCarrell, 1977).

In conjunction, project based learning promotes social learning through practice, so student communication skills become more proficient (Bell, 2010, p. 2). During projects students are challenged to actively listen to one another, in order to be positive contributors as group members. Bell (2010) insists that "at the end of the project, students do a self-evaluation" (p. 3) to evaluate both self and the success of the group's social interactions. "These skills are critical for future success" (Bell, 2010, p. 3). With success, project based learning raises student's self-esteem and willingness to participate in future projects (Doppelt 2003). Not only does project-based learning instill conceptual and procedural knowledge, but also the flexible thinking skills to prepare students to be lifelong learners and adaptive with forthcoming challenges and issues (Bereiter & Scardamalia, 2006).

Summary

In this literature review, three main topics were explored, alternative education, urban environmental education and instructional theories. Making connections and understanding these topics is essential in order to explore the research question: *How do you empower at risk students to become active citizens about the environment, through the design and implementation of an urban environmental science curriculum within an alternative education setting?*

Within an urban setting, alternative high school students need opportunities to showcase to the community that they are not all "bad kids" and that they can truly be an

asset to their communities as active-informed citizens.The students need choices and differentiation to address different learning styles and abilities, which requires experience in authentic problem-solving and inquiry-based learning in congruence with outdoor education and adventure education. Examining local environmental problems through a citizen science provides alternative high school students the opportunities to work with and learn from scientist to build environmental knowledge, analyze the real-world problems, critically think about environmental issues from a wide variety of contexts and attempt to pose solutions to the environmental issues. As mentioned, together these approaches connect alternative high school students with the environment and connect them with professionals, all committed to promoting sustainable change within the local environment. Students who take on the stewardship roles within nearby parks through study or cleaning natural areas not only enhance local ecosystems, but also create social networks and contribute to community well-being. The dynamic history of urban environmental education focuses on individuals within their local community with a goal of creating citizens that can understand environmental issues and take action.

In the Chapter three, the methodology for exploring the research question is investigated. Examining the research paradigm, while considering the setting and the participants of the study. In addition, the study's methods, tools used for data collection, and the analysis of the data is discussed.

CHAPTER 3

METHODS

Introduction

At-risk students come with a history of failure in school. The mainstream classroom setting has not worked for them in the past; therefore, educators must think outside the box and get students doing as many hands-on, experiential lessons as possible. However, students did not have the opportunity to experience many experiential activities, for a few years the alternative high school had nothing to offer the students in the way of enrichment beyond the most basic curriculum for a high school diploma. The other mainstream high schools in the school district have well-established outdoor adventures, art, music, and sports programs that these at-risk students miss out on when they attend the alternative high school. They badly need these opportunities, but the school was unable to provide them.

This new curriculum helped students get outside learning new skills, and lured them away from chalkboard lessons. A major component with the curriculum was coordinating with the local parks and recreational system, to create a program where students are involved in using and maintaining local natural areas while learning the background science to care for them. The curriculum is a project-based, interdisciplinary course that incorporates aspects of scientific inquiry and citizen science.

This chapter looks at the methodology used to investigate the research question: *How do you empower at risk students to become active citizens about the environment, through the design and implementation of an urban environmental science curriculum*

within an alternative education setting? The motivation for developing this essential curriculum and the theories that directly influenced this curriculum are explored with considerations for the setting and the students involved within the curriculum. In congruence, the curriculum goals and content, data collection, and the analysis play a crucial role when discussing and evaluating the success of the curriculum.

Setting

The at-risk students needed elective courses that are engaging and fun, and provide them with lifelong skills so they can be positive contributors as citizens in their communities. For most at-risk students, relationships are more important than getting good grades. This is closely tied to research on socioeconomics, which shows individuals who come from lower income generally value family and relationships most (Smith, 2008). Around 70% of the at-risk students are on free and reduced lunch at this high school. Therefore, designing curriculum for these students to incorporate relationship building was a key component. When students learn traditional knowledge while expanding relationships with their community members, both the student and adult develop a sense of renewed respect for one another and an enhanced pride in their work (O'Donoghue & Strobel, 2007).

This alternative high school enrolls nearly 300 students who arrive from five other traditional high schools within the school district, and nearly 12-13% of those students open enroll from outside the school district. Kerr and Legsters (2004) reiterated that the need for small enrollment is necessary for alternative programming to be successful. In accordance, class sizes are small, ranging from 15-25 students per class; rarely reaching

30 students. With fewer students, the teacher can truly provide students with individualized instruction. Wehlage (1987) supported the concept of a small school setting, small class size, and individual student instruction for at-risk students, because it allows personalized relationships to foster amongst the student and teacher.

Despite the school being located in an urban setting outside a major metropolitan city in the upper midwest, the school sits next to an oasis of a green spaces. Just outside the school door, there is a pollinator garden and across the parking lot is a city park utilized by many community members. In addition, within the park, there is a clay pit pond and a creek which is a powerful learning area for pond and stream studies. Furthermore, within walking distance there is a regional park where the creek enters a major river. Along the river is wonderful section of a floodplain forest, which needs managing because there are diseased trees and invasive species like buckthorn and garlic mustard that need to be removed.

Participants

Each year the new curriculum benefits 60-90 students, giving those the opportunity to learn new skills in the outdoors and help them be aware of environmental issues. The school is on the northern edge of a major metropolitan city in the upper midwest. The school enrolls approximately 300 students grades 10-12 with an almost 70% free and reduced lunch population. The racial makeup of the school is 64% White, 19% Black, 9% Hispanic, 5% Native, and 3% Asian. The ratio between males and females is nearly 50/50.

Students have a six day period featuring 55 minute periods for learning. Plus, students have an advisory class for half a period and lunch the second half of the period. Generally, students take the same class as they would at the traditional high schools. However, one of the main differences is at the alternative high school core subjects are taught throughout an entire school year. At the traditional high schools, core subjects are covered over two-thirds of a year. Homework is not assigned at the alternative high school, which is why it takes longer to teach the core subjects; not assigning homework is good for at-risk students because most of the students have jobs, and some of those students are helping to support their families. Even in the information era of technology, a fair number of students do not have access to technology at home to work on homework. A portion of those students do not have access to a local library because they live too far from the nearest one and the student does not have transportation, including not having funds to cover public transportation. Lastly, a vast number of students do not have parents who can help them with their homework, due to a variety of reasons. These obstacles include parents' not having the skills, language barriers, work schedules, or a students that live on their own. At-risk students face many basic and complex hurdles that influence their successfulness in school.

Curriculum Goals and Content

Outdoor urban environmental education curriculum is new for this alternative high school that currently has no elective courses. In table 1, the curriculum goals for this new elective course are outlined.

Table 1. Elective course goals for outdoor adventures curriculum

Elective Course Goals for Outdoor Adventures Curriculum
1. Increase student motivation by offering a fun and engaging course 2. Offer at-risk students new skills and experiences 3. Expose students to the natural world 4. Involve students in local community service projects

The curriculum would be labeled as an elective science course worth a half credit. Students would be enrolled in the course for twelve weeks, which is broken into four three week terms. The curriculum would teach the Minnesota science standards through the lens of environmental issues at a local level. The units and curriculum included the following topics and projects: outdoor survival with wilderness safety, resource management with forest management within a local regional park, diversity of life in a habitat restoration area (pollinator garden), and environmental issues with sustainability and local water quality monitoring. Along with these projects and topics, students learned recreational outdoor skills including birding, plant identification, snowshoeing, winter survival, canoeing, and biking.

Curriculum Development Motivation and Theories

When considering starting an urban outdoor environmental education class for at-risk students, balance is key to connecting students, community, politicians and others together to be stewards of the land. Most of the students have not had many positive learning experiences, let alone outdoor learning experiences. Commonly, there is a fear factor with nature. Students can be afraid of aspects associated with the natural world (de Sousa Vianna, 2002). In turn, students are unable "to perceive and understand

environmental aesthetics, the environment as the places where we live, work and play" (Blanc, 2012). Therefore, a young person's experience at school is a powerful developmental factor, given that school is where much socialization and identity development occurs (Harter, 1999). It is important to get at-risk students to feel connected with their surroundings, and encourage them to be involved with improving their local environments. This is important for their psychological and emotional development, otherwise known as "commitment to civic engagement" (National Research Council, 2002). The goal is to get students devoted to working outside, and developing youth as citizens (Monroe & Krasny, 2015, pg. 116).

One of the first obstacles in alternative education is to get the students to view themselves through a different lens. Rather than viewing alternative schools as the "dumping grounds" where traditional schools send the "bad kids", alternative schools embrace second-chance opportunities for education completion and dropout prevention (Harter, 1999). Alternative high school students need opportunities to showcase to the community that they are not "bad kids," and that they can truly be an asset in their communities as active-informed citizens. This curriculum would get students outside learning new skills, and get them coordinating with the local parks and recreational system, where students are involved in using and maintaining local natural areas while learning the background science to care for those areas.

Alternative education programs assist the student and family in accessing support systems necessary for the student to be successful in school and community (Foley & Pang, 2006). Integrating citizen science, outdoor education, and adventure education

provide alternative students great opportunities to be involved with the community as active citizens. All of these practices incorporating the outdoors provide additional intensive experience beyond what the traditional classroom can provide for at risk students (Zhang, Howell, & Iyer, 2014).

According to choice theory, five basic needs drive internal motivation to drive behavioral changes: survival, love and belonging, power, freedom, and fun (Erwin, 2003). Choice theory plays a strong role in urban environmental education when working with at risk students in alternative education. Choices provide much needed freedom for students to learn, and freedom of choice plays an important role in most people's lives. Some professionals concur, suggesting that choice is an important determinant of interest, cognitive processing, motivation, and even long-term health (Glasser, 1986). In congruence, self-determination theory states that choice has a positive impact on cognitive and affective engagement because it increases intrinsic motivation (Deci, 1992)

Urban environmental education can easily integrate citizen-science projects within the curriculum. Citizen science invites and encourages the public to participate in both data collection and to think scientifically (Cooper et al., 2007). In the process, citizen science influences conservation in residential ecosystems from being a “science of discovery” to a “science of engagement” (Meffe, 2001). In citizen science students engage with with scientists and participate as non-scientists in data collection for scientific investigations (Trumbull, 2000). Furthermore, citizen science projects interconnect with professional partnerships that give students an opportunity to participate in real-world scientific research and to interact with scientists in the process

(Cohen, 1997). Students who are invested in citizen science projects are more likely to volunteer with similar projects in the future (Bonney, et. al. 2009).

Most citizen science projects take place outdoors. Donaldson and Donaldson define outdoor education as, "education in, about, and for the outdoors" (Donaldson & Donaldson, 1958, p. 63).

> The word *in* referred to the location; taking place in the outdoors. The word *about* referred to the subject matter; learning about nature. The word *for* referred to the purpose of outdoor education; for the future benefit of our planet's finite resources (Priest, 1986, p. 13).

The goal is to get students devoted to working outside, and developing youth as citizens (Monroe & Krasny, 2015, pg. 116). In order to develop students to be active citizens, outdoor education benefit students by implementing course structures that facilitate leadership development. National Outdoor Leadership School targets six learning objectives for its students: communication skills, leadership skills, small group behavior, judgment in the outdoors, outdoor skills, and environmental awareness (Gookin, 2006). Over time students will be motivated to push themselves harder with challenges that require both mental and physical stamina.

Incorporating a curriculum that starts with the end in mind allows teachers to facilitate an active classroom that motivates students to build on their knowledge (Austreim, 2011). Teachers must focus on three steps when designing effective curriculum: first, identify the desired results, second, determine adequate evidence that shows the desired results, and third, align instruction with desired results (Roth, 2007).

The universal by design framework makes it easier for teachers to cover standards and benchmarks more efficiently, and simultaneously lead to increased student motivation and an emphasis on lifelong learning skills (Austreim, 2011). Wiggins and McTighe (2008) describe how UbD framework is "not to help students get 'good' at school, but rather to prepare them for the world beyond school...to enable them to apply what they have learned to issues and problems they will face in the future" (p. 36).

In science inquiry-based learning, students use skills that provide opportunities to develop plans to explore solutions to problems and questions while self-reflecting on their own process used in investigations (Chen & Howard, 2010). Inquiry learning requires students "to collaborate with peers, think deeply about the concepts, relate new science content to their lives inside and outside school, and self-regulate their behavior and thinking across the weeks that an inquiry project might unfold" (Marx et al., 2004). Furthermore, inquiry-based learning focuses on building on prior knowledge or a common experience (Witt & Ulmer, 2010, p. 272).

The project-based learning approach has students investigate a real problem in order to learn science content and allows them to positively contribute to their community (Harmer & Cates, 2007). During these experiences, students learn the steps of basic problem-solving, such as making observations, collecting and analyzing data, examining all variables, and then conclude which solution might be the best (Manning & Butcher, 2006). Hmelo & Silver (2004) argued, "as students understand the problem better, they generate hypotheses about possible solutions"(p. 2). Throughout this process,

students continue to develop critical thinking skills to be able to make moral and ethical decisions while solving real-world problems (Manning & Butcher, 2006).

Curriculum Implementation and Timeline

This curriculum was implemented spring 2017 over four terms; each term consisted of three weeks (12 weeks total) and an additional week generally used as a final exam week. The first term focused mainly on students developing basic outdoor skills and first aid training. When working outdoors there are many hazards, so students must learn to be aware of their surroundings and potential dangers. The second term focused on forest management, and the students worked with a local park managing the floodplain forest. The third term focused on diversity of life and habitat restoration. Students monitored birds, identified plants, learned about pollinators, and helped with building pollinator gardens at the school and regional park; in addition, students restored natural habitat at the regional park. The fourth term focused on environmental issues and sustainability surrounding water. Students learned about point and nonpoint pollution, public drinking water, and how to canoe. Lastly, students reflected on how society can sustainably use water for drinking, public and industrial use, and recreational use.

During week one, students went over survival scenarios and determined what supplies they would take for certain scenarios. The students then discussed and gave his or her rationale for choosing the items. Students ranked the items as what is most to least needed for the scenario while supporting their ranks with evidence. Students then were given scenarios where someone was injured, and the students determined the level of

severity of the injury describing what they would do in that situation. Afterwards, students reflected and discussed their decisions.

During the second week, students learned basic outdoor skills and first aid skills. Students specifically learned how to prepare and pack for an outdoor exploration using multiple scenarios. Students researched the pros and cons of different outdoor gear, including durability, water resistance, warmth, and weight. Students need to know what is the right gear to bring for different types outdoor exploration scenarios. In addition, students became familiar with common injuries and how to treat those injuries when outdoors. Students practiced administering first aid for different situations.

During the third week, students reenacted survival and first aid scenarios in the classroom first and then outdoors. Students took turns acting out an injury while others assessed the area and injury before offering first aid. Students then discussed how well each other assessed the situation. At the end of the week students, again, reenacted a situation and were assessed by the teacher.

During the fourth week, students learned the parts and functions of a tree, reviewed photosynthesis, and learned about the differences between deciduous and coniferous trees. Lastly, students learned how to use a winter dichotomous key to identify trees without their leaves on the school grounds and at the local park.

During the fifth week, students spent the first couple of days walking the trails at the nearby regional park and identified the trees in the floodplain forest. Students became familiar with trees in the forest to be ready to help the parks naturalist manage the park forest. In addition, the naturalist taught students how to identify hazardous and diseased

trees. Lastly, students helped clear out these trees after the naturalist and land manager cut them down.

During the sixth week students learned how to make a campfire. At the same time, students conducted an experiment to determine the British thermal unit for each wood. In turn, this helped students build a successful fire. Afterwards, at the end of the week students were assessed on identifying trees and its parts, forest management practices, and campfire building and safety.

During the seventh week, students students continued to use their identification skills by monitoring birds. Then students were challenged to predict what the birds eat, and then observed the birds eating and recorded the food they eat. To help students understand what the birds ate, they needed to learn how to identify flowers and plants as well. In conclusion, students reflected and discussed how birds can contribute to the reproduction of plants.

During the eighth week, students learned more about plant reproduction and pollinators. Students researched, planned, and decided on native plants to be planted in the school's pollinator garden. Then students spent a couple of days planting the garden. On the last day students observed and recorded birds and pollinators within the pollinator garden.

During the ninth week, students helped the regional park plan their pollinator garden. Students then reflected and made comparisons between the school's and park's pollinator gardens. The rest of the week, students learned about invasive species as they removed buckthorn and garlic mustard at the regional park. At the end of the week,

students reflected on their work for the week, and why it is important to be concerned with invasive species.

The tenth week, students were given a piece of land to develop alongside a river; students sketched and shared about the cost and benefits with their development. Afterwards, students used some of that knowledge on a nonpoint pollution walk along the nearby stream and made observations, recorded, reflected on their findings, and then discussed nonpoint and point pollution. Students then researched the history of the major river to which the nearby stream drains looking at historic floods, engineering projects, industries, pollution, policies and laws, and socio-economic issues. Students would spend the last day sharing and discussing each one's research.

The eleventh week, students looked at soil degradation and came up with a plan on how to manage the soil, which can also be a considered a contaminant once it reaches a stream. Students went on another observational walk in the floodplain plain forest at the regional park. Afterwards, students discussed their findings and possible solutions to manage that specific area of soil degradation. Then students conducted a lab to replicate and test their solutions using a stream table. Lastly, students helped manage one of the areas at the regional park with the parks naturalist.

The twelfth week students were questioned about the water they drink and where it comes from, and students drew a sketch or wrote a description of where they believed there drinking water came from and then shared with others. Next students visited the local water treatment plant and learned about how the river water is treated to provide drinking water at the school, and other homes and businesses. Following, students

conducted a lab to sample water from their own homes, then compared and discussed reasons for the differences. At the end of the week students sampled water from both the stream and pond, again they compared and discussed reasons for differences. Lastly, students devised a plan using natural materials to clean the stream and pond water, reenacting a survival situation. Afterwards, students sampled the water and made comparisons to the original samples, and then discussed the results.

The final week students learned about water recreation, and specifically learned how to canoe. The first part of the week was dedicated to teaching safety and paddling skills. The last days of the week students went on a guided canoe trip. The final day students found a place of their own to reflect upon their experience.

Methods and Assessment

Overall, the curriculum utilized a mixed methods approach. Mixed methods tend to base knowledgeable claims on practical interconnections, examples include consequence-oriented and problem-centered interconnections (Creswell, 2014). The curriculum used strategies of inquiry that involved collecting data either simultaneously or sequentially to best understand the research problem. The data collection involved gathering both quantitative and qualitative data.

> Creswell gives a rationale for "…mixed methods is chosen because of its strengths of drawing on both qualitative and quantitative research and minimizing the limitations of both approaches…it is a useful strategy to have a more complete understanding of research problems/questions…" (pg. 218).

Students earned two grades, an academic grade and a soft skills grade. The academic grade used quantitative data, while the soft skills grade used qualitative data. The goal of integrating a two assessment system was to educate, to improve performance on difficult tasks, then to get students to self-assess and adjust their performance accordingly. The purpose of the academic grade is to evaluate students outdoor skills and environmental literacy. The academic grade will be assessed by quizzes, pre and post tests, and projects. The purpose of the soft skills grade was to show the correspondence of the student's' academic grade to student participation. The soft skills grade was determined by attendance, participation, science journals, and reflections. In turn, with more participation, students were more likely to pass the post test and unit tests. Lastly, to predict if student will become an active steward of the environment within their own community was mostly determined by the students soft skills grade (Simovska, 2008).

Human Subjects Research Review Process

Prior to the approval from the Human Subjects Committee, permission was received from the school administrator to develop curriculum for a new elective course in urban environmental science education. The Hamline School of Education Human Subjects Committee approved my application to conduct my capstone research on *How do you empower at risk students to become active citizens about the environment, through the design and implementation of an urban environmental science curriculum within an alternative education setting?* Specific school and student information remained anonymous and confidential, in order to maintain individual integrity. In addition, outdoor adventure education contracts were required to be read and signed by

both the student and parent or guardian assuring that all parties know that the student will be exposed to potentially dangerous situations and there is a risk of injury or death, and students are expected to exercise caution when participating in all activities.

Summary

Three main topics were explored in this chapter, including alternative education, urban environmental education and instructional theories. In addition, multiple subtopics were investigated, including choice theory, citizen science, outdoor education, adventure education, inquiry based learning, and project based learning. Making connections and understanding these topics is essential in order to explore the research question: *How do you empower at risk students to become active citizens about the environment, through the design and implementation of an urban environmental science curriculum within an alternative education setting?*

In Chapter Four, the curricular units will be explored. After designing these curricular units, a reflection of the effectiveness of the UbD model will be included. Lastly, the details of implementation will be explored, including the process, timeline, and assessments. The methods are applied in Chapter Four where results of the curriculum development work are shown in the actual lesson plans that have been developed.

CHAPTER 4

RESULTS

Introduction

This chapter contains the completed curriculum for an urban environmental class for at risk students in an alternative high school. The curriculum includes lesson plans, assignments, labs, projects, and assessments; all connected to standards. This curriculum plan contains three trimesters each having four units for a total of 55 to 60 daily lessons per trimester, each lesson being 55 minutes and a few 80 minutes. All curriculum materials for the first unit can be found in the appendix. This curriculum is intended to provide an enrichment opportunity for at-risk students to learn with and from community members through urban environmental education. The setting for this class is in a suburban area just outside a large metropolitan area. The school sits next to a city park with a pond and creek, as well as within walking distance to a regional park on a major river. Providing students an authentic learning experience.

Much of this curriculum could be adapted for students of multiple age levels. Plus, the trimesters are really dictated by the weather and climate year to year. Therefore, flexibility is a must when planning the units since many are dictated by the weather and climate year to year. Depending on location, the sequence of units for particular terms may need to change throughout the school year. For example, the flower identification week may need to occur earlier or later in the unit or trimester. In addition, the winter trimester would look much different for northern states compared to southern states, yet many of the same concepts can still be implemented. Chapter five addresses

alternative units and willingness to be flexible in taking advantage of unplanned learning experiences and creating units around those experiences.

When preparing to start this curriculum, one must be aware of the time commitment. Before teaching urban environmental science curriculum it is wise to plan a year out before teaching the first class. To be able to access a local natural environment is crucial in order to implement this curriculum. Once an area is established it is encouraged to create a working relationship with the land management and owner. Establishing a relationship will help ensure the longevity of this curriculum for years to come. With an established relationship comes flexibility to continually adjust curriculum to accommodate future projects. In other words, the curriculum writing is never finished for one will need to make changes as new projects arise.

