
**RECOMMENDATIONS ON DIGITAL RESOURCES FOR
THE WISCONSIN K-12 FORESTRY EDUCATION
PROGRAM (LEAF)**

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ABSTRACT

Students of the Millennial Generation (born after 2000) are termed “digital natives” because they have never known life without computers. As learners, these students have heightened ability and knowledge to access information using technology. Such students thrive on stimulation and engaging learning environments. LEAF, Wisconsin’s K-12 Forestry Education Program can meet the needs of today’s learners through the creation of digital resources. Such materials will help the LEAF program stay flexible and current with resources that can be kept updated to address changing forestry issues. Digital resources also serve as tools for teachers’ using the *LEAF Wisconsin K-12 Forestry Lesson Guide* to engage their students in meaningful, practical learning.

This study was conducted to determine what types of digital resources would enhance educators’ use of the LEAF Guide to teach students about Wisconsin’s forests and provide recommendations for the creation of those resources. To accomplish this goal, a survey was conducted in February and March 2006 of all teachers who had taken a LEAF workshop between July 1, 2003 (the first LEAF workshop) and September 1, 2005. Based on survey participant feedback and analysis of the results recommendations were developed and reported to the LEAF Program.

A questionnaire was used as a survey tool to gather participants’ feedback on the types of digital resources that would be most beneficial to them. Responses were returned by mail, email, and web form and all the data was entered into an electronic database. Both

quantitative and qualitative means were used to analyze the data. Analysis focused both on the responses of the overall survey population and the responses of LEAF Guide users by grade specific units allowing recommendations to be provided at a greater level of specificity than if the entire population was studied as a whole. This was important to the LEAF Program because the development of new materials is usually targeted at grade-specific populations.

The results of the survey show that digital resources would enhance the use of the LEAF Guide for over 60% of survey respondents and increase the amount of time the Guide is used for nearly half of respondents. Almost 90% of Guide users indicated that their comfort level with digital resources for teaching students is moderate to very high; yet research shows that training is a key component in assisting educators with the integration of digital resources into their teaching. Recommendations for the creation of digital resources include the development of a LEAF Digital Resources Library that houses a variety of resources such as digital images and maps, printable lessons and activities, educational games, and virtual field trips. Additionally, the LEAF Program can increase its value to educators and stakeholders by serving as Wisconsin's Forestry Education Resource Clearinghouse.

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CHAPTER ONE INTRODUCTION

Importance of the Study

The way students learn has changed with the coming of the digital age. Compared to previous generations, students today regularly and eagerly access information using computer technology. It is becoming common for students to surf the Internet while listening to music on an MP3 player and watching television at the same time. Because of this heightened level of stimulation, students today need to be engaged in order to learn. LEAF (Learning, Experiences, & Activities in Forestry), Wisconsin's K-12 forestry education program, can meet the needs of today's learners through the creation of digital materials. Such materials can also help the LEAF program stay flexible and current. Digital resources can be kept up-to-date and can address changing forestry issues. Digital resources also serve as additional tools for teachers' using the *LEAF Wisconsin K-12 Forestry Lesson Guide* to engage their students in meaningful, practical learning.

Currently, the LEAF Lesson Guide is printed in a two-color format and teaching resources are limited to items educators can photocopy from the book. Developing new materials in a digital format allows for wide dissemination of high-quality full-color resources. Many types of digital resources can be created and disseminated in a relatively inexpensive manner. Materials could include printable maps and photographs, virtual field trips, and even interactive games and activities utilizing video and sound. It is expected that digital resources will keep teachers interested in using LEAF materials and connected to the program long-term. It is also expected that the availability of a wide

array of resources will entice new educators to use LEAF materials and thereby help the program to grow.

Research Goal

The goal of this study is to provide recommendations for the development of digital materials that enhance teachers' use of the LEAF Wisconsin K-12 Forestry Education Lesson Guide.

Subproblems

The First Subproblem

- a) Develop a survey for teachers using the LEAF Lesson Guide to determine what type of digital materials they believe would enhance their use of the Guide.
- b) Implement the survey.
- c) Summarize teachers' responses to the survey.

The Second Subproblem

Provide recommendations to the LEAF Program for the creation of digital materials that will enhance teachers' use of the LEAF Lesson Guide based on the teacher survey.

Research Questions

- 1) What digital materials would enhance teachers' use of the LEAF Lesson Guide?
- 2) What recommendations can be made for the development of future digital materials based on the study?