Planning ahead for field trips dictates the timing of units and individual lessons. Many lessons will take place off campus at the nearby regional park, therefore extra time is needed to travel. Borrowed time from other classes must be negotiated to accommodate for the travel time. Students will need to clear or make up time for those classes. Many alternative schools already have an advisory or homeroom scheduled time for each day. Planning curriculum around advisory/homeroom can provide the needed travel time with the least amount of conflict with other core classes. Creating a relationship with nearby parks and community members will enhance this curriculum and greatly encourage students to become active citizens in their communities.

This curriculum includes a fall, winter, and spring trimester focused on similar and different units. Basic outdoor skills and first aid training will always be the first unit

of each trimester. Forest management and fire building will also repeat every trimester, however for one week of each trimester students will observe the forest differently and perform different management skills according to the season. winter pruning and clearing, and spring observe and record recovery and health of the trees. The fall trimester includes units mountain biking and sustainable trails, and edible plants. The winter trimester includes units winter ecology, snowshoe and nordic skiing, and ending with winter survival and winter camping. Lastly the spring trimester includes units diversity of life and habitat restoration, and water usage and sustainability, and canoeing. The entire scope and sequence of each trimester along with individual units and daily lessons will be listed after the the list of environmental science educational standards. Following the scope and sequence will be all the detailed lessons for the first unit basic outdoor skills and first aid training.

Environmental Science Educational Standards Covered in this Curriculum

(APES: College Board AP Environmental Science Standards)

Standard: Natural and designed systems are made up of components that act within a system and interact with other systems

Benchmark:

9.1.3.1.1: Describe a system, including specifications of boundaries and subsystems, relationships to other systems, and identification of inputs and expected outputs.For example: A power plant or ecosystem.

APES II: A-E: Living World: Ecosystem Structure, Energy Flow, Ecosystem Diversity, Natural Ecosystem Change, Natural Biogeochmical

Cycles **APES I: A-D:** Earth Systems and Resources: Earth Science Concepts, The Atmosphere, Global Water Resources and Uses, Soil and Soil Dynamics
Standard: Natural and designed systems are made up of components that act within a system and interact with other systems **Benchmark:** **9.1.3.1.3:** Describe how positive and/or negative feedback occur in systems. For example: The greenhouse effect. **APES VI: A, B:** Pollution: Types, Impacts on Environment and Human Health
Standard: Global climate is determined by distribution of energy from the sun at the Earth's surface. **Benchmark:** **9.3.2.2.1:** Explain how Earth's rotation, ocean currents, configuration of mountain ranges, and composition of the atmosphere influence the absorption and distribution of energy, which contributes to global climatic patterns. **APES I: A-C:** Earth Systems and Resources: Earth Science Concepts, The Atmosphere, Global Water Resources and Use (Ocean Circulation) **APES VII: A, B:** Global Change: Stratospheric Ozone, Global Warming **9.3.2.2.2:** Explain how evidence from the geologic record, including ice core samples, indicates that climate changes have occurred at varying rates over

geologic time and continue to occur today. **APES VII: B:** Global Change: Global Warming
Standard: The cycling of materials through different reservoirs of the Earth's system is powered by the Earth's sources of energy. **Benchmark:** **9.3.2.3.1:** Trace the cyclical movement of carbon, oxygen and nitrogen through the lithosphere, hydrosphere, atmosphere and biosphere. For example: The burning of fossil fuels contributes to the greenhouse effect. **APES V: E:** Energy Resources and Consumption. Hydroelectric power.
Standard: People consider potential benefits, costs and risks to make decisions on how they interact with natural systems. **Benchmark:** **9.3.4.1.1:** Explain how human activity and natural processes are altering the hydrosphere, biosphere, lithosphere and atmosphere, including pollution, topography and climate. For example: Active volcanoes and the burning of fossil fuels contribute to the greenhouse effect. **APES VI: A3:** Pollution: Pollution Types (Water Pollution) **APES VII: C:** Global Change: Loss of Biodiversity **APES I:C :** Global water resources and use: fresh water/salt water; ocean circulation; agricultural, industrial, and domestic use; surface and groundwater issues ; global problems; conservation**.**

Standard: The interrelationship and interdependence of organisms generate dynamic biological communities in ecosystems.

Benchmark:

9.4.2.1.1: Describe factors that affect the carrying capacity of an ecosystem and relate these to population growth.

APES III: A: Population: Population Biology Concepts

APES IV: B, D3, F: Land and Water Use: Forestry, Other Land Use (Public and Federal Lands), Recreational Use

Standard: The interrelationship and interdependence of organisms generate dynamic biological communities in ecosystems.

Benchmark:

9.4.2.1.2: Explain how ecosystems can change as a result of the introduction of one or more new species. For example: The effect of migration, localized evolution or disease organisms.

APES III: A: Population: Population Biology Concepts

APES VII: C: Global Change: Loss of Biodiversity

APES II: C, D: Living World: Ecosystem Diversity, Natural Ecosystem Change

Standard: Matter cycles and energy flows through different levels of organization of living systems and the physical environment, as chemical elements are combined in different ways.

Benchmark:

9.4.2.2.1: Use words and equations to differentiate between the processes of photosynthesis and respiration in terms of energy flow, beginning reactants and end products.

APES II: B: The Living World: Energy Flow

Standard: Human activity has consequences on living organisms and ecosystems.

Benchmark:

9.4.4.1.2: State: Describe the social, economic and ecological risks and benefits of changing a natural ecosystem as a result of human activity. For example: Changing the temperature or composition of water, air or soil; altering populations and communities; developing artificial ecosystems; or changing the use of land or water.

APES IV: A2, D4: Land and Water Use: Controlling pest, Land Conservation

APES V: B: Energy Resources and Consumption: Energy Consumption

Curriculum Scope and Sequence

Fall Trimester

First Unit: Basic Outdoor Skills and First Aid Training (Repeats: Winter & Spring)

Week 1 Lesson 1 How well do you know the outdoors? Activity, Science Journal

Setup, What is your favorite moment outdoors (written or drawn). **Lesson 2** Journal Swap Activity (share favorite moment), What is Environmental Science? and Nature Walk (20 observations: natural & unnatural) **Lesson 3** Survival Story, Winter and Desert Survival Situation Partner Activity **Lesson 4** Fears, Survival Notes, "Alone" Activity **Lesson 5** Primitive Survival Skills Partner Activity and Discussion **Week 2 Lesson 6** Knot Tying Discussion and Demonstration, Videos, and Practice **Lesson 7** Knot Tying Lab **Lesson 8** Shelter Building Discussion, Why Shelter Notes, Draw a Shelter **Lesson 9** Build a Shelter **Lesson 10** Shelter Sit and Reflection, and Deconstruct Shelter **Week 3 Lesson 11** Medical Scenario Practice (pair share), First Aid Notes **Lesson 12** First Aid Training (lab stations) **Lesson 13** Medical Scenario Reenactment Practice **Lesson 14** Outdoor Basics & Survival Practical **Lesson 15** Outdoor Basics, First Aid, & Survival Exam
Second Unit: Sustainable Trail & Mt. Biking **Week 1 Lesson 16** What is Sustainable Trail? Slideshow Practice Quiz & Discussion

Lesson 17 Building Sustainable Trail Guest Speaker: DNR Mountain Bike Trail Technician

Lesson 18 Floodplain Forest Nature Walk with Naturalist, Flag Existing Sustainable and Unsustainable Trail.

(Community Volunteer Weekend: Flag Trail and Start Closing Off and Redirecting Unsustainable Trail)

Week 2 Lesson 19 What was your favorite experience biking? Pair-Share & Discussion, The History of the Bike and Parts Notes, Partner Worksheet

Lesson 20 Bike Parts Partner Practice Quiz, Bike Safety and Biking Laws Notes, Partner Worksheet

Lesson 21 Mountain Bike Mechanical Advantage Lab

Lesson 22 Bike Safety and Maintenance Guest Speakers: Framed Bike Mechanic

Lesson 23 Bike Parts and Safety Quiz, Mountain Bike City Park Paved Trail

Week 3 Lesson 24 Mountain Bike City Parks Trails 20 observations

Lesson 25 Mountain Bike Paved Trails at Regional Park 20 observations

Lesson 26 Mountain Bike Single Track Trail (Comparison Reflection)

Lesson 27 Bike Maintenance, Sustainable Trail & Mountain Biking Review

Lesson 28 Sustainable Trail & Mountain Biking Exam

Third Unit: Edible Plants & Diversity

Week 1 Lesson 29 What are some wild edible plants? Journal Entry & Swap,

Discussion

Lesson 30 Wild Edible Plants History Project, Research, Outline

Lesson 31 Finish Wild Edible Plants History Project (projectable)

Week 2 Lesson 32 Present Wild Edible Plant History Project (2-3 min. each)

Lesson 33 Slideshow Wild Edible Plants, Partner Practice Quiz, Discussion

Lesson 34 Plant Identification Notes & Nature Walk (20 Observations)

Lesson 35 Review Plant Identification and Edible Plants, Outdoor Practice

Lesson 36 Slideshow of Wild Edible Plants Quiz & Outdoor Identification Quiz, 3-2-1 Review

Week 3 Lesson 37 Review Wild Edibles & Identification, Identification Requiz

Lesson 38 Plan a Meal with Wild Edible Plants and Collect, Discuss Preparation

Lesson 39 Edible Plants Luncheon & Discussion

Lesson 40 Nature Sit & Personification Entry or Reflective Summary, Discussion

Lesson 41 Edible Plants & Diversity Exam

Fourth Unit: Forest Management and Fire Building

(Week 3 different for Winter and Spring)

Week 1 Lesson 42 What is a Forest? Why are Trees Important? Journal Entry, Pair-Share, and Discussion. Draw a Tree.

Lesson 43 Tree Notes, Tree Cookie and Parts Activity Worksheet

Lesson 44 Tree Parts Partner Practice Quiz, Photosynthesis Notes and Drawing, Nature Walk and Why are Trees Important? Journal Entry

Lesson 45 Tree Identification Notes, Practice, and Discussion

Week 2 Lesson 46 Tree Identification Nature Walk

Lesson 47 Tree Identification Partner Quiz (identify 3 trees)

Lesson 48 Why are Trees Different? Uses for Trees? Journal Entry, Fire Building Notes, and Hypothesize the Best Wood for a Campfire.

Lesson 49 Nature Walk and Gather Wood, Write Lab Procedures, Rational, and Hypothesis (Set up lab if time permits)

Lesson 50 Campfire Btu Lab, Report, and Discussion

Week 3 Lesson 51 What is a Forest? Notes Guest Speaker: Regional Park Naturalist

Lesson 52 Regional Park Floodplain Forest Walk with Naturalist 20 observations

Lesson 53 Sample the Floodplain Forest and Mark Diseased Trees

Lesson 54 Finish Marking, Why must we trim and cut out the diseased trees? Why must we wait until winter? Summary Reflection, Share & Discuss

Lesson 55 Forest Management and Campfire Building Exam

Winter Trimester

First Unit: Basic Outdoor Skills and First Aid Training, Lessons 1-15

Same as Fall Trimester (page 62)

Second Unit: Nordic Ski, Snowshoe, and Orienteering

Week 1 Lesson 16 How can you travel in the winter by foot? Journal Entry & Pair-Share Nordic Ski and Snowshoe History Notes, Nordic Ski & Snowshoeing Partner Worksheet

Lesson 17 How can you build snowshoes? Share and Discuss, Nature Walk and Collect Materials.

Lesson 18 Plan, Draw, Construct, and Test Snowshoes Activity, Discussion

Lesson 19 Rebuild Snowshoes and Test, Reflection Summary

Week 2 Lesson 20 Snowshoe Regional Park Floodplain Forest 20 Observations

Lesson 21 Nordic Ski Regional Park (Practice Day)

Lesson 22 Nordic Ski Regional Park 20 Observations

Lesson 23 How do you not get lost in the forest? Journal Entry, Discussion, Orienteering Notes, and Orienteering Partner Worksheet

Lesson 24 Orienteering Review and Outdoor Practice

Week 3 Lesson 25 Regional Park Snowshoe Geocaching and Orienteering Activity

Lesson 26 Regional Park Snowshoe Orienteering Quiz/Challenge

Lesson 27 Nordic Ski, Snowshoe, and Orienteering Review

Lesson 28 Nordic Ski, Snowshoe, and Orienteering Exam

Third Unit: Forest Management and Fire Building, Weeks 1-2 Same as Fall Trimester (page 65)

Week 3 Lesson 38 What is a Forest? (Guest Speaker: Naturalist from Regional Park)

Lesson 39 Regional Park Floodplain Forest Walk, 20 observations

Lesson 40 Trim and Clear Diseased Trees in Floodplain Forest

Lesson 41 Disposal of Diseased Tree Waste, Why must we dispose the waste of diseased trees appropriately? (summary reflection) Share and Discuss

Lesson 42 Forest Management and Campfire Building Exam

Fourth Unit: Winter Ecology and Camping

Week 1 Lesson 43 What do you need to camp in the winter? Journal Entry, Pair-Share, Discussion and Make a List of Items Needed for 2-3 Nights

Lesson 44 Which active animals survive the winter? Journal Entry, Swap and Share, Winter Ecology Notes, 3-2-1 Exit

Lesson 45 Tracks & Traces Notes, and Nature Walk 20 Observations

Lesson 46 Winter Critter Investigation Lab (down time tracks and traces)

Lesson 47 Winter Ecology, Tracks & Traces Partner Quiz, Nature Sit (Logo Draw)

Week 2 Lesson 48 Climate, Cultures, and Adaptations Notes, Project Introduction

Lesson 49 Create 5-7 Slide Presentation

Lesson 50 Present Projects (2-3 minutes each)

Week 3 Lesson 51 Winter Survival & Camping Notes, Snow Study Lab

Lesson 52 Build a Quinzee

Lesson 53 Quinzee Reflection, and Backpack Check, Winter Ecology Review

Lesson 54 Winter Ecology & Winter Camping Exam

Lesson 55 Backpack Check, Winter Camping Quiz Review, Scenarios Review **Week 4 Lesson 56** Winter Camping: Boundary Waters Canoe Area Wilderness **Lesson 57** Winter Camping Expedition Day 2 (Full Day Outdoors) **Lesson 58** Winter Camping Expedition Day 3 Return **Lesson 59** Recap, Discussion, Reflective Summary
Spring Trimester **First Unit: Basic Outdoor Skills and First Aid Training, Lessons 1-15** **Same as Fall Trimester (page 62)**
Second Unit: Forest Management and Fire Building, Lessons 16-24 Same as Fall Trimester (page 65) **Week 3 Lesson 25** What is a Forest? Notes Guest Speaker: Regional Park Naturalist **Lesson 26** Regional Park Floodplain Forest Walk with Naturalist 20 observations **Lesson 27** Collect Tree Data for Regional Park: Tree Recovery and Health **Lesson 28** Health Report (Naturalist), What can we do, what will suffer from the loss of these trees? Summary Reflection, Share and Discuss **Lesson 29** Forest Management and Campfire Building Exam
Third Unit: Diversity of Life and Habitat Restoration **Week 1 Lesson 30** What is a Habitat?(pair-share) Journal Entry, MN Biomes Notes, What is your favorite Minnesota animal and flower? (Draw or Write)

Lesson 31 Journal Swap-Pair-Share, Flower Dissection Lab, & Flower Notes

Lesson 32 Flower Identification Notes & Practice

Lesson 33 Nature Walk and Flower Identification

Lesson 34 Flower Identification Partner Quiz (3 flowers)

Week 2 Lesson 35 Insect Collection and Inventory Activity (adapted: Larry Weber)

Lesson 36 Pollinator Lab Experimental Design, Procedures, and Setup

Lesson 37 Pollinator Observation and Data Collection Lab

Lesson 38 Finish Pollinator Report, Present, & Discussion

Lesson 39 The Importance of Native Plants and Pollinators Notes, and Summary Reflection (Guest Speaker: Professional Beekeeper and Honey Farmer)

Week 3 Lesson 40 What is an Invasive Species? Invasive Species Notes, and Research Mini-Project

Lesson 41 Summarize Invasive Specie and Report on Project, and Discussion

Lesson 42 Regional Park Invasive Species & Habitat Restoration: Buckthorn, Garlic Mustard, & Milfoil (Guest Speaker: Regional Park Naturalist)

Lesson 43 Pull Buckthorn & Garlic Mustard at the Regional Park Reflection

Lesson 44 Diversity of Life & Habitat Restoration Exam

Fourth Unit: Water Usage & Sustainability, and Canoeing

Week 1 Lesson 45 Water Cycle Dice Activity, Water Cycle Drawing, Drinking Water Partner Pretest & Discussion

Lesson 46 Where Does Drinking Water Come From? Drinking Water & Flint Michigan Notes,Which is Water Activity

Lesson 47 Water Treatment Plant Field Trip (summary reflection)

Lesson 48 Treatment Plant Review, Who Polluted the Stream Interactive Story, & Well Lab

Lesson 49 Unpolluting Water Lab and Summary Reflection

Week 2 Lesson 50 Riverfront Property Design Project

Lesson 51 Finish & Discussion of Project, Human Use & Pollution Notes

Lesson 52 Stream Table Lab

Lesson 53 Floodplain forest, Soil & Erosion Notes, Point and Nonpoint Source Pollution Hike Observations Coon Creek, 20 observations

Lesson 54 Mississippi Floodplain Forest Pollution Hike Observations, Comparison, & Discussion (summary reflection)

Week 3 Lesson 55 River Flow, Ecology, and Canoeing Notes, Partner Worksheet

Lesson 56 Canoe Safety Quiz and practice in the pond

Lesson 57 Mississippi River Canoe Field Trip (20 observations, animal checklist)

Lesson 58 Discuss Trip Observations and Concerns, Logo Drawing and/or Personification Assignment

Lesson 59 Canoe, Drinking Water, and Land Ethics Exam

Daily Lesson Plans

First Unit: Basic Outdoor Skills and First Aid Training

Week 1 Lesson 1 How well do you know the outdoors? Intro Activity, Science Journal Setup, What is your favorite moment outdoors (written or drawn).

Objectives – I can ...

- Describe the basics of environmental science.
- Organize and set up a science journal.
- Draw a picture of an outdoor scenery.

Materials and Supplies Needed:

- Science Journal
- Color Pencils
- Project an Example of Science Journal setup (APPENDIX A)
- Project the Trimester Scope and Sequence for students to copy into journals

Opening Activity: (20 minutes)

Have students come up one at a time and ask them "how well do you know the outdoors?" After the student answers have the student line up along the board, far left being "*I Should be the Head of the E.P.A.*" to far right "*Clueless, I Have No Idea*" In between starting left, *Pretty Good I Want to have a Career in this Field, I have an Awareness but Want to Learn More, I like the Outdoors but I Should Know More, I'm interested and it's Why I'm in this Class,* and *I know what the basic things are like a pine tree from the other trees.* Once everyone is lined up and without talking have students observe the differences amongst the group. Make a point of the differences and

how we will need to learn from one another, and that we all are here because we all want to learn more about environment and be outdoors.

Instruction and Discussion: (20 minutes)

Students will receive his/her own science journal. Show students the example of a journal and the table of contents. Students will be instructed on how to set up and number the journals. Leaving the first four pages open for the table of contents, each of the four pages will be a separate unit along with the lessons. The first notes and assignment will begin on page five in their journals. Project the scope and sequence of the the units and lessons for the trimester. Students will write in each unit and corresponding lessons. Page numbers will not yet be assigned to each of the units and lessons in the table of contents, page numbers will be written when students conduct each lesson. Students will begin to number the first 50 pages in the upper corners. While the students are numbering pages the teacher should talk about the advantages of keeping a journal. Project some more examples from the journal, for example 20 observations, basic notes taken during an activity, logo drawing reflection activity, and the storytelling /personification reflection activity.

Conclusion; (15 minutes)

On page five, the first page after the table of contents, students will either write and/or draw about his/her favorite moment outdoors. Students may use color pencils in the drawings. Students should finish by the end of the period.

Lesson 2 Journal Swap Activity (share favorite moment), What is Environmental Science? and Nature Walk (20 observations: natural & unnatural)

Objectives – I can ...

- Share and discuss a favorite moment outdoors.
- Describe and discuss fears of the outdoors.
- Observe and document natural and unnatural characteristics in the local environment, and any possible dangers to humans or any other life.

Materials and Supplies Needed:

- Science Journal
- Color Pencils
- Rain Gear (if rain/snow)

Opening Activity: (15 minutes)

Have student journals set out on a table, and instruct students to grab a random journal. If a student grabs his or her own they must put it back and grab another. Students will then look over the other students favorite moment in outdoors and find similarities and differences before finding the owner of the journal. Once the student finds the owner he or she may ask questions and/or comment. It is unlikely two students will have each others journal, so students will need to move around to find who has his/her journal as well. Together students will determine similarities and differences from each journal entry. Afterwards, a few groups will share their findings with the rest of the class. As students share, the teacher writes the similarities students have on the board. Ending the activity with a short discussion leading into fears of the outdoors.

Interest approach: (15 minutes)

Write on the board and pose a question for the students, “what is environmental science education, outdoor science education, and adventure science education?” Have the students answer these questions themselves on a piece of paper. Afterwards, students will crumple them into a ball and have a 30 second paper ball (snowball) fight. Each will pick up a piece of paper and read the discription. If a student gets his or her own he or she will crumple it up and toss it at another student and that student will need to throw their paper back at the student. All students will then share the descriptions on the piece of paper and make comparisons to their own descriptions they originally wrote. At the end together we will write the definitions on the board.

Outdoor Activity: (30 minutes)

Students will work in pairs on a nature walk and make at least ten observations. Before going out students will create a T-chart on one page separating it into “natural” and “unnatural”, yet leaving a small section at the bottom of the page for possible observed “dangers to the environment or themselves”. Together students will need to determine what they observe is either natural or unnatural, and give a brief reason why they believe it to be. In addition, students will need to document one possible danger and give an explanation as to why it is considered a danger to the environment or themselves. Check in with the students about every five minutes, and be sure to start heading back when there is only five minutes left of class.

Review & Discussion: (20 minutes)

Review natural and unnatural characteristics, and draw a T-chart on the board. Each group will present their observations. When one group presents an observation, ask if any other groups had similar observations and if so those groups are the only ones allowed to discuss and decide which side the observation goes on, either natural or unnatural. All groups put an X next to the observation, so there are no repeats of observations. Go to the next group and present the next observation and repeat the process. Be sure to monitor each discussion and try to keep it within two minutes to insure getting through all the observations.

Lesson 3 Survival Story, Desert and Winter Survival Situation Worksheet (pair-share)

Objectives – I can ...

- Express my confidence and competence about the local environment.
- Compare and discuss natural from unnatural characteristics in the local environment.
- Practice preparing for a survival situation.

Materials and Supplies Needed:

- Science Journal
- Winter Survival Worksheet (APPENDIX B)

Survival Story: (15 minutes)

If you have a personal survival story or about someone else close to you, tell your students about the story. If you do not have a survival story, you can find great stories online.

http://blog.theclymb.com/passions/history-2/five-of-the-greatest-wilderness-survival-stories-in-history/ This website has five great short stories.

Activity,Discussion, & Closing: (20 minutes)

Hand out the *Winter Survival Scenario* worksheet, and as you are explain to the students it is important to know about your surroundings in case you ever get yourself in a survival situation. When limited with supplies and materials knowing about your surroundings can play a crucial role in surviving certain situations. In turn, planning ahead for these situations can help you determine what supplies are necessary to have with you if you plan to put yourself in an area where there are potential dangers and the

need for survival exist. For example, if plan to travel far distances by automobile in the winter there are items you should always have in your vehicle incase it ever stalls out in the middle of nowhere. This will lead the students into the activity, then go over the problem and directions from the student worksheet. After the students read through the situation and start to rank the items list check in with students and ask them about their strategy for choosing items and note it on a piece of paper or tablet. While students finish, draw a table listing all the items on the worksheet on the board. Once the groups are done, discuss each group's rankings of items and record on the board by writing down each item and placing a numerical value next to each item according to each group's response. At the end add up the numerical values for each item, the lowest value being the most desired item. After discuss whether the students overall agree or not with the results. Then take a couple of minutes to describe the different strategies used to choose items. Finally, ask each group to come up with one practical item they would like to have that was not on the list. Have the students list them on the board and briefly discuss and poll the class if it would be a ‘aye’ or ‘nay’ for each item. Activity and Discussion: (20 minutes)

After have the students complete another survival worksheet, however this time the situation takes place in a desert. Just like before, go over the problem and directions from the worksheet. As students start to itemize ask them about their strategy and record for discussion later. While students finish, draw a table listing all the items on the worksheet on the board. Once the groups are done, discuss each group's rankings of items and record on the board by writing down each item and placing a numerical value

next to each item according to each group's response. At the end add up the numerical values for each item, the lowest value being the most desired item. After discuss whether the students overall agree or not with the results. Then take a couple of minutes to describe the different strategies used to choose items.

In closing, have student write in their journals about the one item they absolutely want to have in a survival situation and explain why. If you have time, have each person share his or her item of choice.

Lesson 4 Fears of the Outdoors, Survival Notes, "Alone" Activity

Objectives – I can ...

- Discuss and understand basic outdoor skills and survival skills.
- Practice preparing for a survival situation.
- Review items for survival and select ten items.

Materials and Supplies Needed:

- Science Journal
- Survival Notes Powerpoint (APPENDIX C)
- Desert Survival Worksheet (APPENDIX D)
- Alone gear list found at http://www.history.com/shows/alone/articles/gear-list

Short Discussion and Journal Entry: (15 minutes)

On another page in the journal, students will have five minutes to write about one or two fears he or she has about the outdoors. After allow students to share and discuss each of the students fears. Some students may have the same fears, so be sure to ask if other students had similar fears to be able to address them all at once. Generally, most of the fears do have truth behind them therefore be sure to validate those fears. During the discussion reassure students that they do not need to be afraid, instead encourage students it is better to be cautious of these dangers and will prepare for most of their fears. For example, many students are fearful of being attacked by an animal. The truth is it is unlikely to be attacked by an animal for many of them are generally scared of humans and either hide or run from humans, including black bears. We will discuss fear more during the survival notes.

Survival Notes: (10 minutes) Notes found in APPENDIX C

Closing Activity: (30 minutes)

Beforehand print out the contestants bio and items list. Start with '*Alone'* trailer clip and then go over the items allowed and banned from this show. Next have the students pair up and review three of the contestants and their lists. Then have students predict who survived the longest. Each pair of students will team up with another pair and explain and try to convince one another why their contest will go further. Afterwards, each group will discuss their predictions and try to convince others why their contestant would be the winner. Finally, reveal the winner of 'Alone' and the order as to when contestants dropped out. Discuss any surprises.

In conclusion, have the students choose and record three to five items from the show they would want if in a similar situation. Before ending class, students will pair up with another student and compare their items and challenge each other on the selections.

Lesson 5 Review Items Needed for Survival, Primitive Survival Skills Activity

Objectives – I can ...

- Review items for survival.

- Discuss and understand basic outdoor skills and survival skills.

- Complete primitive survival skills activity worksheet.

Materials and Supplies Needed:

- Science Journal

- Primitive Survival Skills Worksheet (APPENDIX E)

- Computers & Internet

Review: (10 minutes)

Before class write a list of the items contestants from the show 'Alone' were allowed to choose from. Take the first 5 minutes to review items from the show 'Alone' and tally on the board as to which items were chosen by the students. Then discuss the most to least common items chosen from the list.

Activity and Discussion: (40 minutes)

Students will work in pairs to complete the primitive survival skills worksheet. Go over the directions with the students before allowing students to log into computers. Once finished with the directions students may use a computer or laptop to help look up answers. Be sure to encourage students to research a few of the questions, and not to just guess and make inferences. Some of the questions they can infer, but others should be researched. As pairs of students finish up, combine pairs to make groups of fours and have them share and discuss their answers with one another; students may make changes

to their answers as they develop new knowledge. At the end, discuss all the questions as a group and correct any misconceptions while elaborating on any connections and aha moments.

Closing Activity: (5 minutes)

In the students' journal have them complete a 3-2-1 review entry. Students record three things they learned, two things they found interesting, and one question they still have about something from the lesson.

Week 2 Lesson 6 Questions Review, Knot Tying Discussion, Videos, and Practice

Objectives – I can ...

- Review and discuss survival skills.

- Write and/or draw the directions to tying four knots.

- Tie two types of knots and teach one knot.

- Practice tying another two knots for a total of four.

Materials and Supplies Needed:

- Science Journal

- Knots to Know sheet (APPENDIX F)

- A meter long rope for each student

- Different types of rope and twine, or other tying materials

- Knot Tying animations and videos at www.animatedknots.com

- Computers or can be projected one by one

Review: (15 minutes)

At the beginning of class go over each of the students questions from the 3-2-1 review entry. As students ask their questions first ask if others have similar questions and then allow the students to answer one another's' questions. Try to spend only one to two minutes on each question, yet some questions may be quick single word answers. Be sure to intervene while students answer each other's questions when necessary, and you most likely will need to answer questions not answered by the students.

Discussion and Videos (15 minutes)

Lead students discussion of survival skills into knot tying skills. Ask students how confident are they in their knot tying, and for those who feel they are competent ask them about what type of knots and with which kind of rope. Then start to show students different types of ropes and discuss what they are generally used for and which knots are used when tying. Any of those student who are confident to tie a knot, have them come up while demonstrating some knots. Next show students how to check rope for safe usage, especially important for climbing rope. After, hand out the 'Knots to Know' sheet to each student before showing students a video of each knot they will tie; each video can be found at animatedknots.com and towards the bottom of the page is a video. Before starting each video inform the students to write each one into their journals and to leave space to write out or draw out the directions on how to tie each knot. Tell students they will have more time to copy the directions during the activity.

Activity (25 minutes)

Students will be in groups of four, and each member will become an expert in learning one of the four knots that they will learn to tie. Students will randomly be given a type of knot; using playing cards to create groups works well. For example, all students with *fours* are in a group and each suite indicates which knot the student will tie. Once in groups, students will first finish writing or drawing the directions on how to tie each knot into their journal (5 minutes). As students finish writing the directions into their journal, give each student a piece of rope to practice tying their knot (5 minutes). Then have each student take turns teaching how to tie their knot (12 minutes). Lastly, in the

final minutes of class each student will tie their knot on one end of their rope and tie another knot on the other end of the rope. The experts in the group will check each knot.

Lesson 7 Knot Tying Lab

(Adapted from Wagstaff, M., & Attarian, A. (2009). ***Technical skills for adventure programming: A curriculum guide*** **Human Kinetics.)**

Objectives – I can ...

- Know appropriate terminology.
- Be able to tie four knots.
- Be able to apply knots in appropriate contexts.
- Understand the purpose of each knot.

Materials and Supplies Needed:

- Science Journal (reference)
- Knots to Know sheet (APPENDIX F)
- A meter long rope for each student
- Small incentive prizes

* The materials below are not needed for this lab, but providing the real application instills the importance for knowing different knots.

- Hammock
- Canoe and/or kayak
- Fishing poles (2-3)
- Tarp (2-3)
- Climbing harness (2-3)

Review and Directions: (10 minutes)

Review basic knot construction terminology by describing and demonstrating each term with a piece of rope. Once demonstrated, review by creating each and asking the group to identify using correct term.

Three basic concepts to remember when tying knots:

- A good knot should be relatively easy to tie.
- A good knot should serve the purpose for which it is designed and used.
- A good knot should be relatively easy to untie.

Knot terminology:

The following terms establish a common language to assist in knot construction. As knots are tied, they can be described by using these terms.

- Standing end – The part of the rope that you do not work with while tying a knot.
- The standing end could be several inches or many feet in length.
- Working end – The part of the rope that you work with, usually one end of the
- rope.
- Loop – When the rope crosses under or over itself to form a loop.
- Bight – Is a bend in the rope. The rope does not cross to form a loop.

Take a few minutes to go over each knot, and be sure to demonstrate each one slowly.

- Taught-line Hitch: will be used to put up a hammock and tarp.
- Bowline: will be used to anchor a canoe.
- Figure Eight: will be used when climbing (Harness).
- Square: will be used when tying two ropes together.

Explain to the students that they will be given a card that will have a list of knots that they will need to tie in the order listed. Students will have three minutes at each station to use their rope and complete the knot at each station. In addition, students will be in competition to see how many knots they can correctly tie in the given time. Therefore, if a student is really good at tying one knot they are encouraged to tie and untie that knot as many times possible in the five minutes. Students will need to use the honor system when confirming knots, and students will need to confirm with another student before retying the knot. Prizes will be given out to students who tie the most knots at each station and overall.

After the first round students will repeat each knot station, but this time with realistic scenarios. Students will have five minutes at each station to complete each knot. Once they complete the knots, each student expert from the day before will inspect the knots and reteach any mistied knots (encourage reteaching and to help one another, it's not to single any one out we all make mistakes). Stations will include, a hammock, tarp, anchoring a canoe, climbing harness, and fishing pole. Station will have the hammock and tarp, and student will need to set these item up using the hitch knot. At station two, students will sit in a canoe or kayak and need to anchor it to a tree or pole using the bowline knot. At station three students will show how to use a figure eight knot when tying into a climbing harness. Lastly, at station four students will tie a square knot to tie two ropes together.

Discussion:

Afterwards, discuss each station and ask students which was easier or harder to perform. Before ending have the students record a 3-2-1. Three knots they did well today, two knots they could teach others, and one knot they need to practice more.

Lesson 8 Shelter Building Discussion, Why Shelter Notes, Draw a Shelter

Objectives – I can ...

- Describe how to construct a primitive shelter

- Understand climate plays a factor in the type of primitive shelter to be constructed

- Draw a primitive shelter and list the materials along with a description of each usage

Materials and Supplies Needed:

- Science Journal (reference)

- Primitive shelters sheet (APPENDIX G)

- Why Shelter Notes at billqualls.com/survival/shelter.pps

- colored pencils

-Postcards for opening activity

Opening Question and Discussion: (15 minutes)

Beforehand, on post cards write on the cards which item a student may have or not. Some cards will say “no extra items”. Also, on each card indicate the season, and whether there is snow or no snow for the winter. As students enter class hand each student a postcard. Write on the board and ask students “If you unexpectedly had to spend a night outside in the wilderness, what kind of shelter would you build and with what? Also, you do have paracord rope and how could you use it?” Allow students to discuss in groups of two to three for five to ten minutes, depending on engagement. Spend the last five minutes or more sharing a few ideas. Explain to students that many of their ideas have been used for centuries and we will now learn about primitive shelters.

Why Shelter Notes PowerPoint: (20 minutes)

Notes can be found at billqualls.com/survival/shelter.pps has created a great interactive slideshow to teach about the importance to build a primitive shelter during a survival situation.

Present the powerpoint and allow students to ask questions along the way. Also hand out to students the primitive shelters sheet. Students will enter notes about each shelter discussed.

Closing Activity: (20 minutes)

In their journals students will draw the primitive shelter they described earlier. After drawing the shelter students will also need to provide a list of materials used for the shelter, along with a description of its usage. For example logs (pine, oak, etc.): frame and/or floor. In the last five to eight minutes have students pair-share their journals with one another and encourage students to ask clarifying questions. Students should add details to their drawings and/or descriptions.

Lesson 9 Build a Shelter Activity

Objectives – I can ...

- Describe how to construct a primitive shelter

- Construct a primitive shelter

- Be able to apply knots in appropriate contexts.

Materials and Supplies Needed:

- Science Journal (reference)

- Primitive shelters sheet (APPENDIX G)

- Rope

- Scissors (utility knife 'only if you teach knife safety prior')

- *It is important to check over the selected area ahead of time for possible dangers.*

Opening Discussion and Designating Group Areas: (10 minutes)

Explain to the students that they will have 45 minutes to construct a shelter. Students will be confined to a given area so groups do not overlap. Groups have been preselected by the teacher which will be revealed after. Within the defined area groups may use anything to to construct their shelter, but they can not break off any branches from trees for this shelter yet they may pull dead grass. Each group will need to construct a shelter which will safely confine all members. In addition, each group will be given rope and a pair of scissors (utility knife). Groups should first construct a plan, once the group has a plan they will confirm with the teacher and start gathering materials and construction. During construction the teacher will count down the time for the students. At this time,

tell students which groups they are in. Generally, groups of three work the best, but sometimes pairs work well.

Activity: (45 minutes)

Students will have the rest of the time to build a shelter with the items they can find in their area. If groups realize that breaking down into pairs may work better allow the groups to do so, but they must collaborate now and then.Groups must consider breaking apart before the halfway point. Be sure to warn groups of their time, at the halfway mark, the 20 minute mark, then warn every five minutes after, and call out the final one and two minutes. As students are constructing be sure to ask questions that will assist in their process, for example the size is always a factor. At the same time, be sure to guide students away from anything that may harm them, for example “widowmakers” hanging from the trees above, or dead trees that have the potential to fall.

Lesson 10 Shelter Sit and Reflection, Deconstruct Shelter

Objectives – I can ...

- Reflect on the construction of a primitive shelter
- Deconstruct a primitive shelter using the “No Trace” method
- Understand and implement “No Trace” method

Materials and Supplies Needed:

- Science Journal (reference)
- Trash bags

Opening Discussion: (5 minutes)

Students will sit in their shelters or near it and write a summary reflection. Beforehand assist students in starting by going over what they have covered in the past two weeks. Also, ask why is a shelter important and how could it help in an medical emergency situation. Students can write about connect with historic cultures, how they would construct the ultimate shelter given more time, the difficulty of the construction and how they would improve their shelter, describe a preconceived medical scenario, or describe a real life experience. Students may draw their shelter and provide a description of the construction process.

Nature Sit Reflection: (30 minutes)

Students should sit alone without talking to one another, therefore if two students want to sit in the shelter they must not talk to one another or they could split the time sitting inside and outside (more prefered). Students should be able to write out one page or more into their journal.

Shelter Deconstruction: (20 minutes) “No Trace”

Before the deconstruction of primitive shelters, discuss with students what it means to leave “no trace”. Describe to students how to return materials from the shelter back to nature in way that looks like they were never there. If students remember where an item came from return it otherwise show students how to place items back to look more natural. At the same time, provide students a trash bag to collect any trash they may find. Generally, any where a human has been there is evidence he or she were there and usually in the form as trash.

Week 3 Lesson 11 Medical Scenario Practice (pair share), First Aid Notes, and Medical Scenario 2

Objectives – I can ...

- Practice handling a medical scenario in the outdoors.
- Understand and explain the signs of hypothermia, heat exhaustion, and shock.
- Describe the basic first aid skills to treat hypothermia, heat exhaustion, and injuries.

Materials and Supplies Needed:

- Science Journal (reference)
- First Aid Notes PowerPoint (APPENDIX H)
- Wilderness First Responder SOAP Note (APPENDIX I)
- Wilderness First Responder Cheat Sheet (APPENDIX J)
- Two Medical Scenarios (APPENDIX K & L)

Opening Activity: (15 minutes)

Students will be given a medical scenario where someone is outdoors and experiences an injury. Students may work with on their own or with a neighbor and to come up with a plan to treat the injured person. Have the students to list out there procedures in bullet form into their journals. Midway through have students prioritize their list of interventions. In the final minutes have a few groups share their plans.

First Aid Notes Powerpoint Notes: (30 minutes) (APPENDIX H)

Present the powerpoint and allow students to ask questions along the way. Also hand out to students the first aid note sheet. Students will enter notes about each subject discussed.

Closing Activity: (10 minutes)

Students will complete another medical scenario in the same manner, but in less time. Students may refer to their notes when conducting a plan of action. The next day students will randomly share their plan with others, who will critique the plan and then share and discuss an improvised plan with one another.

Lesson 12 First Aid Training Day One of Two (lab stations)

Objectives – I can ...

- Practice handling a medical scenario in the outdoors.

- Conduct first aid for three of six types of injuries and scenarios.

Materials and Supplies Needed:

- Science Journal (reference)

- First Aide Sheet

- Wilderness First Aid Curriculum and Doctrine Guidelines Handouts (APPENDIX M)

- Rope

- Cloth or bandanas for slings

- Sticks

- Any other improvised materials

- Basic first aid kit

Opening Activity: (10 minutes)

Journal swap: students will randomly choose a journal and read the medical scenario plan. As they read he or she will write questions and critique the plan before finding the owner of the journal. Together they will go over the plan to improve one another's.

Discussion and Demonstration: (15-20 minutes)

Take about three minutes review and demonstrate proper first aid for each of the first aid stations; bone and joint injury, wound and wound infection, hypothermia, heat problems, head injury, and shock. Each station will have the a handout with the scenario and directions along with some basic materials for conducting first aid.

First Aid Lab Stations Activity: (30-35 minutes)

Students will perform first aid for three of the stations. Spending about ten minutes at each station, students will be informed when to switch stations. Refer to the APPENDIX M to view the instructions for each of the lab stations.

Lesson 13 First Aid Training Day Two of Two (lab stations)

Objectives – I can ...

- Conduct first aid for three of six types of injuries and scenarios.

Materials and Supplies Needed:

- Science Journal (reference)
- First Aide Sheet
- Wilderness First Aid Curriculum and Doctrine Guidelines Handout (APPENDIX M)
- Rope
- Cloth or bandanas for slings
- Sticks
- Any other improvised materials
- Basic first aid kit

Repeat the demonstrations of each lab station and have students conduct first aid for the other three medical scenarios. Again, along students ten minutes at each station. (45 minutes)

Closing Activity 3-2-1 Reflection: (10 minutes)

In the students' journal have them complete a 3-2-1 review entry. Students record three things they learned, two things they found interesting, and one question they still have about first aid for a scenario that may not have been covered. Take a few minutes at the end to answer questions.

Lesson 14 Outdoor Basics Survival and First Aid Reenactment Practical

Objectives – I can ...

- Describe how to construct a primitive shelter

- Construct a primitive shelter

- Be able to apply knots in appropriate contexts.

- Perform first aid and simulate a medical scenario

Materials and Supplies Needed:

- Science Journal (reference)

- Medical Scenarios (APPENDIX K & L)

- Scissors (utility knife 'only if you teach knife safety prior')

- Rope

- Cloth or bandanas for slings

- Tarp

- Sticks

- Any other improvised materials

- Basic first aid kit

- Assessment checklist and rubric (APPENDIX N)

Opening Instructions: (5 minutes)

Students will be returning to same place where they built shelters. Students will be in different teams, randomly chosen by the teacher beforehand. Each group will be given a medical scenario, and will need to reenact the situation. Group members will need to decide who will be injured before reading the scenario. After reading the scenario

students will need to assess whether to first build a shelter or perform first aid on their injured person. Depending on the scenario, some injured individuals may be able to assist the group. Lastly, groups must stay in their area to not cross over into other groups areas. Also, when building shelters groups cannot break off branches from the trees.

Activity: (40 minutes)

Once students are given a scenario they can read it and start immediately. Students should spend roughly half time on each part of the scenario, performing first aid and building a shelter. Let students know when the first 10 minutes has passed. Announce again after the next 10 minutes, and every five minutes afterwards.

Closing Activity and Discussion: (10 minutes)

Each group will take turns discussing their medical scenario with another group. Each will describe how they took care of their injured person. The injured will also give feedback on how well their teammates took care of him or her. Together we will determine how well the shelter was built for a survival situation, checking for sturdiness, knot tying, practicality, location, and coziness (important to keep wind out). Students will use a checklist and rubric to assess one another.

Lesson 15 Outdoor Basics, First Aid, & Survival Exam

Objectives – I can ...

- Complete the outdoor basics, first aid and survival exam

Materials

- Journal (Can be used as a reference)
- Exam (APPENDIX O)

Exam and Corrections: (30-35 minutes)

Closing Activity: (20-25 minutes)

Students will need to deconstruct their shelters from the day before and “leave no trace”. Deconstruction should take 10-15 minutes, leaving another 10-15 minutes to write a summary reflection of their medical and survival scenario.

CHAPTER FIVE

Conclusion and Discussion

Introduction

I believe it is beneficial to create well-rounded individuals. This outdoor urban environmental science curriculum fostered inquiry-based learning and project-based learning, teaching students both hard and soft skills, so students could make proper decisions about their environment. In addition, the curriculum connected subject matter to student's lives making the material more meaningful (Glasser, Stapp, & Swan, 1972). The curriculum helped students to develop meaningful methods of thinking and challenged them to think about their thinking (Costa and Kallick 2008). At the same time, the curriculum encouraged and challenged students to be aware of their thoughts and actions, and how individual choices affect the environment.

Mentioned in chapter two, in order for students to become environmentally literate, individuals must "climb the environmental literacy ladder" (What is Environmental Literacy, 2007). The curriculum allowed the students to continually be immersed in nature, helping students to not just be aware of their surroundings, but actually connecting them with nature and letting them be a participant in it. As students spent more time in nature, individuals tended to make more thorough observations, and began to understand how living and nonliving factors contribute to an ecosystem. At the same time, many students saw themselves as not being a big part of the ecosystem until the question arose, "How am I connected, and what is my impact on these animals, plants, streams, and everything else connected to my local environment?" Once the

connection between student and nature was established they became more aware of all the aspects that are interconnected throughout the environment, locally and globally.