Limitations

- 1) This study will be limited to materials that can be presented in a digital format.
- 2) This study will be limited to digital materials that enhance teachers' use of the LEAF Wisconsin K-12 Forestry Education Lesson Guide.
- 3) The survey recipients for this study will be limited to K-12 teachers who obtained a LEAF Lesson Guide prior to September 1, 2005.

Definition of Terms

Enhance: Enhance means to improve the quality of, quantity of, or comfort in doing something.

Digital Materials: Digital materials are resources that can be disseminated in an electronic format such as on CD-ROM or via a web site.

LEAF Program: LEAF is Wisconsin's kindergarten through twelfth grade forestry education program. The program is a partnership between the Wisconsin Center for Environmental Education and the Wisconsin Department of Natural Resources – Division of Forestry. It was created in 2001.

LEAF Wisconsin K-12 Forestry Education Lesson Guide: The LEAF Wisconsin K-12 Forestry Education Lesson Guide is a collection of classroom and field based activities grouped into grade-specific units (K-1, 2-3, 4, 5-6, 7-8, 9-12) and made available to Wisconsin classroom teachers who participate in a workshop conducted by LEAF staff.

Teachers: Teachers are educators who teach kindergarten through twelfth grade students in a traditional classroom setting.

Abbreviations

DNR: Wisconsin Department of Natural Resources.

Guide or **Lesson Guide:** LEAF Wisconsin K-12 Forestry Education Guide.

LEAF: Learning, Experiences, & Activities in Forestry.

Web: World Wide Web.

Assumptions

- 1) Digital materials can enhance teachers' use of the LEAF Lesson Guide.
- 2) Teachers responding to the survey will be representative of teachers who will use the LEAF Lesson Guide in the future.

CHAPTER TWO LITERATURE REVIEW

- I. Introduction**
- II. K-12 Forestry Education**
 - A. Rationale**
 - B. LEAF Background**
 - C. Overview of the LEAF Lesson Guide**
- III. Overview of Digital Resources**
 - A. Definition**
 - B. Distribution Formats**
 - 1. CD-Rom**
 - 2. DVD**
 - 3. Internet**
 - a) World Wide Web**
 - b) FTP**
 - c) Email**
 - C. Digital Resource Examples**
- IV. Existing K-12 Forestry Education Digital Resources**
 - A. LEAF's Digital Resources**
 - 1. CD-Rom**
 - 2. World Wide Web**
 - 3. Email**
 - B. Other Forestry Education Programs' Digital Resources**
- V. Technology in Education**
 - A. History**
 - B. Benefits to Students**
 - C. Teachers' Perceptions**
 - D. Requirements for Success**
- VI. Educational Theory**
 - A. Students in the Digital Age**
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 - C. Learning Objects**
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- VII. Summary**

I. Introduction

The goal of this study is to provide recommendations for the development of digital materials that enhance teachers' use of the *LEAF Wisconsin K-12 Forestry Education Lesson Guide*. The purpose of this literature review is to provide background information

that will serve as a foundation to support this study. To fully understand the study, one must first understand the rationale for forestry education, know the background of the LEAF Program, and have an overview of the LEAF Lesson Guide. Equally important in understanding the study is knowing what digital resources are and how they are currently distributed. Examples of digital educational resources are provided for reference. An explanation of LEAF's existing digital resources and examples of digital resources from other state-based K-12 forestry education programs are also provided. An overview of the use of technology in education helps one to identify with current realities related to technology in the classroom. Information on educational theory and today's students helps illustrate the purpose and need for developing digital resources.

II. K-12 Forestry Education

II.A. Rationale

Forests are important to Wisconsin ecologically, economically, and socially. They provide habitat for wildlife, jobs in the forest products industry, and recreational opportunities. To ensure the benefits of forests are maintained for the long term, they must be managed sustainably. Sustainable forest management involves knowledgeable resource professionals and citizens who are aware of the importance of the resource. Students are the next generation of forest landowners and decision makers. Increasing literacy about Wisconsin's forests in kindergarten through twelfth grade students is the first step in creating a knowledgeable citizenry who will sustain forests long into the future. (LEAF, 2005a, p. 7.)

II.B. LEAF Background

LEAF stands for “Learning, Experiences, & Activities in Forestry” and is Wisconsin’s kindergarten through twelfth grade forestry education program. It was created to promote forestry education in Wisconsin’s schools. In 2001, forestry education stakeholders in Wisconsin met to discuss the current status of and the needs for Wisconsin-based K-12 forestry education. Although a variety of programs existed, voids were identified in delivery and dissemination of educational materials and services. To present a more unified effort, stakeholders supported the development of a comprehensive program that would cooperate with existing efforts.