Conclusions

How do you empower at risk students to become active citizens about the environment, through the design and implementation of an urban environmental science curriculum within an alternative education setting? To answer this question can be challenging, yet possible with the support from administration, colleagues, local professionals, and the community. Ultimately, connecting students with the natural environment is the main goal. Simply letting students have fun while working outside allows students to feel an authentic connection with nature. Once that connection is made, more often students tend to critically question and become more concerned with the environment.

This curriculum encouraged students to learn to respect their fears of the wilderness and the unknown, because many of their fears are real and may help prepare them for a survival situation. Over time, students became more comfortable with pushing themselves outside their comfort zone. Also, many students became more resilient and confident in themselves, building self-esteem and self-determination to become positive role-models within their communities. A few students who foresaw themselves pursuing a career in the environmental sciences found encouragement to continue with their career path after taking this course, and are more likely to become active citizens within their own community in the near future. Students who enroll in the course for the entire school year are the most likely to become active citizens within their community.

Choice theory played a strong role when working with at-risk students in alternative education. Choices within the curriculum provided much needed freedom for students to learn. The curriculum allowed students to learn about the environment in a variety a ways, whether that was through simple observations, hands-on experiences, or directly from local professionals. This differentiation allowed students to develop their own interests and pursue deeper learning through authentic experiences.

In addition, students continually worked in teams to allow multiple intelligences to flourish for each person's job allowed him or her to use his or her strengths. At the same time, being a part of a team instilled acceptable social pressure to motivate individuals in completing their responsibilities. At the same time, students had the chance to positively impact the environment at the community level. Ultimately the community members, including students, need to make the decisions on what is needed in the neighborhood parks and vacant spaces. When students and community members make the choices they become more connected with the project, with nature itself, and with other community members.

There are mainly two limitations to this curriculum. First, you must have access to some sort of natural environment, as simple as a city park or a vacant lot. Secondly, you must have permission to use that area for educational purposes. The curriculum can be greatly enriched when students are able to develop a working relationship with the park or land owner. When a relationship with community members is made flexibility is a must, for many projects will most likely be dictated by the park management or land owner. However, students can still be a part of some of the decision making for a few

projects. Timing of projects cannot always be planned out the same year to year, therefore minor changes to the curriculum will occur annually. Also, weather is the main factor influencing when certain units can be taught, so shuffling of units will occur annually as well. Taking extra time planning to allow students to have authentic experiences can have everlasting effects on students.

Preparing for the Curriculum

When preparing to start this curriculum, one must be aware of the time commitment. Before teaching urban environmental science curriculum it is wise to plan a year out before teaching the first class. To be able to access a local natural environment is crucial in order to implement this curriculum. Once an area is established it is encouraged to create a working relationship with the land management and owner. Establishing a relationship will help ensure the longevity of this curriculum for years to come. With an established relationship comes flexibility to continually adjust curriculum to accommodate future projects. In other words, the curriculum writing is never finished for one will need to make changes as new projects arise.

Proximity to the local natural environment is also a factor when planning this curriculum. If travel time is needed to the location, scheduling with administration may be a factor as well. Planning ahead for field trips dictated the timing of units and individual lessons. Many lessons took place off campus at the nearby regional park. Therefore, extra time was needed to travel. Many alternative schools already have an advisory or homeroom scheduled time for each day. Planning curriculum around advisory/homeroom can provide the needed travel time with the least amount of conflict

with other classes. Otherwise, borrowed time from other classes must be negotiated to accommodate for the travel time. Students would most likely need to clear or make up time missed in those classes.

Lastly, this curriculum can have many expenses depending on what you plan to incorporate. Many alternative schools are underfunded and do not have the resources needed to start and run a curriculum like this to its full potential. Much time will need to be committed to grant writing. One should plan to write three to five grants annually for the first five years, that includes the first year before teaching the first class. Depending on what is planned there will be basic materials that must be purchased to make the curriculum successful. For example, for this curriculum a three thousand dollar grant was written to acquire rain gear, including boots, first aid kits, and field guides to insure students would have the appropriate outdoor gear to be able to be outdoors in any conditions. Another much larger grant was written to acquire a class set of mountain bikes/fat bikes so students could travel to the regional park much faster, in turn saving much desired instructional time. After five years, teachers will still need to consider writing at least one to two grant per year for field trips and other materials.

Potential Variations to the Curriculum

Once again, flexibility is key to allowing this type of curriculum to be successful. It is always nice to get into a routine and rhythm when teaching year to year. Yet when opportunities arise it is beneficial to have other units to incorporate within this curriculum. Past units that I have taught and plan to integrate are astronomy, geology and rock climbing. I encourage those who want to incorporate astronomy to be trained by

NASA so you can access their lunar and meteorite disc samples. There is nothing like showing students moon rocks. Also, if you want to incorporate mountain climbing it wise to teach about the different types of rock one might climb, especially the type of rock found in your state. To incorporate mountain climbing appropriately you would need to have access to a climbing facility, and preferably feasible.

Other units under consideration are meteorology, climatology and Earth history which go well with water usage and sustainability units. Another unit that works well in the fall is firearm safety, game management, and trap shooting or archery. Implementing this unit can be a challenge depending on your school. Other units to consider for areas outside the midwest are bayous, everglades, deserts, mountains, rainforest, oceans, tidal pools, sailing, and surfing to name a few. Ultimately, you need to develop the curriculum to suit your area and community.

Final Thoughts and Things to Consider

Despite the time commitment, implementing curriculum like this for at-risk students in alternative settings can provide those students with the much needed enrichment opportunities that provide authentic experiences. Not every student will immediately become active citizens within their communities, instead many will develop more respect and gratitude for the environment while making small changes in their lives in effort to make positive changes for the environment. Later in their lives students will be more apt to be active citizens and care for their local natural environments.

Sometimes you will need to plan instruction and practice time before or after school. If there is not enough time during the day to teach skills for some adventure

activities, students will need to practice and learn skills outside the school day. For example, when planning for a winter trek that includes pulling sleds full of gear, students will need to practice pulling a heavy sled multiple days. If students are not prepared ahead of time, they will either struggle or not be able to complete the task. In turn, if a student can not be successful he or she will not enjoy the experience and will not be likely to push themselves in other challenges. When the students are successful they are more likely to push themselves with harder challenges and become more resilient and confident. And when students are more confident they are more likely to stand up for what is right and become that positive role model as an active citizen in their communities.

Plan to write to write grant proposals and consider writing proposals with your local park. There are many more grants that the park is eligible for through the federal government. Some of these grants are up to hundred thousands of dollars. Together organizations could write for these large grants that can have a tremendous amount of impact on the community. For example, while having a meeting with regional park management, the idea of creating a bouldering and climbing wall was discussed. The facility needs updates to the structural design of the visitor center, therefore writing additional grants with the park could make this a reality along with teaching a climbing unit. As mentioned, you need to capitalize on opportunities when they arise.

Lastly, colleagues take notice of the curriculum as well. When others notice the success that can be made with this curriculum, those individuals begin to brainstorm other enriching curriculum that they could provide students in other content areas. For

example, a history teacher is considering to create a curriculum about local history were students would have the opportunity to explore nearby historical sites and learn about the history of each site. In turn, students would also learn about local transit systems and its history. The curriculum would inspire students to use public transit while accentuating how it has a positive impact on the environment.

Another literature teacher is considering to develop a theater audience class. Students would learn about all the aspects that go behind the production of theatrical performances, not just the acting. They would learn to become critics and get the opportunity to watch theatrical performances at different levels, high school, college or university, and at the professional levels in small and large scale. These types of authentic experiences are truly enriching to the student.

Empowering *at risk students to become active citizens about the environment, through the design and implementation of an urban environmental science curriculum within an alternative education setting* was mainly meant to inspire the students to become active citizens about the environment within their communities. However the curriculum not only enriched the students experience in high school, but also everyone involved directly and indirectly including the professionals who worked with the students, community members, and other teachers who were inspired. Unprovoked, one student even made walking sticks for everyone in the class, and another graduating student applied for a full time position with the regional park. I never expected this curriculum would inspire so people within the community.

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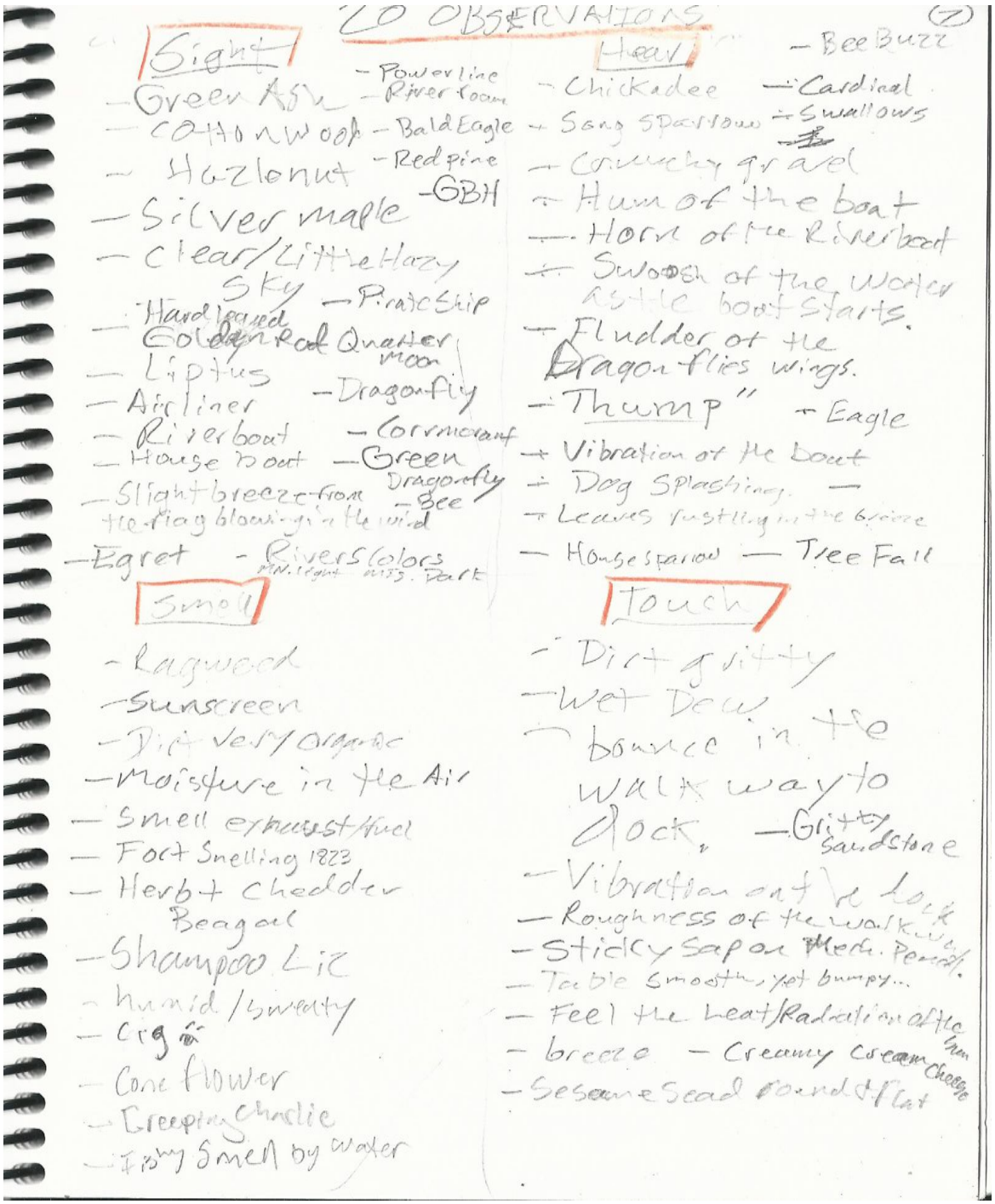
APPENDIX A: Science Journal Example Setup



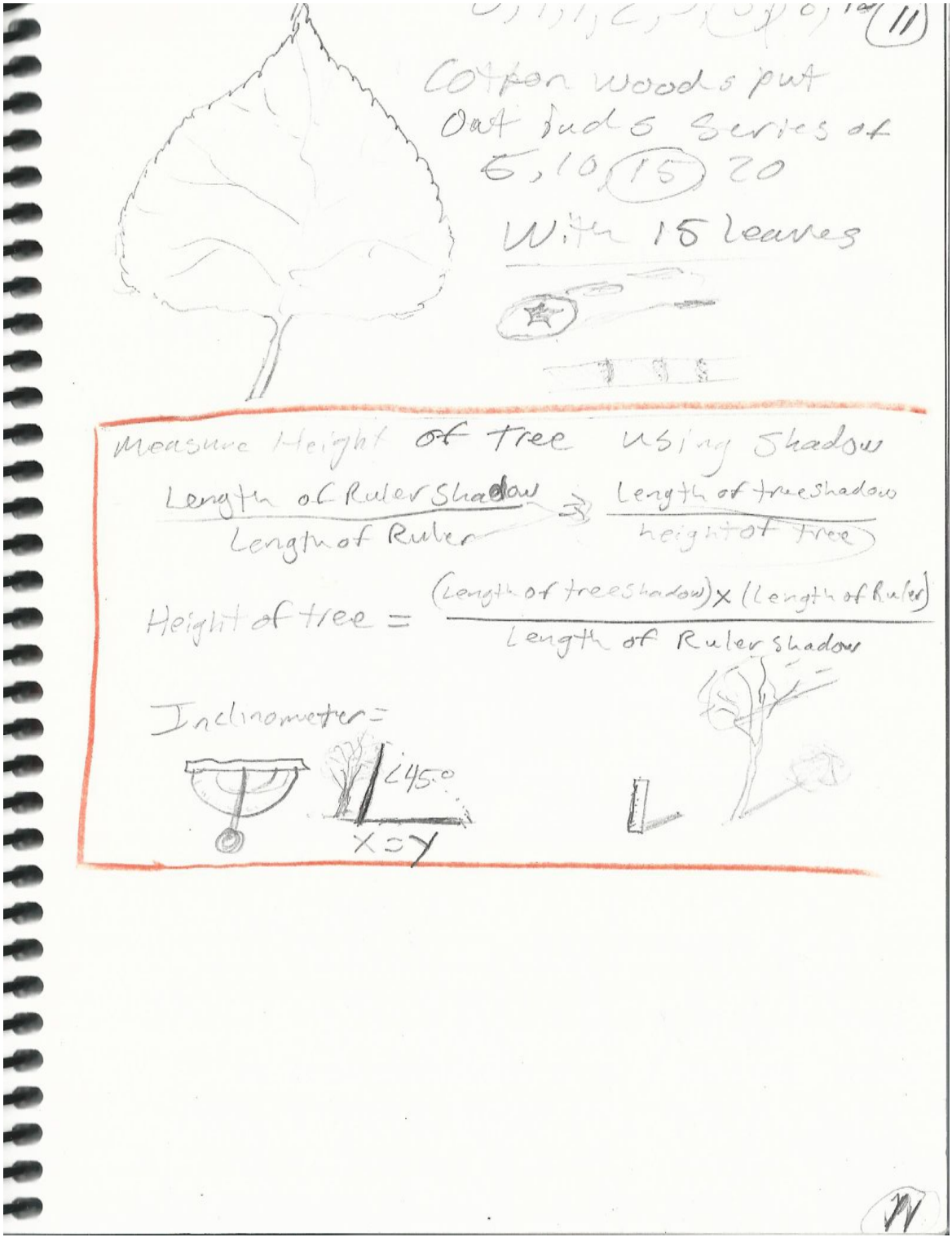
Students may not know the trees.
↳ they can differentiate by drawing leaves.
→ Rubs... Leaf & Barks
→ Bag Method to help show students condensation ... Clouds

- Come up with questionable questions. Students wonder what is happening. Have them ask those questions. Then determine if the question is testable

- Twig Activity

Tree Species	Length of Growth Last yr.	2 yrs	3 yrs
-Cotton Wood	9cm	9.cm	8.3cm

- Differences is do to weather conditions
  ↳ amount of Rain / Drought.
- What would it look like if we had a twig with ten years?.. fairly consistant past 3yrs.. More or less growth years Prior?


(11)
Cotton woods put
Out buds Series of
5, 10, (15) 20
With 15 leaves
Measure Height of tree using Shadow
Length of Ruler Shadow / Length of Ruler ⇒ Length of tree shadow / height of tree
Height of tree = (Length of tree shadow) x (Length of Ruler) / Length of Ruler shadow
Inclinometer=
∠45°
X=Y
L
11

Logo's

13

FLOODPLAIN FOREST

13

22

Squirrels Forget Too.

Throughout the winter Grey Squirrel wakes every three days. And he is always Hungary, luckily he keeps a Big cash of acorns to last the long cold months. In Spring his cash begins to dwindle, but he cannot remember where he put his other small cashes. Soon he notices there are just a few acorns left, but the oak trees have not produced any acorns yet. The next day he sees a green little flag sticking up out of the ground. As he comes down from his tree, he notices the flag is an oak Saplingo. Quickly he runs to it and begins to dig. "Yay!" Grey Squirrel has found one of his small cashes. He eats a few and gathers the others for his main cash. Before going down he looks for another green flag, astonished he notices there are dozens of flags. As he runs to each Sapling finds another small cash and repeats the process; eats a few and cashes the rest. Soon before Fall his big cash is full. Now there are acorns everywhere. Grey Squirrel then begins to make many small cashes. . Now Grey Squirrel is ready for winter again. Squirrels forget too.

APPENDIX B: Winter Survival Scenario

Winter Survival Exercise: The Situation

You have just crash-landed in the woods of Northern Minnesota and Southern Manitoba. It is 11:32 a.m. in mid-January. The light plane in which you were travelling has completely burned except for the frame. The pilot and co-pilot have been killed, but no one else is seriously injured. A total of ten people survived.

The crash came suddenly before the pilot had time to radio for help or inform anyone of your position. Since your pilot was trying to avoid a storm, you know the plane was considerably off course. The pilot announced shortly before the crash that you were 80 miles northwest of a small town that is the nearest known habitation.

You are in a wilderness area made up of thick woods broken by many lakes and rivers. The last weather report indicated that the temperature would reach minus twenty-five degrees in the daytime and minus forty at night. You are dressed in winter clothing appropriate for city wear - suits, pant suits, street shoes, and overcoats.

While escaping from the plane, your group salvaged the fifteen items listed below. Your task is to rank these items according to their importance to your survival. (Your group has agreed to stick together).

1) 10 skis and poles.	2) 5 cans of shortening.	3) 1 compass.
4) 10 newspapers	5) 100 feet of rope.	6) 1 knife
7) 2 Quarts of Alcohol	8) Cigarette lighter (no fuel)	9) 3 Snickers
10) Extra shirts and pants	11) plastic map	12) .45 caliber pistol
13) First aid kits with gauze.	14) Flashlight	15) Ball of steel wool

Correct order:

1. Cigarette Lighter. (to start fire which is needed to signal for help)

2. Ball of steel wool. (to start fire)

3. Extra shirts and pants for each. (warmth)

4.) Piece of rope (construct shelter) (it can burn) (for hauling stuff)

5. Can of shortening. (mirror from the lid) (first aid ointment, high calories)

6. Flashlight (signal at night)

7. Snickers (Enough energy to last a few days

8. newspaper. (fire starter) (insulation) (read it to prevent boredom)

9. .45 caliber pistol (signal for sound) (Powder for fire) (a lot of negatives)

10. knife (nice to have, but not essential)

11. first aid kit (gauze could be used to insulate fingers, toes etc)

12. ski pole (to help construct shelter) (Walking stick) (flag pole)

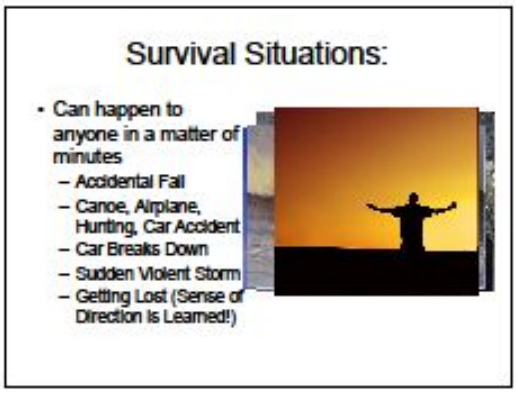
13. whiskey (fire building) (negative effect if drunk - lose body heat)

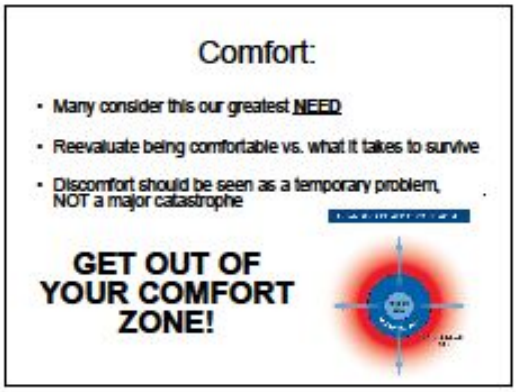
14. map (no need. It will only encourage someone to walk out)

15. compass . (worst) (it might encourage a survivor to leave the crash site)

***Stay put. Do not try to walk out. Take care of your basic needs. Warmth, Shelter, fire, water,

APPENDIX C: Survival PowerPoint





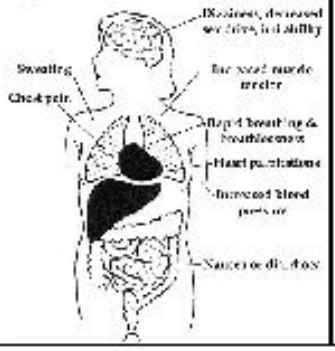
Anxiety

- *Def:* **An unconscious fear;**
- *Possibility of a threat*
- Must be recognized and overcome
- Ranges from mild discomfort to disorientation and panic
- Can distort a moderate danger into a major one when behavior becomes abnormal

Physical Symptoms of Fear and Anxiety

- Quickening of the pulse
- Feeling Faint
- Muscular Tension and Fatigue
- Sweating (palms, pits, feet)
- Dryness of the Mouth/Throat; High Pitch Voice
- Butterflies in the Stomach

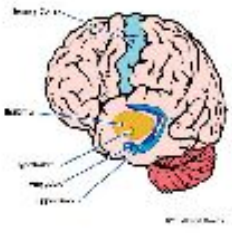
Physical Effects of Anxiety



Psychological Symptoms of Fear and Anxiety

- Irritability
- Hostility
- Talkativeness early on; Silence later on
- Confusion; Inability to concentrate
- PANIC!!!!!!!!!!!!!!!

Neurology of Fear



- Thalamus - decides where to send incoming sensory data (from eyes, ears, mouth, skin)
- Sensory cortex - interprets sensory data; conscious assessment of danger
- Hippocampus - stores and retrieves conscious memories; processes sets of stimuli to establish context
- Amygdala – Controls first physical response; External stimuli sent directly to this region; Triggers hormonal chain reaction leading to Cortisol in bloodstream
- Hypothalamus - activates "fight or flight" response

Moral:

Fear Can Kill……

BUT

Fear Can Also Save Your Life!!!

Control Your Fear!

- **Knowledge** – gain as much info about everything as possible
- **Don't run away from fear.** Recognize it, understand it, admit it, and accept it!
- **Think Positive** (PMA)
- **Keep Busy** (build a fire, talk to Wilson, make a whistle)
- **Practice your Religion**
- **Keep your mind on your main goal**
- **Learn to tolerate discomfort**
- **Stay calm and THINK!!!**

Controlling Fear in Others

- Show mutual support for each other; PMA
- Show leadership – pick a leader
- Show discipline
- Develop contagious behavior

L E A D E R S H I P

Remember:

S – Sit down and relax

T – Think (rule of threes, next steps???)

O – Observe your surroundings

P – Plan a strategy to survive

Rule of 3

- 3 seconds.....Panic
- 3 minutes.....Oxygen
- 3 hours.....Shelter
- 3 days.....Water
- 3 weeks.....Food

Survival Kits

YOUR MIND IS YOUR BEST SURVIVAL TOOL!

Survival Kits

Items in your survival kit should enable you to do the following FIVE things:

1) Carry out basic first aid
2) Build a fire using two different methods
3) Construct a shelter
4) Signal for help both visually and by sound
5) Gather food and purify water

APPENDIX D: Desert Survival Scenario

Stranded in the Desert

You and your four friends decide it would be fun to spend a nice spring weekend hiking in the Sonoran Desert. Excitement is high as all five of you squeeze into your Jeep and head for the wilderness. As you drive you enjoy looking for wildlife and trying to identify the types of cactus. Several hours have gone by when the road suddenly ends. A recent storm washed it away and even with the Jeep's four-wheel drive you can't cross. One of your friends points to a rocky hill just on the other side of the road and suggests a hike to "survey the terrain" and find a good place to camp. You don't want to haul all of your gear until you find a spot to camp and so you leave it in the Jeep. You hike about a mile until you find a nice flat spot on the side of the hill. When you return to where you parked your Jeep, you find only tire tracks and a few scattered items which used to be in your packs. You and your friends discuss your situation. You estimate you drove the jeep 30 miles before the terrain was too rough for it to go any further. The desert reaches a high of at least 90° in late spring and drops to 50° at night. You realize no one from home knows where you are and you are unsure you have cell phone reception. You and your friends estimate it will take 4 or 5 days to walk to the highway, taking in consideration time to sleep and breaks. The terrain is also very rough heading back and does not flatten out until you near the highway. You decide your best option is to start walking right away considering it's almost night time and you don't have any sleeping bags or blankets. One of your friends gathers the scattered gear and lays it out in front of you.

You have:

A flashlight	A Swiss Army knife
One canteen filled with water	Three dented cans of soda
A gallon of whiskey	Approximately 8 feet of nylon rope
A water purification kit	A pack of matches
A compass	A cell phone with one bar of power

A denim jacket with cheese and peanut butter crackers in a pocket

- -

First of all, do not try to walk out, So hear is how I would rank them and why.

1. Cell phone. Service is "unsure". If I can get a hold of someone to tell them we are lost, a search and rescue will be sent to find you. Maybe walk to get to higher ground.

2. 3 cans of soda. Liquid is important, plus the cans can be used to hold water. Metal can to visual signal for help. Boil water to purify.

3. Knife. To cut into a cactus to get water. Can from # 2 to hold water.

4. Rope. To help build a shelter to get out of the sun. (Knife to cut branches, rope, etc.)

5. Matches. To build a fire and stay warm at night. (Fire is also a companion. esteem builder)

6. Canteen with water. Water is good, canteen to hold water. (not essential)

7. Jacket with food. Jacket for warmth, food for calories. (not enough for everyone).

8. Flash light. See at night, fire starter, Signal for help at night.

9. Water purifier. No need if you can boil water.

10. Whisky. fire starter. (Could cause problems if you don’t share)

11.. Compass. Bad to have. Will give you the courage to walk out. You'll get lost, dehydrated, and DIE!!! This is only my opinion of course.

APPENDIX E: Primitive Skills Worksheet

Name:
Date:

PRIMITIVE SURVIVAL SKILLS

1. What are 3 primitive skills that every human should know how to do?

2. Name the 3 categories of primitive shelters.

3. Explain the basic principle in relation to a "Body-Heat Shelter".

4. Explain how you would construct a "Debris Hut".

5. How do you know if a "Debris Hut" is too big?

6. What is the purpose of a candle inside a Quinzhee?

7. What are "the most important shelters to know how to build" and why?

8. Summarize the 3 steps to constructing a "Pole and Bough Lean-To".

9. What is a drawback of an "A-Frame Shelter".

10. Explain the steps to constructing an "A-Frame Shelter".

11. Explain in detail how to make a "Two Strand" Natural Cordage.

12. How must the bough, grass and bark be laid to ensure a structure is waterproof?

13. Summarize the steps to construct a “Wickup”.
14. Name a variety of dry soft wood that is best for Friction Fire Building.

15. What is the only natural occurring tinder and where do you find it?

16. Explain how to make Charred Cloth?

17. Why don’t you need to add tinder when using a Fire Plow?

18. What is the most efficient Friction Fire-Starting Method?

19. What is the glowing spark from when using flint and steel? (Flint or Steel).

20. If you don’t have a “steel” with you, list some other things you could use to generate a spark.

21. What materials work best to set a small Ground Snare?

22. List 5 different materials you could use to make a tinder nest.

23. What can you do to direct animals toward your trap? (Besides Food.).

24. Explain and draw a Spring Snare.

25. Why is the Spring Snare Trap extremely dangerous?

26. How would you make an Ojibwa Bird Pole?

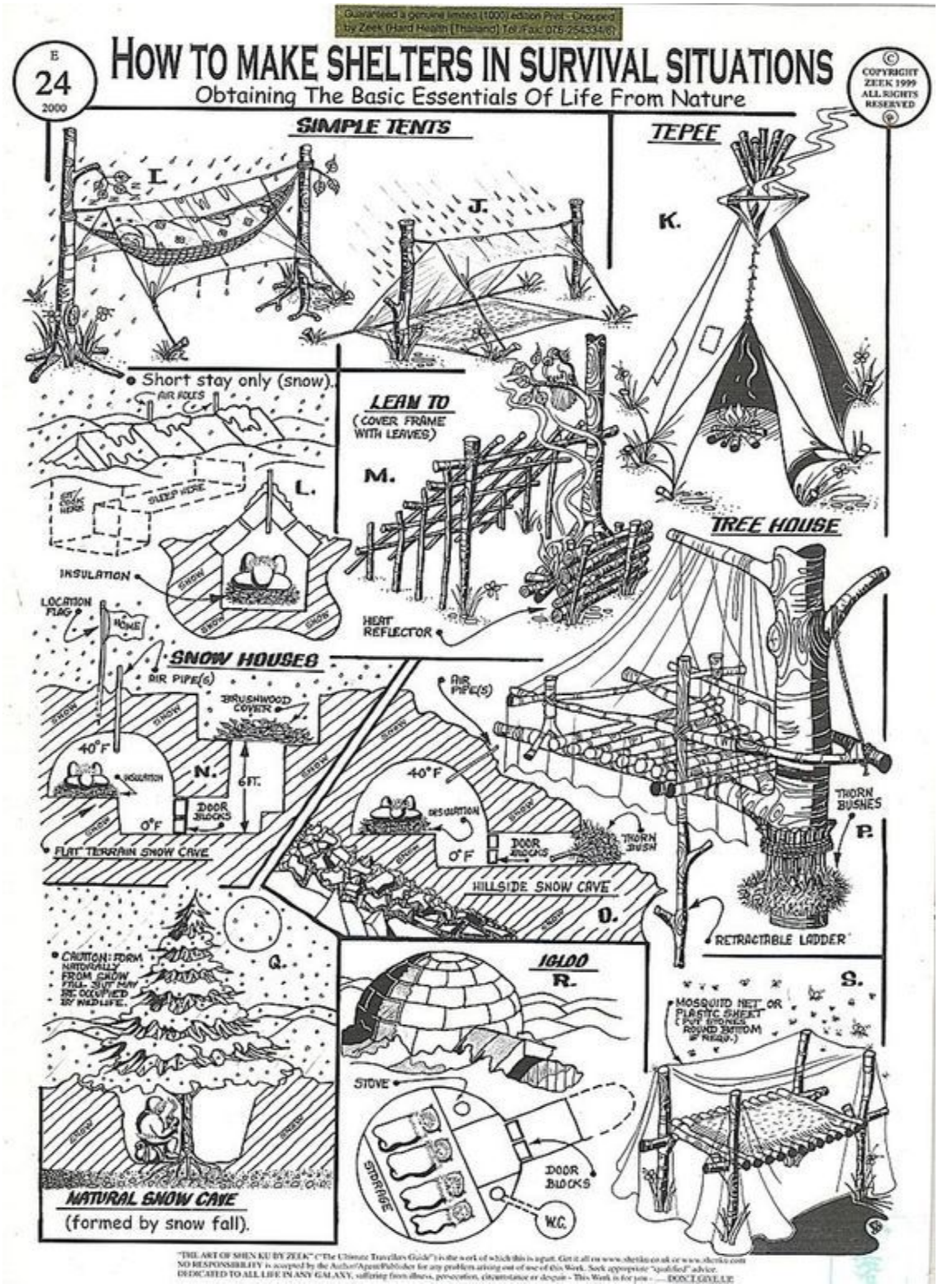
27. Explain how to make a Fish Trap. Include a picture.

APPENDIX F:Knots to Know

Knots to Know
Name_____

Bowline	Figure 8
Taught-line Hitch	Square

APPENDIX G: Primitive Shelter Notesheet



APPENDIX H: First Aid Notes PowerPoint

WILDERNESS
First Aid

Documentation

Medical Legal issues Duty to Care:

Good Samaritan Laws:

Consent:

Wilderness Medicine Vs Urban Medicine

Time:

Environment:

Improvisation:

Communication and Decision Making:

Prevention:

Size Up the Scene: Stay Calm!! It is not your emergency! Calm=Smooth=Confident=Competent

#1: I am #1 (Don't create another Patient)
- -survey the scene for hazards:
  - -danger to rescuers, to bystanders, to patients

#2: What happened to you? -
- Determine mechanism of injury (MOI) -
- use observations to think through what might have happened

#3: None on ME!!!
- -Establish body substance isolation (BSI) -
- But on gloves, mask, etc. depending on situation

#4: Are there any More? -
- Determine # of Patients

#5: Dead or Alive -
- general impression of patient -
- very sick/very hurt

Threats to Life: Stop and Fix problems

1. Obtain consent to treat 2. Responsiveness and spinal control

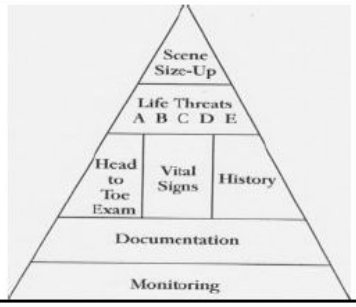
A: Airway management- clear of obstruction

B: Breathing adequacy- look, listen, feel

C: Circulation- signs of, life threatening bleeding

D: Decision about disability: spine injury

E: Environment/Exposure: protect against environmental concerns, expose wounds



Complete Physical Exam, Vital Signs and History

Physical Exam:

Complete a Head to Toe assessment -Systematically inspected, Inquire, Palpate (touch), expose injuries -Muscles, bones, joints, circulation, nerves

Vital Sign: shows how well the patient's basic life support systems- nervous system, circulatory system, and respiratory system- are doing their job. Don't tell you what is wrong with patient, put do let you know how they are doing. -

Early Changing Vitals (1st to change when things are not normal)

-**LOR** (Level of Responsiveness)-
Who are you? Where are you? Approximate time of day?, What happened? -

HR (Heart Rate)- Beats per minute, Rhythm and Quality -50-100 BPM, regular/strong

-**RR** (Respiratory Rate)- Breaths per minute, Rhythm, Quality -12-20 BPM, regular/easy -

SCTM (Skin Color, Temp, Moisture)- -Pink, Warm, Dry -

Late Changing Vital Signs (slow to change, something is already wrong) -

BP (Blood Pressure)- Systolic/diastolic – need pressure cup for systolic, need stethoscope for diastolic - <120 / <80 - strong radial pulse indicates adequate BP (at least 100 systolic) (good)

-**Pupils** (P)- - PERRL (Pupils are Equal, Round and Reactive to Light)

-**Temperature** (T): -use thermometer (98.6 degrees F)

Patient History: Be the detective!

Chief Complaint (CC)- What is patients primary concern...investigate

All Patients: "SAMPLE" History

S--Symptoms- Headache, dizziness? Nasuea? Hot? Cold? (Open Ended)

A--Allergies- medication, food, insects, pollen, exposure, what happens?

M--Medications- over the counter, prescription, alcohol, recreational Drugs,

P--Pertinent Medical History- felt this way before?, Issues: heart, breathing, digestion, seizures, diabetic

L- Last ins/outs- food, water, urination, defecation, vomiting

E- Events leading up to incident/illness?

Medical Issue Patients: "OPQRST"

O- Onset- sudden? gradual?

P- Provokes- What makes pain worse or better

Q- Quality- What words describe the pain: sharp, dull, constant, erratic, ect.

R- Radiates- Where is pain? does it move anywhere?

S- Severity- How does this rate on a scale of 1-10? what is a 10 for you?

T- Time/Trend - How long has it been going on? better or worse?

Your Turn!!

Practice writing down and Taking all Patient "SAMPLE" History

Don't forget to RECORD info.

BE THE DETECTIVE!!

IT JUST MIGHT SAVE THEIR LIFE!

Common Campsite Issues

Flu and Illness

Dehydration/ Nutrition

Cut / Abrasion / Puncture / Blisters

Burns: Sun, Snow, Water

Hypothermia- cold water rescue

Frostbite, Trench foot

Mental Status

Flu and Illness #1 Bacterial Transferring agent= R+L Hand "Wash your Hands"

Upper Respiratory Infections (URI): Viral or bacterial infections that produce flu-like signs and symptoms (increase mucus production, sometimes productive cough, soar throat, fever, malaise) and afffect sinuses, pharynx, or bronchi.

Sore Throat: Common cause of sore throat are simple dryness due to altitude/cold and viral infections such as common cold. Strep throat, roughly 10% of sore throats, is caused by bacterial (beefy red throat with white pus spots accompanied by fever, headache, vomiting).

Fever: the body's resetting of our internal thermostat triggered by the immune system's response to an infection.

Headaches: dehydration, muscular tension, altitude, vascular disorders, trauma, brain tumor, CO poisoning.

Treatment (Tx) of Flu Like Symptoms

1. Hydrate
2. Wash hands and maintain good hygiene
3. Rest and be patient
4. Massage muscles for muscle tension
5. consider pain medication for headache and muscle aches
6. Decongestants, anti-cough meds, antihistamines, acetaminophen or Ibuprofen for fever
7. Bland diets are best for stomach (BRAT)

Evacuation Principles

1. fever greater than 102 f persists for more than 48 hours
2. severe headache, difficulty breathing, not responding to treatment
3. Symptoms of pneumonia or strep throat
4. abdominal pain worsening for more than 24 hours
5. dehydration from diarrhea, or inability to tolerate any fluids

Hydration/ Nutrition "L" portion of SAMPLE History

Hydration: necessary for good health. it helps us tolerate heat, altitude, cold, and break down food.

Signs and Symptoms of Dehydration:
1. Thirsty
2. Weakness, headache, fatigue, lightheadedness, irritability
3. Dark, smelly urine. Diminished Urine output
4. History of inadequate water intake (2-4 liters a day is ideal)
5. altered mental status

Tx:
1. Drink water until no longer thirsty! -Avoid coffee, tea and alcohol
2. Dehydration usually takes time to develop and time to treat
3. Electrolyte imbalance, add sugar, Gatorade packet, crystal lite packet to water

Nutrition Eating is NOT an option.....An expedition is never a time to Diet!!!
Calories = energy = body functions properly

Prevention is the name of the game!! Stay hydrated, eat salty foods, snack often, don't rely on electrolyte replacement drinks.

Signs and Symptoms of Hyponatremia (lack of nutrition...water intoxication):

1. History of Heavy water intake without much food intake
2. Headache
3. weakness and fatigue (shaky)
4. Nausea vomiting

Tx: 1. Prevention

Cut / Abrasion / Puncture / Blisters Wound Management

Short term: Control Bleeding:

1. Direct Pressure and elevation
2. Pressure Dressing
3. Tourniquet Last Resort!!!!

Long Term: Prevent Infection and Promote Healing

1. Clean Wound:
   - wash your hands, put on gloves
   - clean around wound with soap and water...use drinkable water!!
   - Remove any foreign matter (unless it is impaled!!)
   - Pressure irrigate BEST First Aid Kit Device
2. Cover Wound with clean dressing, keep moist with antibiotic ointment.
3. Keep Dressing Clean and Dry. Change dressing every 24hrs.

Blisters: Prevention is key.

Infection: Prevention..Prevention..Prevention

Signs and Symptoms: (Mild)

- Redness extending beyond the wound
- Warmth, mild swelling, tenderness
- Pus formation

Signs and Symptoms: (Severe)

- Heat, swelling, discoloration and pain,
- Red Streaking from wound towards the nearest lymph node
- Swollen lymph nodes
- Malaise, fever
- Shock

TX:

- Soak in hot water for 20-30min several times daily
- Clean wound following hot Soak
- Consider packing the wound open to allow drainage
- Consider antibiotic and fever reducing therapy

Burns

Mechanism of injury (MOI): What caused burn

Thermal Burns: Caused by heat (ex.hot water on stove)

Chemical Burns: Caused by strong corrosive that can damage the skin. (ex. Hand and foot warmers)

Electrical Burns: cause by the resistance to electrical current flowing through tissue (battery, generator, gps)

Radiation Burns: caused by ultraviolet light or alpha, beta or gama ray radiation (ex. Sunlight, exemplified by wind and cold)

Safety:

- Ensure Scene is safe (Don't create another patient)
- Remove patient from immediate danger

TX:

- Cool immediately, irrigate with water
- Remove clothing and constricting objects (jewelry, watches, belts)

Asses burn:

- Superficial: red, Painful, Swollen
- Partial Thickness: red, Painful, swollen and Blistered
- Full Thickness: Painless, Pale, Charred

Surface area Burned:Estimate percent of total body surface burned (rule of 10 hands)

Location Burned: some areas more dangerous than others Consider Pain medication, Anti Inflammatory (no aspirin)

HYDRATE!!!!! Lose a lot of water

Monitor

Burn Prevention

Sunscreen: Protect skin from sun even if cloudy!

Lotion/chapstick: Dry skin enhances effects of Sun.

Cover Skin: Wind dries skin enhancing Sun's effect

Sunglasses: Snow Blindness is the burning of cornea and conjunctiva due to reflection of Sun. Snow reflects 70-90% of light.

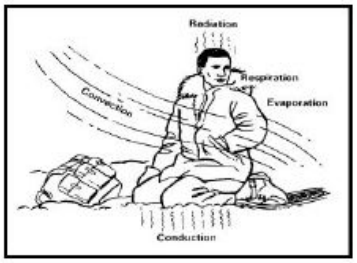
No messing around by Kitchen/Fire: Stoves and spilled water #1 cause of trip ending burns

Make sure you have layer between skin and heating or cooling mechanism

Environment/Exposure

Types of heat loss

- **Radiation:**This normal process of **heat** moving away from the body usually occurs in air temperatures lower than 68°F (20°C). The body loses 65% of its **heat** through **radiation.**
- **Evaporation:** When you sweat or when your skin or clothing gets wet, the **evaporation** of that liquid (i.e., the change from liquid to vapour form) promotes **heat loss**, and the natural result is a cooling **effect.**
- **Conduction** (such as **heat loss** from sleeping on the cold ground). **Heat** is lost in air temperatures lower than 68°F (20°C).
- **Conveotion** is the process of air or water flowing by the skin and carrying away body **heat.**



Hypothermia "the cooling of the body's core to a temperature where normal brain and/or muscle function is impaired"

Signs and Symptoms:

Mild: 90°F 95°F (32°C – 35°C): impaired ability to perform complex tasks, 'The Umbles': Stumbles, Mumbles, Fumbles, Grumbles, (Loss of Motor Coordination)

Moderate: 82°F – 90°F (28°C – 32°C): Uncontrollable violent shivering, worsening of "The Umbles", Loss of motor skills, slurred speech, violent shivering, grumpy.

Severe: <82°F (<28°C): Shivering Stops, Muscular Rigidity, Decreasing mental Status progressing to unresponsive, decreasing pulse, and respiratory rates that may become nonpalpable.

Not Dead until they are Warm and Dead!!

Must Do:(Gently)

- Change patients environment (shelter, wind, water, surface)
- Change patient's clothing: remove wet clothing, add new insulating clothing.
- Increase Caloric intake
- Warm and Hydration

TX: (Dry and insulating layers)

Mild: Feed them and Beat them

- Mild exercise (increase furnace)
- Food-Calories-Energy-wood for furnace, quick sugars, proteins, salts = Fast Energy
- Warm, Sweet Drinks

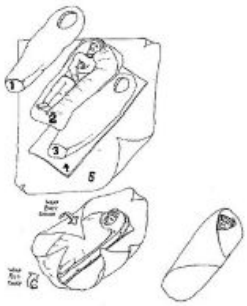
Moderate

- Increase Caloric intake:quick sugars, proteins, salts
- Warm Sweet Drinks
- Hypothermia Wrap
- Heat packs or Hot Water Bottles: armpits, chest, groin, neck, (warm core)

Severe: (Evacuate)

- Handle Gently
- Assist breathing 5-15 min prior to moving
- Hypothermic Wrap
- Heat packs or Hot Water Bottles: armpits, chest, groin, neck,

Avoid CPR Chest compressions



Nonfreezing Cold Injuries

"Trench Foot"

Definition:Tissue is chronically cold, but not frozen. Combination of wet and cold and compressed

Signs and Symptoms:

- The area is initially cold, pale or mottled, possible swollen
- After it warms, itch and pain often the prominent symptoms
- After it warms, the area can also be red, hot, swollen and numb
- The appearance is similar to mild frostbite injury...but possible longer term effects

TX:

- Warm affected area
- air dry and elevate
- Consider pain medication
- Avoid constriction and further injury of project blisters and damaged tissue
- Healing takes weeks, pain and temperature may last YEARS!