During the spring of 2001, legislation was written to establish the LEAF Program as a partnership between the Wisconsin Department of Natural Resources - Division of Forestry and the Wisconsin Center for Environmental Education in the College of Natural Resources at the University of Wisconsin-Stevens Point. Funding for the program is provided through a surcharge on the sale of seedlings sold at Wisconsin Department of Natural Resources - Division of Forestry nurseries.

The mission of LEAF is to “initiate and facilitate the development, dissemination, implementation, and evaluation of forestry education within Wisconsin Schools.” (LEAF, 2005a, p. 6.) This is done by accomplishing a variety of goals including:

- Documenting forestry concepts Wisconsin K-12 students should learn
- Developing forestry education materials specific to Wisconsin for the classroom and field

- Building partnerships with other Wisconsin K-12 forestry education stakeholders and supporting their efforts
- Providing professional development opportunities for teachers, non-formal educators, forest landowners, and resource professionals through forestry education credit courses and workshops
- Assisting schools with the infusion of standards based forestry education concepts into their curriculum
- Assisting school forests with site management and education plan development, networking, and training programs

(LEAF, 2005a, p. 6.)

II.C. Overview of the LEAF Lesson Guide

The *LEAF Wisconsin K-12 Forestry Lesson Guide* provides educators with complete interdisciplinary teaching units designed to present an overview of forests and forestry in Wisconsin. The Lesson Guide is divided into six grade-specific units: K-1, 2-3, 4, 5-6, 7-8, 9-12. The units contain a mixture of classroom lessons, careers explorations, and field enhancements. The appendix section of each unit lists vocabulary, the Wisconsin Model Academic Standards that the lessons meet, the multiple intelligences that the lessons address, and the subjects covered in each lesson. Each spiral bound unit of the LEAF Lesson Guide is printed in two colors (black and green) and contains suggestions for additional resources that enhance the lessons. (LEAF, 2004.)

III. Overview of Digital Resources

III.A. Definition

The term “digital” describes a system that is based on discontinuous data or events.

Smoke signals and Morse code are examples of digital signals, since they start and stop and in the process convey information. Digital is the opposite of analog, which describes a continuous spectrum of values. An electric current is an example of an analog signal. A clock with hands is an analog device because it can indicate any possible time. (Analog, TechEncyclopedia, 2007; Analog signal, Wikipedia, n.d.)

Computers are digital machines because at their basic level they can only distinguish between two values: 1 and 0. All information processed on a computer must be encoded digitally. (*Computer Dictionary*, 1994; Digital, Webopedia, n.d.; Digital, Wikipedia, n.d.)

For the scope of this project, digital resources are materials that can be accessed via computer. Digital resources span text, images, sound, maps, video, and more. The source of these resources is equally broad, and can include collections of resources developed by well-known institutions, such as libraries and museums, as well as those developed by individuals. (Harley et al., 2004, p. 12.)

III.B. Distribution Formats

There are multiple ways that digital materials can be distributed to educators. Listed below are four common distribution formats.

III.B.1. CD-ROM

CD-ROM stands for “compact disk-read-only-memory.” A CD-ROM is a tool (plastic disk) used for optical memory storage. It may contain audio, video, or other types of media files. (Hansen, 1999.) Space is limited to 650-700 megabytes of data. (Compact Disk, Wikipedia, n.d.)

III.B.2. DVD

A DVD or DVD-ROM stands for “digital video disk” or “digital versatile disk.” A DVD is a tool (plastic disk) used for optical memory storage that exceeds the capacity of a standard CD-ROM. It may contain audio, video, or other types of media files. (Hansen, 1999.) A single-sided DVD can hold 4.7 gigabyte, or approximately seven times a CD-ROM. (DVD, TechEncyclopedia, 2007; DVD, Wikipedia, n.d.) Double-layer, double-sided DVDs are available with nearly four times the storage space of single-sided DVDs. DVD technology is rapidly increasing and it is predicted that the storage capacity of DVDs will continue to increase.

III.B.3. Internet

The Internet is a global network connecting computers around the world. The Internet is accessed by an Internet Service Provider (ISP). Information can be disseminated in a variety of ways over the Internet, including the World Wide Web, File Transfer Protocol (FTP) sites, and email. The Internet can be envisioned as a diverse community of online users that is self-governing. (Hanson, 1999, p. 160; Internet, Webopedia, n.d; Internet, Wikipedia, n.d.)