"Trench Foot"

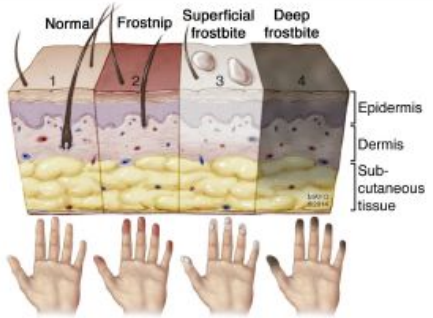
Frostbite

Definition: local freezing, creating a spectrum of injury from minor irritation to extensive tissue loss.

Types of Frostbite:

- **Superficial** no permanent damage to tissue
- **Partial Thickness** damage to the upper layers of skin, seldom resulting in significant tissue loss
- **Full Thickness:** damage to deeper layers of skin and potentially bone and muscle structure

Colds and feet are a stop and fix Problem!!!



Signs and Symptoms of superficial frostbite:

- Mild tingling and numbness
- White waxy skin
- Warm, swollen, painful, and tend after thawing

Signs and symptoms of partial or full

- Tissues appears cold, pale, numb, wooden, hard
- after thaw may appear blue, waxy, swollen and red
- Blisters form after thawing suggests partial thickness tissues
- remaining numb, cold and bloodless after thawing suggest full thickness.

TX: (Prevent further heat loss)

- Thaw superficial frostbite promptly. skin to skin warming acceptable in field.
- Field thaw partial or full thickness injury if minimal risk...Optimal thawing in warm water bath.. (99-104F)

PREVENT REFREEZING

- Never massage or rub area
- Consider ibuprofen for pain
- Avoid constriction and protect blister and damage tissue.

TX: (Prevent further heat loss)

- Thaw superficial frostbite promptly. skin to skin warming acceptable in field.
- Field thaw partial or full thickness injury if minimal risk...Optimal thawing in warm water bath.. (99-104F)

PREVENT REFREEZING

- Never massage or rub area
- Consider ibuprofen for pain
- Avoid constriction and protect blister and damage tissue.

APPENDIX I: Wilderness First Responder SOAP Note

Wilderness First Responder SOAP Note

Name _____ **Date**_____

Location_____

Subjective/Summary/Story *(age, sex, chief complaint, OPQRST, MOI/HPI).*

_____

_____

Objective/Observations/Findings *(Describe position found. Describe injuries).*

_____

_____

Patient Exam_____

_____

_____

Vital Signs

Time	_____	_____	_____
LOR	_____	_____	_____
HR	_____	_____	_____
RR	_____	_____	_____
SCTM	_____	_____	_____
BP	_____	_____	_____
Pupils	_____	_____	_____
Temp	_____	_____	_____

History

Symptoms_____

Allergies_____

Medications_____

Pertinent Medical History_____

Last Intake/Output_____

Events recent _____

Assessment *(List Problems)*_____

_____

_____

Plan *(Plan for each problem)*_____

_____

Anticipated problems _____

_____

APPENDIX J: Wilderness First Responder Cheat Sheet

Pt Assessment

1-Scene: Safe? MOI for Spine? BSI. How many? How bad?

2-Stop+fix: A, B, C, D, E[2]

3-Head-to-toe, plus:

@ time:			
LOR	HR	RR	SCTM
BP	*Pupils*	*Temp*	

Symptoms	Onset speed
Allergies	Provokes/ Palliates
Meds	Quality
Pertinent med. History	Radiation/ region/refer
Last In/Out	Severity 1-10
Events	Time/trend

Focused Spine Assessment

For wilderness settings only

- A+Ox3 or 4 & sober
- No distractions – physical or emotional; pinch to confirm
- Normal CSM (unless explainable) in all extremities
- No spinal pain or tenderness

Shock kills! Anticipate shock

⇑ *legs, manage temp, give H_20*

Early	Late
Anxious	↓ LOR
n/v, ↑ HR/RR, skin P/C/C	↑+weak HR, ↑+shallow RR
Treat cause	Rapid evac

CPR

Check pulse; 30:2 (x5) - push hard, push fast; recheck pulse

- Severe hypothermia: NO. Assist br'thing 10m b4 xport
- Cold H_20: GO & don't stop
- Lightning: GO. May need breathing for a long time

Bad Trauma: Re-✓ ABCs

Treatment, waiting…, evac

Abdominal Evac?

- Continuous pain > 12h
- Localized. Rigidity, guarding, or tenderness
- Pain motion/foot strike
- S/sx of shock
- Blood in vomit, urine, feces
- Nausea/vomit/runs causing dehydration or lasting > 72h
- Fever > 102°F/39°C
- S/sx of pregnancy

Head/Brain Injury Evac?

Won't wake to aggressive stim; note time LOR is ⇓. DIC. Also

- Nausea/vomit/HA, irritability, & other s/sx of mild head injury not improving >24h
- Vision Δs, ataxia, drowsy, seizure, not A+Ox3 or 4

Diabetes: Give Sugar

S: I have a *age, sex* whose chief complaint is _. Pt/witness states *MOI/HPI - OPQRST.* Pt also reports _. Pt denies other probs.

O: Pt found _. Exam reveals _. Pt denies/reports loss of consc'ness. …spinal pain/tenderness. *CSMx4. Vitals.* Pt reports hx of *SAMPLE.*

A: *Potential problem list. Major probs considered & rejected.*

P: *What you've done (e.g. FSA) & plan to do for each problem.*

Version 4.8

APPENDIX K: Medical Scenarios #1

Medical Scenario #1

Setting: You are on Lake Seagull on the second day of Winter Trek, you have been out snowshoeing for about 2 hours with your camp mates and finally reach camp 19 to visit. This is what you see as you enter camp 19……

Patient #1: You are sitting around the fire, trying to warm up since you don't feel good. You woke up this morning with a throat ache, but you think that is just from the fire last night. You have been having achy and had the chills (hot sweats then cold) for the last couple of hours and can't seem to get ride of your headache. **If asked, you have pale, clammy skin, and your forehead feels really warm. You have been drinking a normal amount of water and the last food you ate was oatmeal for breakfast.**

Patient #2: you are found sitting off by yourself, curled up trying to res. You feel tired, weak, lightheaded, and have a big headache. You don't feel like doing anything, and become irritable when asked to do anything, especially eat because you just don't feel good. You are thirsty but, have been for a while now so you don't think that is it. **If asked , you have only drank 1 liter of water since you left wilderness canoe base since your group has not been good at keeping a fire going. You have not used the bathroom since you left the wilderness canoe base and at wilderness canoe base your pee was dark yellow and smelled. You ate breakfast, but it was really slow process since your stomach did not feel good.**

Patient #3: you are found sitting by the fire holding your hand and panicking. You were carving a heart out of wood for your significant other, and slipped with the knife. You did not think it was bad, but once you saw the blood, you started getting really nervous and light headed**. If asked, it was an old pocket knife that you can't remember the last time you cleaned. You recently sharpened it so there was no rust on the blade. You have eaten and drunk water as normal, but still feel queasy and lightheaded.**

Patient #4: You are found yelling and holding your leg next to the cooking stove. At a closer look the Kettle of boiling water appears to have fallen off of stove and onto your lower leg. You tried to move back in time, but could not. You are wearing Nylon pants with wool socks**. If asked, a team member was goofing around by stove and tripped knocking it off into your lap. As time passes you get nervous because blisters quickly appear.**

Patient #5: you are found hunched over and shivery in a t-shirt sitting next to your cross-country ski's. You just went out for a 2 hour ski, and came back to relax around the fire. You started to get cold, but you were still sweating so you thought it felt good to take off your jacket. Eventually, you initially started shivering, as the shivering increased your motivation to move and change cloths diminished. You notice your coordination diminishing, causing you to mumble, fumble and stumble and get really grumpy with those helping you**. If asked: you have not eaten since breakfast, and it**

was a small breakfast since you were excited to go out to ski. You have drank a little water, but not used the bathroom yet today. You just want to be left alone until you warm up.

Patient 6: you are found in the tent holding your toes. They are really cold and hurt. You did not change your books after going skiing, you figured once you started moving again they would warm up, but the did not. When you took off your boots the tips of your toes are black and you don't know what to do.

APPENDIX L: Medical Scenarios #2

Medical Scenarios #2

Setting: You are on Lake Seagull on the third day of Winter Trek, you overheard a panicked radio call on your radio and realized that based on their description of location, it was right around the corner from your campsite. You and your team decide to see if you can help this winter traveler that seems to be in trouble. As you approach you see sled marks down a steep incline with lots of rocks and find the patient hunched over, shivering, and holding their left elbow next to their sled .

Patient: You are sitting on the ground next to your sled, trying to warm up, while holding your left elbow since it hurts from hitting it on something. You know your name, where you are, and what time of day it is, and remember what happened. You are really cold (and continue to get colder) and your elbow really hurts.

If they do a **sample history:** you have throbbing pain in your left elbow, you are **allergic to bee stings,** you used **medical marijuana** earlier that day, have a **history of diabetes**, you **drank 2 liters** of water and **peed clear** earlier today, had an **average breakfast**, and **pooped normally** this morning.

If they do a **physical exam:** They find tenderness on **left elbow** and if expose it they find **scrapes, bleeding and bruising** on left elbow. They will find tenderness to touch on **right shin,** if exposed they find more **scrapes, bleeding and bruising** on right shin.

If they do **Vitals: LOR:** you can answer all 4 questions .**HR:** yours +20, **RR:** yours

+10, **SCTM:** Pink, warm, dry (normal), **BP**: did they find radial pulse**, Pupils:** whatever they actually find**, Temp:** cooling down.

If they **calmly take care of you, and keep you warm, your vitals stabilize** at whatever they actually find. If they seem unsure and don't keep you warm, you keep getting colder, start to panic and your HR and RR continue to climb.

APPENDIX M: Wilderness First Aid Curriculum and Doctrine Guidelines Handouts

2009 Boy Scouts of America

Bone and Joint Injuries

Time
2 hours

Objectives

Upon completion of this lesson and skill practice, the participant will be able to:

1. Define strain, sprain, fracture, and dislocation.
2. List the signs and symptoms of a strain, sprain, fracture, and dislocation.
3. Demonstrate a field assessment for injuries to bones and joints.
4. Define RICE (rest, immobilize, cold, and elevate) and describe its use.
5. Demonstrate and/or describe the emergency treatment, including the use of improvisation, for:
   a. Strains and sprains
   b. Fractures
   c. Dislocations, including realignment of fingers, toes, patella, and shoulder
6. Describe the emergency treatment for:
   a. Angulated fractures
   b. Open fractures
7. Describe the long-term care for injuries to bones and joints.
8. Describe how to prevent some bone and joint injuries.
9. Describe situations that would require an evacuation versus a rapid evacuation.

General Information

Injuries to the musculoskeletal system—bones, ligaments, muscles, tendons, and cartilage—are among the most common in wilderness activities. You will often be unsuccessful in your attempt to assess exactly what is wrong, but you need to know how to handle these emergencies.

Guidelines for Assessment and Treatment of Strains

Strains are overstretched muscles and/or the tendons that attach muscles to bones. They can range from a mild annoyance to debilitating. They are indicated by pain and sometimes by bruising in the area of the strain.

A strain can be used within the limits of pain—in other words, tell the patient if it hurts, *do not* do it. RICE can be helpful.

(**R**) The patient should **r**est the injured area. Have him or her avoid movement that causes pain.

(**I**) **I**mmobilize the injured area. Immobilization can lessen pain and prevent further damage.

(**C**) Apply **c**old to the injured area. Applying ice or a cold pack can help reduce swelling and ease pain.

(**E**) **E**levate the injured area above heart level to reduce swelling. Serious injuries to the limbs may preclude this.

Guidelines for Assessment and Treatment of Sprains

Sprains are injuries to ligaments—the bands holding bones to bones at joints—and can vary from simple overstretching to complete tears. They are indicated by pain, pain on movement, swelling, and bruising, although bruising may take hours to appear.

Note: *Strains and sprains, especially where a joint is involved, are often impossible to differentiate. Differentiation, however, is not required. They are both treated the same.*

First aid is RICE: **r**est, **i**mmobilize, **c**old, and **e**levate. But RICE should be applied after an initial evaluation of the injury. The primary goal of the evaluation is to determine if the injury is usable or not. Get the patient at rest and relaxed, and take a look at the injury. Look for deformities, swelling, and perhaps discoloration. Have the patient actively move the joint and evaluate the amount of pain involved. Move the joint more aggressively with your hands and evaluate the pain

response. Finally, if the joint appears usable, have the patient test it with his or her body weight. A usable injury can be used, within certain parameters. An unusable injury will require a splint.

Usable or unusable, *do not* allow the injury to be used (rest) for the first half-hour while you reduce its temperature (cold) as much as possible without freezing. Crushed ice works best, as it conforms to the shape of the anatomy involved. Do not put ice directly on skin—put it in a plastic bag and wrap it in a shirt or sock. Without ice, soak in cold water, or apply chemical cold packs, if they are available. Another option (during warmer months) is to wrap the joint in wet cotton and let evaporation cool the damaged area. Immobilization can best be attained with a compression dressing; this requires an elastic wrap. Wrap it snugly but not tight enough to cut off healthy circulation, and wrap from below the injury toward the heart. Elevation refers to keeping the injury higher than the patient's heart. After 20 to 30 minutes of RICE, remove the treatment and let the joint warm naturally for 10 to 15 minutes before use.

Note: *The injury will heal faster if RICE is repeated three to four times a day until pain and swelling subside.*

Usable upper-extremity sprains do not require support. With usable knee sprains, the patient may be aided by creating a walking splint—a splint that restricts the movement of the knee without putting pressure on the kneecap—for the knee. A pad should be placed behind the knee within the splint to keep the knee slightly flexed. The patient will be further supported by using a stick or staff for balance. Patients with usable ankles should have their boots laced firmly and will also benefit from a stick or staff for balance.

Guidelines for Assessment and Treatment of Fractures

Sometimes the assessment of a fracture, or broken bone, is simple: Bones stick out through the skin, or angulations occur where no angulation should exist. Without the obvious, and without an X-ray, rescuers can base an assessment on specific guidelines. The goal, once again, is to determine whether or not the injury is usable.

Remove clothing carefully, and take a look at the site of the injury. Is there discoloration and swelling? Does the patient move the injury easily or guard it, preventing motion? Compare the injured side to the uninjured side. Does it *look* broken?

Ask the patient: How did the injury occur? (High-speed impacts cause more damage than low-speed impacts.) Do you think it is broken? (The patient is often correct in their assessment.) How bad does it hurt? (Surrounding muscle spasms create pain and give evidence of the seriousness of the injury.)

Gently touch the damaged area. Does the patient react to your touch? Does it feel like the muscles are spasming? Does it feel unstable? Is there point tenderness—one particular spot that hurts noticeably more when touched? These are indications of a fracture.

Check for CSM—**c**irculation, **s**ensation, and **m**otion—beyond the site of the injury. Loss of a pulse, numbness, tingling, and inability to move are signs of loss of normal blood flow and loss of normal nerve messages—serious complications with a fracture. After splinting, check CSM often to assure circulation is not cut off by wraps that are too tight.

Remember: Patients will usually benefit from RICE, whether the bone is broken or not.

Splinting

The general rule is: *When in doubt, splint!* A splint should restrict movement of the broken bone(s), prevent further injury, and maximize patient comfort until a medical facility can be reached. To do this best, a splint needs to be made of something to pad the injury comfortably and something rigid enough to provide support. Padding should fill all the spaces within the system to prevent movement of the injury. In addition, a splint should be long enough to restrict the movement of the joints above and below a broken bone, or restrict the movement of the bones above and below an injured joint.

Splints should hold the injury in the position of function or as close to position of function as possible. Functional positions include:

1. Spine, including neck and pelvis, straight with padding in the small of the back.
2. Legs almost straight with padding behind the knees for slight flexion.
3. Feet at 90 degrees to legs.
4. Arms flexed to cross the heart.
5. Hands in a functional curve with padding in the palms.

In choosing materials for splinting, you are only limited by imagination: sleeping bags, foam pads (and they can be cut to fit the problem), extra clothing, and soft debris from the forest floor stuffed into extra clothing can all serve as splints. For rigidity, there are items such as sticks, tent poles, ski poles, ice axes, lightweight camping chairs, and internal and external pack frames. Lightweight commercial splints are available as additions to your first-aid kit. Splints can be secured in place with things like bandannas, strips of clothing, pack straps, belts, and rope. Useful items in your first-aid kit for securing splints include tape, elastic wraps, and roll gauze. Large triangular bandages are helpful in creating slings and swathes.

Specific Fractures

Jaw fractures can be held in place with a wide wrap that goes around the head. Be sure the wrap can be removed quickly if the patient feels like vomiting.

Collarbone (clavicle) fractures can be secured with a sling-and-swathe. Slings can be made from triangular bandages or improvised by lifting the tail of the patient's shirt up over the arm on the injured side and safety-pinning it in place. Be sure the sling lifts the elbow to take pressure off the shoulder.

Lower arm (radius and/or ulna) fractures (including wrist and hand) can be secured to a well-padded, rigid support, and then held in a sling-and-swathe. Place a roll of something soft in the hand to keep it in position of function. If bones of the hand are damaged, be sure to secure the hand well to the splint with, as always, lots of padding.

Fingers that are broken can be secured to nearby healthy fingers with padding between the fingers.

Upper arm (humerus) fractures can be placed in a sling-and-swathe. Leaving the elbow free sometimes eases the pain. Secure the broken bone to the patient's chest wall with a wide, soft wrap.

Rib fractures can be protected by supporting the arm on the injured side with a sling-and-swathe. Do not wrap a band snugly around the patient's chest. Do encourage the patient regularly to take deep breaths, even if it hurts, to keep the lungs clear. Be sure to watch the patient for increasing difficulty breathing.

Pelvis and hip fractures should include securing the entire patient on a rigid litter before attempting a carry-out. Conforming wraps around the pelvis will provide some support and security. Secure the legs comfortably to each other. Be sure to watch the patient for signs of shock due to internal bleeding common with pelvic fractures.

Leg (femur, tibia, and/or fibula) fractures (including the ankle and foot) can be secured on a well-padded, rigid support that includes immobilization of the ankle and foot. Sleeping pads and lightweight camping chairs can make excellent leg splints. Pad behind the knee for comfort.

Complicated Fractures

An *angulated fracture* (angles in bones) needs to be straightened. Pull gentle traction on the broken bone *along the line in which it lies*. This relaxes the muscles and reduces the pain, allowing you to move the broken bone slowly and gently back into normal alignment. The sooner this movement takes place the better. Do not use force. Do not continue if the patient complains of increasing pain. Once aligned, splint as usual. If alignment cannot be achieved, splint as best you can.

An *open fracture* is indicated by an open wound at the point of fracture. Bones may or may not be visible. The wound should be irrigated and dressed appropriately, and the bone should be splinted. If bone ends stick out of the wound, and if the doctor is more than four to six hours away:

1. Clean the wound and bone ends without touching them.
2. Apply gentle traction in line to the fracture and pull the bone ends back under the skin.
3. Dress the wound.
4. Splint the fracture. Infection is on the way, but bones survive better if pulled back inside the body.

Guidelines for Assessment and Treatment of Dislocations

With a dislocation, the bone ends in a joint are no longer properly aligned. The patient typically experiences pain in the joint and a loss of normal range of motion. The joint will look wrong. Many dislocations can only be managed in the field by splinting in the most comfortable position. With some dislocations, a field reduction (realignment) may be attempted.

Work quickly but calmly. Typically, the sooner a reduction is attempted, the easier it is on patient and rescuer. Encourage the patient to relax as much as possible, with special concentration on relaxing the injured joint. Reduction may cause pain, but stop if pain increases dramatically. Once reduced, the injury should be splinted.

Specific Reducible Dislocations

Anterior shoulder dislocations are one of the most common. There are several ways to reduce a dislocated shoulder. With the Stimson technique there is little chance of harm to the patient, although it takes time and sometimes fails to work:

1. Position the patient prone (face down) across a rock or log with the arm on the injured side dangling down vertically.
2. With a soft cloth, tie something of about 5-10 pounds of weight to the dangling wrist.
3. Wait. This process takes 20 to 30 minutes to work. The key to success is for the patient to be relaxed and to allow the gentle pull of the weight to slowly fatigue the chest and back muscles, thus allowing the head of the humerus to slip along the chest wall and then snap back up into position in the shoulder joint (glenoid fossa). Too much weight will cause increased spasms and prevent this method from working.

Persons experiencing a shoulder dislocation can frequently pull their shoulder back into place, if they perform virtually the same maneuver immediately upon themselves. Standing or sitting, the patient should pull the injured arm straight forward away from the body by gripping their wrist with the opposite hand. This is the same mechanical maneuver that the Stimson technique employs. If the victim delays more than a few minutes in attempting this reduction, the dislocation will cause so much spasm in the chest muscles that this technique will probably not work.

Upon reducing the shoulder, the patient should be placed in a sling-and-swathe. Do not swathe the patient if the person may need to use their arm in an emergency, such as escaping from an overturned raft or preventing a fall. While it is best that the shoulder be immobilized, allow the patient the ability to use the arm in an emergency.

Finger dislocations are also common. Keeping the injured finger partially flexed, pull on the end while gently pressing the dislocated joint back into place with your other thumb. Tape the injured finger to a neighbor with a gauze pad between them. Do not tape directly over the joint itself.

Kneecap (patella) dislocations are typically very easy to reduce. Apply gentle traction to the leg to straighten it out. Sometimes the kneecap pops back into place when the leg is straightened. If it does not, massage the thigh and push the kneecap gently back into normal alignment with your hand. With a splint that does not put pressure on the kneecap, the patient may be able to walk out.

Toe dislocations are treated similarly as finger dislocations. Keeping the injured toe partially flexed, pull on the end while gently pressing the dislocated joint back into place with your other thumb. Tape the injured toe to a neighbor with a gauze pad between them. Do not tape directly over the joint itself.

Guidelines for Preventing Bone and Joint Injuries

Attention to safety prevents many injuries. Adequate and properly fitted footwear decreases the chance of injury. Pretrip physical conditioning prior to wilderness activities may decrease the chance of injury.

Guidelines for Evacuation

With a usable injury, the degree of discomfort of the patient will determine more than anything the need to evacuate the patient. Evacuate any patients with unusable injuries and with first-time dislocations (except perhaps dislocations of the outer joints of the fingers and toes). Evacuate rapidly—go fast—any patients with angulated fractures; open fractures; fractures of the pelvis, hip, or femur (thigh); and injuries that create a decrease in CSM beyond the injury.

Wounds and Wound Infection

Time
2 hours

Objectives

Upon completion of this lesson and skill practice, the participant will be able to:

1. Define serious bleeding and demonstrate control of bleeding including direct pressure, packing the wound, and tourniquets.
2. Define abrasion, laceration, and blister, and demonstrate wilderness treatment, including the use of improvisation, for each.
3. Demonstrate proper wound-cleaning techniques, including pressure irrigation, scrubbing, and rinsing.
4. Define and demonstrate the proper management of superficial, partial-thickness and full-thickness burns in short- and long-term settings.
5. Define and describe the treatment for chafing.
6. Define and describe treatment for common medical problems related to ears, nose, and teeth.
7. Describe treatment and prevention of bites from mosquitoes, ticks, and venomous snakes.
8. Describe the signs, symptoms, and treatment of wound and skin infections.
9. Describe personal and camp hygiene and their role in prevention of skin infections.
10. Describe how some wounds and wound infections could be prevented.
11. Describe situations that would require an evacuation versus a rapid evacuation.

General Information

Wounds, burns, and problems related to the ears, nose, and teeth are among the most common ailments dealt with by all providers of first aid. All wounds should be considered and treated as contaminated. Goals of management include stopping serious blood loss, cleaning wounds and keeping them clean, and treating wounds in order to increase comfort and promote healing.

Note: *Use nonlatex gloves when there is any possibility of exposure to blood or other* body fluids.

Guidelines for Treatment of Bleeding

Life-threatening arterial bleeding spurts from a wound each time the patient's heart beats. Venous bleeding, which can also be serious, flows smoothly and rapidly.

A quick visual scan of the patient is often enough to detect serious bleeding—but not always! Check inside the clothing of someone wearing bulky winter gear or rain gear. Check beneath someone who is lying in sand, rocks, snow, or any other terrain that might disguise blood loss.

Note: *Severe blood loss can also be internal, so monitor for shock.*

Almost all bleeding can be stopped with direct pressure, usually applied with pressure from your hand directly on the wound with a barrier between you and the wound. If there is time, place a sterile dressing on the wound before applying pressure. If there is no time, grab anything absorbent to press into the wound. In cases of severe bleeding, packing a wound initially with your fingers, then switching to and packing with absorbent material, can supplement continued direct pressure.

Be aware that some wounds should not be treated with direct pressure. Pressure to a wound on a patient's neck may cut off the air supply. Instead, stop the bleeding by carefully pinching the opening closed. Pressure to a head wound may push cracked bone fragments into the patient's brain. Cover the wound with a bulky dressing and press lightly instead.

If blood loss is tremendous and death imminent, a tourniquet can be used on an arm or leg. Tie a band of soft material, about 4 inches wide, around the limb, approximately 2 inches above the wound. Do *not* use anything narrow, such as a rope or string, as a tourniquet. Tie a short stick or another rigid object into the material to create a windlass technique, and twist it, tightening the tourniquet until bleeding stops—and no more. It is critically important to check the pulse

beyond the tourniquet after application. If you can find a pulse, the tourniquet is *not* tight enough and should be tightened more. Note the time when you apply the tourniquet. These arterial tourniquets are rarely necessary, but if one is required to control bleeding, apply and keep it on continuously until the patient reaches definitive surgical care. In a very remote area where care might not be reached for days, continuous application will result in loss of the limb. Only in this situation will it be appropriate to release the tourniquet approximately every two hours while continuing to apply direct wound pressure, in order to assess the continued need for the tourniquet and to diminish the possibility of distal limb loss. If bleeding has remarkably slowed or stopped, replace the tourniquet with a pressure dressing. If bleeding remains persistent, replace the tourniquet. It is more important to save a life than a limb. Assessment of continued bleeding can be accomplished within one second of release. In all situations, it is better to apply a tourniquet prior to seeing the signs and symptoms of shock. If there has been extensive blood loss, and the person is already in shock or it is difficult to assess the amount of continued bleeding, leave the tourniquet in position and *do not* remove it. Continuous tourniquet application is preferred to allowing additional blood loss.

Guidelines for Assessment and Treatment of Some Wounds

Abrasions are shallow and often dirty wounds that occur when some skin has been scraped away. If treated within approximately 10 minutes, abrasions can be treated by simply applying a thick layer of antibiotic ointment and covering it with a sterile dressing. If treated later, abrasions should be scrubbed clean. You can scrub with a gauze pad or a clean, soft cloth with soap and water. Follow scrubbing with irrigation or rinsing. Apply a thin layer of antibiotic ointment, then a dressing and bandage.

Lacerations are cuts through the skin that have either even or ragged edges. They will vary in depth. Skin around a laceration should be washed clean prior to thorough irrigation of the wound. There is no definitive amount of water to use when irrigating a laceration, but plan on using at least a half-quart. In most cases, lacerations that you had to hold open in order to irrigate thoroughly should be held closed with wound closure strips or thin strips of tape after cleaning. Apply a thin layer of antibiotic ointment, then a dressing and bandage.

Blisters result from sheer forces that cause aggressive rubbing of outer layers of skin against inner layers. The tough outer layer of skin separates from the sensitive inner layer. Fluid fills the space created between the layers. Blisters feel better when deflated, and controlled draining is far better than having them rupture inside a dirty sock. Clean around the site thoroughly. Sterilize the point of a needle or knife, or use a sterile scalpel, and open the blister wide enough to easily massage the fluid out. Leaving the roof of the blister intact will make it feel better and heal faster. If the roof has been rubbed away, clean the wound. In all cases, apply a dressing that limits friction. Many commercial products are available that are ideal for this purpose. You can also build a moleskin donut, which is a rounded piece of moleskin with a hole cut in the center. Center the blister site in the hole and fill the hole with ointment. An antibiotic ointment is preferable, but any lubricating ointment will work. Tape or a strip of moleskin needs to be placed over the hole to keep the ointment in place.

Notes on Wound Cleaning

Proper wound cleaning, closing, and dressing will prevent most wound infections. Cleaning also speeds healing and reduces scarring. Start by washing your own hands and putting on protective gloves.

The best method for cleaning is mechanical irrigation. Irrigation involves a high-pressure stream of an acceptable solution directed into the wound, best directed from an irrigation syringe. For most wounds, the best cleaning solution is disinfected water or at least potable water (water safe to drink). Draw the water into the syringe, hold it about two inches above the wound and perpendicular to the wound, and push down forcefully on the plunger. Keep the wound tipped so the water runs out. Without an irrigation syringe, you can improvise by using a biking water bottle, melting a pinhole in the center of the lid of a standard water bottle, or punching a pinhole in a clean plastic bag. If you use something other than disinfected water, follow irrigation with a final flush of disinfected water or potable water.

Large dirty wounds, wounds that expose bones, tendons, or ligaments, and wounds caused by animal bites should be left open. They are difficult to clean well enough to prevent infection. After irrigation, cover these wounds with sterile gauze. Exceptionally dirty wounds should be packed open with moist sterile gauze and covered with dry gauze to allow them to drain until a physician can be consulted.

Notes on Laceration Closure

If hair gets in the way of laceration closure, it can be carefully clipped short, but it should not be shaved. When using closure strips, apply one end of one strip to one side of the wound and another to the opposite side. By using the opposing strips as handles, you can pull the wound edges together, pulling the skin as close as possible to where it should lie naturally.

Notes on Wound Dressing

A dressing is the primary covering of a wound. It works best if it is sterile, nonadherent, porous, resistant to bacterial invasion, and easy to use. Wounds heal faster with less scarring if they are kept slightly moist with an antibiotic ointment or with a dressing that holds in the body's moisture, such as a micro-thin film dressing. Film dressings have the added advantages of being see-through and water-repellent. The dressing should completely cover the wound and ideally extend a half-inch or so beyond the wound's edge. If you use a micro-thin film dressing, *do not* use an ointment. Dressings, ideally, should be changed at least once every 24 hours, although transparent film dressings may be left in place until healing is complete.

The function of a *bandage* is to fix, protect, and further assist the dressing. It can be conforming gauze, tape, elastic wraps, clean cotton strips, or improvised out of anything available. The usefulness of a bandage is handicapped if it is too loose, and dangerous if it is too tight. Do not hide rings or anything that could cut off circulation if swelling occurs. Check bandages often.

Guidelines for Assessment and Treatment of Burns

Burns may result from heat, chemical reactions, electricity (including lightning), and radiation (including solar radiation). Initial treatment needs to be given immediately following a quick initial assessment.

1. Remove the patient from the source of the burn.
2. Stop the burning process, the faster the better—within 30 seconds, if possible. Burns can continue to injure tissue for a surprisingly long time. No first aid will be effective until the burning process has stopped. Smother flames, if appropriate, then cool the burn with water. Do not try to remove tar or melted plastic.
3. Be immediately suspicious of possible airway complications with burns to the face and/or neck, soot in the nose and/or mouth, singed facial hair, and a dry cough.

Specific burn treatment depends on your assessment of the depth and extent of the injury. Even though this assessment may be rough, it will be your basis for deciding how the patient will be managed, whether evacuation is required, and how urgently.

Burn Depth

Superficial burns: Skin is red, painful, and perhaps swollen.

Partial-thickness burns: Skin is red, painful, and swollen, and blisters form, sometimes more than an hour after cooling.

Full-thickness burns: Skin is painless and without blisters—although partial-thickness burns may surround full-thickness burns—and pale (scalding) or charred (burns from fires).

Burn Extent

Use the "Rule of Palmar Surface": The patient's palmar surface—the inner surface of the palm and fingers—equals about 1 percent total body surface area (TBSA). The more TBSA burned, of course, the more serious the injury.

Note: *In addition to depth and extent, do not underestimate the value of pain as a burn assessment tool. If the patient is in a lot of pain, that is an indication of the need for a physician's care.*

To treat a burn:

1. Gently wash the burn with slightly warm water and mild soap. Pat dry.
2. Leave the burn blisters intact.
3. Dress the burn with a thin layer of antibiotic ointment.

4. Cover the burn with a gauze pad or a thin layer of roll gauze, or apply clean clothing. Covering wounds reduces pain and evaporative losses.
5. Do not pack wounds or patient in ice.
6. Elevate burned extremities to minimize swelling. Swelling retards healing and encourages infection. Get the patient, as much as possible, to gently and regularly move burned areas.
7. If you have no ointment or dressings, leave the burn alone. The burn's surface will dry into a scab-like covering that provides a significant amount of protection.
8. Keep the patient warm.
9. Keep the patient well hydrated.

Note: *When evacuation is imminent, do not redress or re-examine the injury. But if evacuation is distant, redress the injury twice a day by removing old dressings (you may have to soak off old dressings with clean, tepid water), rewashing (and removing the old ointment), and putting on a clean covering.*

Guidelines for Treatment of Chafing

Chafing in the groin area and between the thighs can be treated with a layer of lubricating oil or ointment, such as petrolatum jelly (Vaseline®) or cooking oil. It is messy but relieves the irritation.
Chafing is easier to prevent than treat. Consider the following:

1. Wear loose cotton pants and underwear to hike in when it is not too cold. Sweat gets absorbed, and dry skin chafes less often.
2. Apply a layer of lubricating ointment to chafe-prone areas prior to hiking.
3. Apply an antiperspirant to chafe-prone areas.

Guidelines for Assessment and Treatment of Ear, Nose, and Teeth Problems

Ear

If something is lodged in the ear, *do not* use force to remove it. If it is small, it can often be rinsed out with water. An insect in the ear canal can be treated by instilling sweet oil, or any cooking oil, into the ear, which effectively decreases the insect's movement and may rinse the insect out or suffocate it until it can be removed by trained medical personnel. Outer ear infections, or swimmer's ear, hurt more when you pull on the earlobe. Rinse the ear daily with a solution of 50 percent water and 50 percent vinegar or alcohol. If pain persists, seek trained medical help. Middle ear infections do not increase in pain when the earlobe is tugged and are often accompanied by vertigo. These infections require a physician's attention.

Nose

To stop a nosebleed, keep the patient sitting and leaning forward, and pinch the meaty part of the nose firmly shut. Hold it for 10 minutes. If the bleeding persists, pinch for another 10 minutes and repeat until the bleeding stops. Continued bleeding can be treated by packing the nostrils gently with gauze soaked with antibiotic ointment or a decongesting nasal spray. Most nosebleeds are not serious, but it is possible for noses to bleed from the back, and for blood to run down the throat. These posterior nosebleeds need a physician's attention and rapid evacuation. Blows to the nose that cause deformity may be treated with cold packs. Nosebleeds that result from trauma can be very brisk, but generally stop within 15 to 20 minutes and usually do not reoccur; however, spontaneous nosebleeds frequently reoccur. Spontaneous bleeds will be prone to reoccur until the scab heals firmly, which takes about 10 days. Ask the patient not to blow their nose as this tends to remove the clot and restart the bleeding. It is best to seek professional help within 10 days if the nose is deformed by trauma.

Teeth

Where a filling has fallen out or a cavity has developed, pain usually first occurs when cold, food, or the tongue hits the spot. After rinsing the area clean, a drop of oil of cloves (eugenol) will ease the pain. A temporary filling is the best treatment until a dentist can be found. Temporary filling material is available for first-aid kits. A temporary filling can be

made from mixing zinc oxide powder and eugenol. To improvise, fill the cavity with candle wax, ski wax, or sugarless gum. Temporary filling material can also be used to hold a dislodged crown back in place.

If a tooth is knocked out, there is a chance it can be salvaged if you can get it back in the empty socket. Hold the tooth by the crown and avoid touching the root. After rinsing the tooth with clean water (*do not* scrub it), press it gently back in. If it will not go back in, at least save it until you find a dentist. The best way to store the loose tooth is for the person to hold the tooth in their mouth with obvious care being taken not to swallow it. If this is not practical, store the tooth in milk or 0.9 percent saline. If neither is possible, store the tooth in water.

An infected tooth is indicated by pain and swelling in the gum and cheek near the tooth. Discoloration of the gum may be visible. Cold packs on the cheek may give some relief. If evacuation is delayed, have the patient rinse her or his mouth several times a day with warm, salty water. Antibiotic therapy is usually required, and an evacuation without delay should be initiated.

Guidelines for Treatment and Prevention of Insect Bites

Common insect bites include those received from mosquitoes and ticks. Although primarily a nuisance, these bites may carry the risk of disease.

Mosquitoes

The itching from mosquito bites can be treated with topical agents available over the counter. In all cases, scratching should be avoided to prevent open wounds that may become a source of infection. Some mosquito bites carry the risk of West Nile virus. Flu-like illness that develops within two weeks of receiving mosquito bites should be evaluated by a physician.

Some mosquito bites can be prevented by avoiding exposure during prime biting times, usually dawn and dusk. Be sure tents have adequate netting on doors and windows. Set camps well away from high-risk areas: standing water, swampy ground, dense brush. Repellents that work with mosquitoes include products containing DEET, the most effective repellent. Concentrations of DEET higher than 30 percent do not improve repellency, but they do require reapplication less often. In the United States, Picaridin is only available in 7 percent concentration. This is effective for light infestations of flies, gnats, and mosquitoes. Some nonchemical repellents work for short periods of time. With all repellents, read and follow the directions on the labels.

Treat clothing, tents, and sleeping bags with 0.5 percent permethrin every six weeks. Studies have shown that the combination of permethrin on clothing and an appropriate insect repellent on skin can prevent nearly 100 percent of bites from disease-bearing mosquitoes and ticks.

Ticks

In the United States, ticks may carry one of at least eight diseases. Depending on the specific pathogen, the tick has to feed from several hours to several days to pass enough germs to cause disease. Any illness that develops after removal of an embedded tick should be evaluated by a physician.

Ticks are repelled by many of the same repellents that keep mosquitoes from biting. Body checks for ticks should be performed twice daily when hiking and camping in tick-infested country. All ticks need to be removed immediately. Embedded ticks should be pulled out slowly with tweezers after grasping the tick perpendicular to the long axis of the tick and near the patient's skin line.

Snakes

Venomous snakes of the United States include the pit vipers and coral snakes. The risk of death from a bite is low. With all snake bites, keep the patient physically and emotionally calm, and gently wash the bite site. Splint bitten extremities and keep the bite site at approximately the level of the patient's heart. Do *not* cut, suck, apply a constricting band, or apply cold. Go for help. The patient should not walk unless it is unavoidable in evacuating the patient. The treatment of choice for snake bite is your car keys. Snake bites need to be evaluated by a physician. Snake bites are puncture wounds that might cause infections, including tetanus.

Wilderness First Aid Curriculum and Doctrine Guidelines

Guidelines for Assessment and Treatment of Wound Infection

Mild infection is indicated by pain, redness, swelling, and a little light-colored pus. These wounds should be recleaned, redressed, and monitored closely. Monitor for signs of serious infection:

1. Increasing pain, redness, and swelling are primary indicators of serious infection.
2. Increasing heat at the site
3. Pus increasing and growing darker in color
4. Appearance of red streaks just under the skin near the wound
5. Systemic fever

Persons with signs of serious infection require rapid evacuation. If you see any signs of serious infection, allow the wound to reopen and let it drain. You may need to encourage the process with soaks in water as hot as the patient can tolerate. Pack the wound with moist, sterile gauze to keep it draining, and dress it with dry, sterile gauze. Wet-to-dry dressings encourage draining. Reclean and repack the wound twice a day during an extended evacuation.

Guidelines for Personal and Camp Hygiene

Maintaining a high level of personal and camp hygiene can reduce the risk of skin infections. Use soap and water to wash hands at least once a day and before meal preparation. Use a hand sanitizer after bowel movements and urinating. Body washing is not mandatory but should be considered on extended trips and performed at least 200 feet from natural water sources. During cold or inclement weather, powdering the groin, underarms, and feet with talcum powder can provide protection from moisture and accumulating body odor and oils.

Guidelines for Prevention of Wounds and Wound Infection

Standard safety precautions will prevent many wounds. Most wound infections can be prevented with adequate cleaning, dressing, and bandaging. Blisters can be prevented by:

1. Wearing boots or shoes that fit and are broken in
2. Wearing a thin inner sock under a thicker outer sock
3. Treating "hot spots" *before* they become blisters
4. Taking off your boots to let your feet dry when you take a break from hiking

Evacuation Guidelines

Evacuate—go slow--any patient with a wound that cannot be closed in the field. Evacuate rapidly—go fast—any patient with a wound that:

1. Is heavily contaminated
2. Opens a joint space
3. Involves tendons or ligaments
4. Was caused by an animal bite
5. Is deep and on the face
6. Involves an impalement
7. Was caused by a crushing injury

Wounds that gape more than one half-inch should not be closed in the field but instead evacuated for closure by a physician.

Evacuate any patient with an infected wound or skin infection that does not improve within 12 hours of treatment or which spreads to other parts of the body. Evacuate rapidly—go fast—any patient with signs and symptoms of a serious infection. If more than one person on the trip breaks out in skin boils or abscesses, be concerned about group contamination with MRSA, a serious staph infection, and immediately evacuate to seek professional medical care.

Evacuate all patients with serious burns to the face, neck, hands, feet, armpits, or groin, and all patients with full-thickness burns. Rapidly evacuate—go fast—any patient with burns threatening the airway, with partial- or full-thickness circumferential burns, and with blisters and/or full-thickness burns covering 10 percent TBSA.

Hypothermia

Time

45 minutes

Objectives

Upon completion of this lesson, the participant will be able to:

1. Describe the mechanisms of heat loss versus heat gain.
2. Define hypothermia.
3. List the signs and symptoms of mild and severe hypothermia.
4. Demonstrate the emergency treatment of and describe the long-term care for mild and severe hypothermia.
5. Describe the prevention of hypothermia.
6. Describe situations that would require an evacuation versus a rapid evacuation.

General Information

The human body constantly generates heat via metabolism. At rest, heat is generated via basal metabolic activity. Exercise increases metabolic heat production dramatically, the rate depending on the fitness of the person and the level of activity. Some heat may be absorbed from external heat sources. Heat is constantly shed via radiation from skin, conduction via contact with cold material such as the ground, convection via the movement of air across skin, and evaporation of moisture from skin. The human thermoregulatory system typically balances heat gain and heat loss to keep the body core temperature around 99.6 degrees Fahrenheit (98.6 degrees oral temperature).

Hypothermia is a lowering of the body's core temperature to a point where normal brain and/or muscle function is impaired. This condition may be mild, moderate, or life-threateningly severe.

Guidelines for Assessment and Treatment of Hypothermia

Mild hypothermia manifests itself in a patient through shivers, inability to perform complex tasks (fumbles), confusion, apathy, sluggish thinking (grumbles), slurred speech (mumbles), and altered gait (stumbles)—sometimes referred to as "the umbles."

Moderate hypothermia manifests itself in a patient through worsening of the umbles and uncontrollable, violent shivering.

In a patient with severe hypothermia, shivering stops. The patient may experience increasing muscle rigidity, stupor progressing to coma, decreasing pulse, and respirations to the point where they are undetectable (but still present!).

Management can be divided, for simplicity, into two categories: treatment for mild and moderate hypothermia, and treatment for severe hypothermia.

The mild-moderate hypothermia patient is still trying to warm up internally. The patient can talk, eat, and shiver. Change the environment so the heat being produced internally is not lost. Get the patient out of wet clothes and into something dry, and out of wind and cold and into some kind of shelter, even if the only shelter available is the protection of waterproof, windproof clothing. Cover the patient's head and neck. If the patient can eat and drink, give her or him simple carbohydrates to stoke the inner fire. Fluids are more important than solids to a cold person. A warm, sweet drink will add a negligible amount of heat but a lot of simple sugar for energy plus fluid. Even cold fluids are better than no fluids. If the patient can still exercise easily, you may keep moving after initial treatment. If the patient cannot exercise easily, do all you can to encourage entrapment of inner heat production: insulate the patient from the ground, bundle in dry insulation, snuggle with warm people, place hot water bottles near the heart and in the armpits (but not against naked skin), use chemical heat packs as you would hot water bottles, and wait until the patient returns to normal.