III.B.3.a. World Wide Web

The World Wide Web is an information space that exists on the Internet. Information on the World Wide Web is formatted in hypertext markup language (HTML). HTML can be read by web browsers, such as Internet Explorer or Netscape Navigator. A web site is a collection of HTML documents known as web pages that are stored on web servers and read by web browsers. Each web site contains a home page and may also consist of additional web pages and documents. Web sites are owned by individuals, companies, or organizations. (Hansen, 1999 p. 340; Web site, Webopedia, n.d; World Wide Web, Webopedia, n.d; World Wide Web, Wikipedia, n.d.) The size of a web site is limited by the size of the server. The speed of a web site is limited by individual user modems.

III.B.3.b. FTP

FTP stands for File Transfer Protocol and is a means of transferring files over the Internet. FTP involves two computers, one of which is an FTP server. Using an FTP site, people can upload and download information from computer to computer. (Hanson, 1999, p. 120; FTP, Webopedia, n.d; FTP, Wikipedia, n.d.)

III.B.3.c. Email

Email is short for electronic mail. It is a means of composing, sending, and receiving messages electronically. Once sent, messages can arrive almost instantly. Users have an email address and an electronic mailbox where messages are stored. Email systems operate both within workgroups, such as

one company or office, and via the Internet. Internet email allows users to send messages to others with email anywhere in the world. (Hanson, 1999, p. 102; E-mail, Webopedia, n.d; Email, Wikipedia, n.d.)

III.C. Digital Resource Examples

Classifying digital materials can be very complex due to the vast number and type of materials available. Digital materials are continually being created as technology advances, and therefore, any list generated soon becomes outdated. Below are several examples of the type of digital materials that could be found freely and publicly on the World Wide Web by doing a basic search at the time this study was conducted. Some of these materials are elements of a larger web site and others comprise the entirety of a web site. This list was generated in part through searching the World Wide Web and using the *Typology of Digital Resource Landscape*. (Harley et al, 2004, p. 21.)

Virtual Field Trips

The term “virtual” refers to something that is conceptual versus something that is physical. For example, an architect’s drawing for a house could be considered a virtual house, whereas the actual house is the physical reality. Virtual can refer to anything that exists but has no concrete manifestation. (Hanson, 1999, p. 328; Virtual, Webopedia, n.d.) Virtual field trips present information on a specific topic or place via the Internet. There are an endless number of topics for virtual field trips ranging from volcanoes to the human heart. They vary widely in format and presentation and can include a mixture of images, text, sound, or video. Some virtual field trips include links to other web sites, while others are entirely self-contained. Many places such as national parks and museums

offer virtual field trips to encourage Internet users to visit the site, as well as provide and experience for people who cannot physically come to the site. A few following examples illustrate the diversity of topics and activities that can be incorporated into a virtual field trip.

- Tramline is a company that specializes in virtual field trips. They host a web site that includes virtual field trips for K-12 students on an array of topics such as hurricanes, wildfire, and New York City. Many of the field trips include an overview with learning objectives for the field trip and suggested activities for teachers to use. The field trips guide users through a series of individual web pages maintained by entities outside Tramline that are related to the field trip topic. Tramline also offers software for students and teachers to create their own virtual field trips, a book on creating virtual field trips, and training courses. (<http://www.field-guides.com/>) (*Tramline*, n.d.)
- The Utah Education Network has a web site containing hundreds of virtual field trips organized into categories such as foreign languages and science. The field trips are a collection of images and text and the site encourages teachers to make their own field trips and add them to the collection. (<http://www.uen.org/tours>) (*Virtual Field Trips*, n.d.)

WebQuests

A WebQuest is “an inquiry-oriented activity in which most or all of the information used by learners is drawn from the Web” (Dodge, 1995). The WebQuest model was developed at San Diego State University in 1995. WebQuests are more than students searching the World Wide Web for information on a particular topic. They are learning tools that are

designed to make effective use of students' time and promote the use, analysis, and synthesis of information, rather than just having students looking for it. Most often WebQuests are group activities in which students assume a role that allows a team of learners to investigate an issue from multiple perspectives which are found on a subset of web sites (March, 2006). The essential components of a WebQuest include an introduction, a description of the task, information sources, an explanation of the process to be used, guidance on how to organize the information, and a conclusion.