The severe hypothermia patient is semiconscious or unconscious and has stopped shivering. She or he has lost the ability to generate an appreciable amount of heat. Handle the patient gently—roughness can overload a cold heart and stop it. If breathing is undetectable, perform rescue breathing for at least three minutes prior to any movement. Remove clothing and bundle the patient in as much dry insulation as possible. Insulate well from the ground. Wrap hot water bottles or heat packs in a dry sock or shirt and place them appropriately as with mild hypothermia. Finish with a vapor barrier—a tent fly, sheet of plastic, or garbage bags—something to trap any heat still left in the patient. The final product is a cocoon,

a "hypothermia wrap" open only to the mouth and nose. Do not try to force food or drink. Treat for severe hypothermia even if the patient appears dead. *No patient is dead, as far as you are concerned, unless he or she is warm and dead.* Call for help immediately—*do not* try to evacuate the patient by any means other than gentle.

Guidelines for Prevention of Hypothermia

It is far easier to maintain core temperature than to regain core temperature, so:

1. Wear clothing that retains body heat even when wet. Do not wear cotton clothing if the temperature could drop below 77 degrees Fahrenheit.
2. Stay dry by wearing layers of clothing, taking off layers before sweating starts, and adding them back before chilling occurs.
3. Stay well hydrated.
4. Eat regularly, especially carbohydrates.
5. Maintain a pace that prevents overexertion. Rest often.
6. In a group, watch each other for signs of hypothermia. Treat early, and if one person is treated, treat everyone.

Evacuation Guidelines

Patients who recover from mild to moderate hypothermia may remain in the field. Evacuate rapidly—go fast (but with extreme gentleness)—any patient with severe hypothermia.

Heat Problems

Time
1 hour

Objectives
Upon completion of this lesson, the participant will be able to:

1. Define heat exhaustion, heat stroke, and hyponatremia.
2. List the signs and symptoms of heat exhaustion, heat stroke, and hyponatremia.
3. Describe the emergency treatment of and long-term care for heat exhaustion, heat stroke, and hyponatremia.
4. Describe the prevention of heat illnesses.
5. Describe situations that would require an evacuation versus a rapid evacuation.

General Information

Heat illness describes a range of problems associated with very warm to hot air temperatures. In addition to air temperatures, other factors increase the risk of heat illness:

1. High humidity
2. Being overweight
3. Being very young or very old
4. Being unaccustomed to heat
5. Taking certain drugs, such as antihistamines
6. Often the most important factor, being dehydrated

Guidelines for Assessment and Treatment of Heat Exhaustion

Heat exhaustion is a result of heat stress, water and electrolyte loss (most often via sweat), and less-than-adequate hydration. The patient has usually been exercising and sweating out water and salt, and now feels very tired. Skin may appear pale and sweaty or flushed, and the patient complains of a headache, perhaps nausea, and sometimes vomiting. Thirst is usual, as well as a decreased urine output. Dizziness may strike when the patient stands quickly. An elevated heart rate and respiratory rate are common. The core temperature with heat exhaustion may have risen a few degrees but more often not at all.

Treatment is suggested by the name of the condition: Exhaustion calls for rest, preferably in a cool, shady spot. Replace lost fluids with water and lost salt by adding a pinch to a quart of water or by eating salty snacks. Oral rehydration salts or a sports drink will work. Do not use salt tablets—they are too concentrated. To increase the rate of cooling, the patient may be wet down and fanned. A drowsy patient may be allowed to sleep. When the patient feels okay, he or she may continue.

Guidelines for Assessment and Treatment of Heat Stroke

Heat stroke occurs when a patient is producing core heat faster than it can be shed. The patient may be overexerting and/or seriously dehydrated, and the core temperature rises to 105 degrees Fahrenheit or more. Disorientation and bizarre personality changes are common signs. Skin turns hot and red, and sometimes (but far from always) dry. Look for a fast heart rate, fast breathing, and complaints of a headache.

Heat stroke is a temperature problem. The patient is too hot inside. Once a human brain gets too hot, it is a true emergency, and only rapid cooling will save the patient. The ideal treatment is to take off any heat-retaining clothing and immerse the patient in cold water until he or she regains consciousness. Immersion is recommended when a large enough source of water is available. Without a large source of cold water, take off any heat-retaining clothes and drench the patient with cold water. Concentrate cooling efforts on the head and neck. Cold packs may be used on the neck, armpits, groin, and on the hands and feet. Fan the patient constantly to increase evaporation. Monitor the patient closely and cease cooling efforts when a normal mental status returns. When, or if, the patient is able to accept and drink cold water, give it. Do not give fever-reducing drugs. The patient must see a physician as soon as possible, even if she or he appears to have recovered. During evacuation, a careful watch on the patient should be maintained. Relapses are common.

Wilderness First Aid Curriculum and Doctrine Guidelines

Guidelines for Assessment and Treatment of Hyponatremia

Hyponatremia results when the blood sodium level falls too low to maintain normal body function. This is usually the result of drinking more than enough water while failing to eat.

Common complaints include headache, weakness, fatigue, lightheadedness, muscle cramps, nausea with or without vomiting, sweaty skin, normal core temperature, normal or slightly elevated pulse and respirations, and a rising level of anxiety. The patient appears to have heat exhaustion. But if you treat it like heat exhaustion—just add water—you are harming the hyponatremia patient. More severe symptoms of hyponatremia include a patient who is disoriented, irritable, and combative—which gives the problem a more common name: water intoxication. Untreated, the ultimate result will be seizures, coma, and death.

Heat-exhausted patients typically have a low output of yellowish urine (urinating every six to eight hours) combined with thirst. Hyponatremia patients have urinated recently and the urine was probably clear. Hyponatremia patients will also claim to have been drinking a lot of water, and they deny thirst.

Patients with mild to moderate symptoms and a normal mental status may be treated in the field: Rest in shade with no fluid intake and a gradual intake of salty foods while the kidneys reestablish a sodium balance. Once a patient develops hunger and thirst combined with normal urine output, the problem is solved. Restriction of fluids for someone who is well hydrated, fortunately, is harmless. Patients with an altered mental status require rapid evacuation to a medical facility. There is no question.

Guidelines for Prevention of Heat Illness

1. Stay well hydrated. A hydration routine should be based on discipline and not on thirst. Consume 400-600 ml of water about two hours prior to periods of exercise. During exercise consume 150-350 ml of water for every 15-20 minutes of exercise. If exercise lasts for more than one hour, the addition of 4-8% carbohydrates and electrolytes (such as a sports drink) is recommended. Fluid replacement after exercise is also vitally important. Urine output should be clear and relatively copious, an indication of adequate hydration. It is practically impossible to drink too much water as long as you eat regularly, preferably low-salt snacks. Avoid alcohol and caffeinated drinks.
2. Wear baggy, loosely-woven clothing that allows evaporation of sweat. Keep your head covered and your face shaded.
3. Keep yourself fit, and allow time for acclimatization when you are new to a hot environment. Go slow the first few days and avoid exercising during the hottest times of day.
4. Beware of drugs that increase your risk of heat illness, including alcohol and antihistamines.
5. Rest often in the shade.

Evacuation Guidelines

Evacuate—go slow—any patient that does not fully recover from heat exhaustion or mild hyponatremia. Evacuate rapidly—go fast—any patient who has an altered mental status due to heat or hyponatremia.

Shock

Time
30 minutes

Objectives
Upon completion of this lesson and skill practice, the participant will be able to:

1. Define shock and discuss briefly the stages of shock.
2. List the signs and symptoms of shock and describe the patient in which shock may be a potential threat to life.
3. Demonstrate the emergency treatment of and describe the long-term care for a patient in shock.
4. Define heart attack and list the signs and symptoms of a heart attack.
5. Demonstrate the emergency treatment of and describe the long-term care for a patient having a heart attack.
6. Describe situations that would require an evacuation versus a rapid evacuation.

General Information

Shock is inadequate perfusion, a condition that results when the cardiovascular system is challenged, causing the patient's brain and other body cells to receive a less than sufficient flow of oxygenated blood. It can occur from a great variety of injuries and illnesses including but not limited to: loss of the needed level of fluid in the body via blood loss or dehydration; failure of the heart to pump adequately due to heart attack; or loss of adequate pressure in the blood vessels of the body due to spinal cord damage or a severe allergic reaction. Whatever the cause, shock patients tend to share similar signs and symptoms, and you must be able to intervene with proper care and know when the patient needs a higher level of care than you can provide.

Guidelines for Assessment and Treatment of Shock

Patients in shock progress through stages as they deteriorate.

In the early stages, look for:

1. Level of responsiveness (LOR) that is anxious, restless, and/or disoriented.
2. Heart rate (HR) that is rapid and weak.
3. Respiratory rate (RR) that is rapid and shallow.
4. Skin color, temperature, and moisture (SCTM) that is pale, cool, and clammy (but may be pink and warm in some cases, such as if the shock is the result of an allergic reaction).
5. Symptoms that include nausea (and sometimes vomiting), dizziness, and thirst.

In the later stages, look for:

1. LOR that continually decreases with eventual unresponsiveness.
2. HR in which the radial pulse (the pulse at the wrist) grows increasingly rapid, weakens, and eventually disappears.

Since shock can kill, and since what you can do for shock is limited in the wilderness, early recognition and management are critical.

1. Treat shock early, before serious signs and symptoms develop.
2. If a cause can be identified, such as bleeding or dehydration, treat the cause immediately.
3. Keep the patient calm and reassured.
4. Keep the patient lying down (as found in most cases).
5. Elevate the patient's feet comfortably and approximately 10 to 12 inches. (Injuries to the head or lower extremities may preclude this.)
6. Protect the patient from loss of body heat.
7. Sips of cool water may be given to prevent dehydration with shock from any cause if the patient tolerates fluids, and his or her mental status allows holding and drinking from a container.

Guidelines for Assessment and Treatment of Heart Attack

Heart attack (damage or death of part of the heart muscle due to lack of adequate perfusion) is the leading cause of deaths in the United States. A heart attack may, but not always, lead to shock. Not only does shock make the situation more serious—it is often fatal. What you do, therefore, is of critical importance.

Patients may complain of center-chest discomfort such as crushing, squeezing pain, or heavy pressure. Pain, predominantly on the left side, may radiate to the shoulder, down the arm, or into the jaw. Nausea, sweating, and shortness of breath are common. Patients often deny the possibility that this could be a heart attack.

In all situations, you need to:

Keep the patient physically and emotional calm, in a position of comfort (usually not lying down) and warm. Do not allow the patient to walk, even short distances. Call for help.

In the wilderness, you should:

Give the patient four 81 mg aspirins or one 325 mg aspirin. If the patient has been prescribed nitroglycerin, one pill should be placed under the tongue with the patient sitting—but only if the patient has a strong radial pulse. Most physicians recommend a second pill after 10 minutes if the first fails to work and a third after another 10 minutes if the second fails to work.

Guidelines for Evacuation

Evacuate any patient with signs and symptoms of shock that do not stabilize or improve over time. Evacuate rapidly—go fast—any patient with decreased mental status or worsening vital signs, especially if the patient's heart rate keeps speeding up. Go fast if your assessment is heart attack. All of these patients will need to be carried.

Head (Brain) and Spine Injuries

Time
1 hour, 30 minutes

Objectives
Upon completion of this lesson and skill practice, the participant will be able to:

1. Demonstrate a field assessment for injuries to the head.
2. List the signs and symptoms of a closed head injury and a skull fracture.
3. Describe the emergency treatment of and long-term care for a head injury.
4. Describe how some head injuries could be prevented.
5. List the most common mechanisms of injury for spinal trauma.
6. List the signs and symptoms of spinal injury.
7. Demonstrate a field assessment for injuries to the spine.
8. Demonstrate how to properly restrict spinal motion with an improvised collar.
9. Discuss the importance of proper lifting and moving of patients.
10. Demonstrate a one-rescuer roll from back to side, side to back, and facedown to back with placement of a protective pad underneath the patient.
11. Demonstrate a two- and three-rescuer roll from back to side, side to back, and facedown to back with placement of a protective pad.
12. Demonstrate body elevation and movement (BEAM) of a patient.
13. Describe how some spinal injuries could be prevented.
14. Describe situations that would require an evacuation versus a rapid evacuation.

Head (Brain) Injury General Information

Anyone who has received a significant blow to the head or face runs the risk of bleeding and swelling of the brain. Because there is little room inside the head for swelling to occur, brain injuries can cause death in a relatively short period of time.

Guidelines for Assessment and Treatment for Head Injury

Despite the possibility of heavy bleeding from a scalp wound or the growth of a goose egg–sized bump, a serious threat to the patient is rare if the skull is intact and the brain is relatively undamaged. With a mild head injury, there will be very short-term loss of consciousness or no loss at all. Symptoms may include short-term amnesia, briefly blurred vision, nausea, headache, dizziness, and/or lethargy. Treat wounds appropriately: Apply pressure from a bulky dressing on the bleeding scalp and a cold pack for the bump. Monitor the patient for about 24 hours. Awaken the patient every two hours during the night to check for signs and symptoms of serious brain damage.

A period of unconsciousness during which the patient does not respond to aggressive stimulation should be considered long-term unconsciousness and may indicate serious brain damage. The injury may or may not involve a skull fracture, which should always be considered severe.

Signs of a skull fracture include:

1. A depression in the skull.
2. A fracture visible where the scalp has been torn revealing the fracture.
3. Bruising around both eyes (raccoon eyes) or behind both ears (Battle's Sign).
4. Cerebrospinal fluid (clear fluid) and/or blood weeping from nose or ears.

Without an obvious skull fracture, patients may at first appear to have recovered but later may start to deteriorate. With or without evidence of a skull fracture, you must watch for signs and symptoms of brain injury.

Signs and symptoms of a head (brain) injury include:

1. Mental status deterioration—from disoriented, to irritable, to combative, to coma.
2. Personality changes.
3. Loss of coordination and/or speech.
4. Debilitating headache.
5. Visual disturbances.
6. Seizures.
7. Persistent nausea and vomiting.
8. Relapse into unconsciousness.
9. In later stages, heart rate may slow and bound, respiratory rate may become erratic, and pupils may become unequal.

If there is an obvious head injury, consider the possibility of a cervical (neck) spine injury. Specific measures to implement during evacuation include the critical importance of establishing and maintaining an airway in all unconscious patients. You can usually keep an airway open by keeping the patient in a stable side position (the HAINES position). Alternatively, with consideration for possible spinal injury, place the patient with his or her head elevated approximately six to eight inches.

Guidelines for Prevention of Head Injuries

Adequate care for a brain injury is not possible in the wilderness. Prevention should rank high among your priorities. In addition to approaching activities safely, wearing a helmet approved for specific activities such as biking and climbing is a must. The helmet must fit the user and be held in place with a nonstretching chinstrap. Wearing a helmet does not eliminate the chance of a serious injury, but it does reduce the risk.

Guidelines for Evacuation

Evacuate any patient who does not respond initially to aggressive attempts at stimulation after a blow to the head. When responsive, this person can walk out if there are no indications of serious head injury. Evacuate rapidly—go fast—any patient with signs and symptoms of severe head injury, especially a skull fracture and/or a decrease in mental status. Serious patients require carrying.

Spine Injury General Information

Damage to the spinal cord may result in permanent paralysis or death. The spinal cord of nerves is protected by the spinal column of bone. Injury to the bones may not always lead to damage of the nerves, but it is an indicator that spinal precautions should be taken. For that reason, proper management of a patient with suspected damage to the spine is critical to prevent spinal cord damage (if it hasn't occurred already). In the initial assessment, any patient who has a mechanism for a spine injury, especially a cervical injury, should be kept still with your hands on his or her head and calming words said until secondary treatment can be applied.

Note: *A patient found unconscious should be considered spine-injured.*

Highly suspect mechanisms of injury include:

1. Compression/axial loading, such as falling from a height or landing on the head.
2. Excessive flexion, as when the chin is forced to the chest.
3. Excessive extension or rotation, such as tumbling downhill without skis releasing.
4. Distraction, such as an attempted hanging.
5. Penetration, as from a gunshot or stabbing in the area of the spine.
6. Sudden and violent deceleration.

Wilderness First Aid Curriculum and Doctrine Guidelines

Guidelines for Assessment and Treatment of Spine Injury

Signs and symptoms of spine injury include spine pain, spine tenderness to touch, and obvious injury to the spinal column.

Signs and symptoms of spinal cord injury include:

1. Altered sensations in and the ability to move the extremities such as numbness, tingling, unusual weakness, inability to move, or unusual hot or cold sensations.
2. Respiratory difficulty.
3. Loss of bowel control.
4. Signs and symptoms of shock.

Patients on their back can be log-rolled onto their side to assess the back for injuries. Manual stabilization of the head and neck is critical during the roll. At the command of the head-holder, the patient is rolled as a unit, keeping the neck and back in line. Patients must be held stable during the check and rolled back with the same precautions.

Note: *A log-roll can also be used to roll a patient onto her or his side in order to place a pad underneath before rolling the patient back onto the pad.*

Patients can also be rolled from side to back and from facedown to back using the same precautions. Although it is possible for one rescuer to perform such rolls, two or three rescuers make the job easier and safer for the patient.

If the patient's neck lies at an odd angle, it may be straightened with slow, gentle movement—performed by the rescuer—to line it up with the rest of the spine. This straightening improves the airway and makes immobilization easier. If this movement causes pain or meets resistance, stop and immobilize the patient's head as it lies.

A patient with a possible spinal injury who is found crumpled into an odd body position may be straightened with slow, gentle movement of one body part at a time. This typically makes the patient more comfortable and provides for better immobilization.

When the spine-injured patient has to be moved, such as into a tent for warmth, move her or him via **b**ody **e**levation **a**nd **m**ovement (BEAM). A BEAM requires a sufficient number of rescuers kneeling on both sides of the patient and another rescuer holding the head. The rescuers on the sides gently push their hands underneath the patient. At the command of the head-holder, lift the patient *as a unit* with as little spine movement as possible, and carefully carry him or her, using shuffling steps, to a predesignated spot. The patient is then lowered via commands from the head-holder.

With the spine in normal alignment, the next step is to restrict spine motion with a cervical collar. Ambulances carry rigid cervical collars. You can improvise one in the wilderness by rolling extra clothing, such as a long-sleeved fleece sweater, or by cutting off the end of a foam sleeping pad to fit the patient's neck and taping it in place. A collar goes completely around the patient's neck. If an improvised collar varies in thickness, the thickest part should be placed between the chin and chest.

Collars, even commercial products, cannot totally stabilize the cervical spine. Hands-on attention should still be maintained, if possible, until the whole patient is stabilized in a rigid litter. In the backcountry, you're often looking at a long wait for a litter, but attempting to move a spine-injured patient without one creates great risk and is *not* recommended. When a litter is available, the patient should be FOAMed in place—made **f**ree **o**f **a**ny **m**ovement—with an adequate amount of padding and straps. Fill any voids with pads under the knees, in the small of the back, and anywhere there is space that could let the patient shift. The patient's head should always be strapped down last. Proceed with care.

Focused Spine Assessment

After completing a full assessment on a patient with a mechanism for spinal injury, and after finding no signs and symptoms of spinal injury, you may choose to perform a focused spine assessment in hopes of discontinuing spinal immobilization. A focused spine assessment includes a second check for:

1. A fully reliable patient. A fully reliable patient is at least A+Ox3 on the AVPU scale, sober, and without distractions such as severely painful injuries or deep psychological distress.
2. A patient without altered sensations in the extremities, such as tingling, or the ability to move the extremities.
3. A patient with grip strength and the ability to lift the legs against resistance.
4. A patient who denies spinal pain and tenderness to palpation of the spine.

Wilderness First Aid Curriculum and Doctrine Guidelines

Guidelines for Prevention of Spine Injuries

In addition to approaching activities safely in general, avoid climbing without safety ropes, diving headfirst into water, riding in a vehicle without seat belts fastened, and skiing with bindings that do not release under the appropriate pressure.

Evacuation Guidelines

Evacuate any patient being treated for a possible spinal injury. Evacuate rapidly—go fast—any patient with the signs and symptoms of spinal cord injury.

APPENDIX N: Practical Rubric and Checklist

Survival Practical: 50 points

Go outside with a group and:

10 pts. Build a shelter.

10 pts. Use proper knots with your rope .

10 pts. Leave no trace. ***-15 points. Leave a trace.***
Put logs and other items back where you found them'

20 pts. Care for an injured person (medical scenario)

	Criteria				Points
Responder Observations	1	2	3	4	
I am #1: Scan the scene for hazards, do not create another patient.	Only looked around the injured person	Scanned around the immediate area of the injured person	Scanned the entire area for hazards	Scanned the entire area hazards and determined possible hazards	
Respect: Responder introduced themselves and asked if they could assist with first aid, encouraging and supportive of the injured person	None of the time	Some of the time	Most of the time	All of the time	
Questioning: Responder interacted, and asked questions of the injured person.	None of the time	Some of the time	Most of the time	All of the time	

First Aid: Responder determined the injuries of the person and used appropriate first aid for the medical situation.	Determined the main injury and provided inappropriate first aid.	Determined the main injury and provided appropriate first aid.	Determined all injuries and provided first aid correctly to most injuries.	Determined all injuries and provided correct first aid for all injuries.	
Documentation	Documented 1 of the 4 items	Documented 2 of the 4 items	Documented 3 of the 4 items	4/4 items: Documented the scene, personal information of injured person, all injuries, and first aid applied.	
				Total Points	

APPENDIX O: Outdoor Basics, First Aid, & Survival Exam

Name_____ **Date**_____

SURVIVAL EXAM

1. Describe environmental science and give examples of natural and unnatural components.

2. Name a way to ensure that you are walking in a straight bearing, when lost in the woods.

3. Discuss how you would move an injured camper that has experienced a compound leg fracture, in the backcountry.

4. What is hypothermia, what are the signs and how do you treat it?

5. Discuss why it is important not to take unnecessary chances when traveling in the wilderness.

6. Name 2 ways to help avoid lightning strikes when caught in a storm.

7. Name 3 natural fears people have.

8. Name 3 physical and/or psychological symptoms of fear.

9. Give 3 examples why it is important to know different knots, lis specific knots and explain how they are used.

10. What do we mean by putting pain and discomfort in perspective when in a survival situation.

11. List 2 ways to help control fear in others.

12. Name 2 methods of signaling for help.

13. Why is a shelter important during a survival situation, rather than going for help?

14. Why is any decision you make in a survival situation so important?

15. If you were suddenly thrust into a survival situation not knowing the proper direction to travel, except that you knew of a mountain stream five miles away. Which five of the following items would be the most important to bring and why? What would be your plan for survival in this environment when temperatures will likely be 0C. Keep in mind that you informed friends of your trip plans and timetable before leaving. Remember that this is a desperate situation.

five gallon water _____ peanut butter ___

fishing gear ____ tent ____

sleeping bag ___ matches ___

insect repellant ___ steak ___

first aid kit ___ compass ___

books ___ keys ___

sweaters ___ knife ___