- Radio Days is a WebQuest that has learners explore the “Golden Age” of radio and work as a team to produce a radio drama. Each team member begins by visiting three web sites to learn about the history of radio from 1930-1945. As a group they construct a timeline of key events. Students then choose a part either as the playwright, Foley artist, or advertising executive, and visit two to four web sites to learn about the job. The group then discusses their findings, writes a script, rehearses, and produces a show that is tape recorded. Evaluation of all group members is done on an individual basis, with a rubric being provided to the students ahead of time. (<http://www.thematzats.com/radio/>) (Matzat, 2005.)
- The WebQuest Page is a web site hosted by the Educational Technology Department at San Diego State University. The site is a comprehensive library of WebQuest-related materials. It provides an overview of what WebQuests are and information on the people who developed the concept. There is a feature on the web site for searching WebQuests by topic or grade level. The WebQuests on the site can be submitted by anyone and are created by anyone. They are also rated by users with an evaluation form. The web site has another section devoted to the

creation of WebQuests and steps users, who need no prior web development experience, through the process of creating their own WebQuest. Additionally the web site has links to articles about WebQuests, development tools, and related workshops. (<http://webquest.sdsu.edu/>) (The WebQuest Page, n.d.)

Citizen Science Monitoring

Citizen science monitoring describes the efforts of volunteers to monitor the status of living organisms or collect information on environmental variables such as weather. The data collected through citizen science monitoring can be used in management plans or policy making, as well as educational efforts. (*Citizen Science*, 1999-2005.) Citizen science monitoring does not require using computers but often technology is utilized to simplify data collection and analysis. There are several web sites available for educators who want to involve their students in citizen science monitoring projects. The general public has access to the web sites as well. Participants enter data about the study area into a central database using any computer with Internet access. The compiled information from the database can then be recalled, analyzed, and accessed by anyone through the specific monitoring web site.

- Journey North is an example of a citizen science monitoring program designed for students and teachers. The program engages students in the study of wildlife migration and seasonal change throughout the world. Through the Journey North web site, K-12 students can share field observations with students across North America. Example projects include migration patterns of monarch butterflies, bald eagles, hummingbirds, and whooping cranes and tracking the coming of spring, the budding of plants, and the change in sunlight throughout the seasons.

The web site also includes resources for teachers such as standards-based lesson plans and activities. (<http://www.learner.org/jnorth/>) (*Journey North*, 2005.)

- NatureMapping is a biodiversity survey program that allows students, citizens, and professionals to enter observations of wildlife into a statewide database for Wisconsin. The information is entered via a web site and used in natural resource management, scientific studies, and environmental education. Training sessions are available to help monitors identify the species being studied and submit data correctly. Geographic Information Systems (GIS) software is used to create maps useful in analyzing the data. Teachers can use the maps with their students to study species distribution. (<http://www.wisnatmap.org/>) (*Wisconsin NatureMapping*, n.d.)

Chat Rooms and Discussion Boards

The terms “chat room” and “online discussion” are sometimes used interchangeably. For this study, they will be considered two separate items so that a range of options for virtual conversation can be described. The descriptions below serve as examples, as there is tremendous variation in chat room and online discussion formats.

Chat Room

A chat room is a virtual space on the Internet where people can have a conversation by broadcasting messages. Multiple participants are logged on simultaneously and the conversation occurs in real time, just as if people were in an actual room together with questions being asked and answered instantly. Chat rooms are often monitored by a moderator who ensures that the conversations are appropriate. Chat environments can range from text only formats to the use of live

video streaming where people can see and hear one another. (Hansen, 1999, p. 51; Chat room, Wikipedia, n.d.) Some chat rooms are continually ongoing and others are scheduled to occur on specific days and times. Chat rooms often have a specified focus or topic. Some create opportunities for people to chat with experts in a certain field.

- The National Aeronautics and Space Administration (NASA) sponsors several themed educational events each year which culminate in a live web cast where students can chat with NASA scientists. Any teacher with access to the NASA Quest web site can participate. Teachers prepare students for the live event several weeks in advance using lessons and materials specific to each event provided by NASA. When the day of the web cast arrives, teachers connect to the NASA Quest site, turn on the live video feed of NASA scientists, and enter the chat room by providing a name and location. Students can then ask questions which may be answered live by the scientist, or chat with other students participating in the program. (<http://quest.nasa.gov/>) (*NASA Quest*, n.d.)

Discussion Board

A discussion board is a place on the World Wide Web where people can post messages, read other people's messages, and respond to messages. Often discussion boards are centered on a specific topic or central question. Unlike a chat room, participants post questions and answers at any time. Participants could ask a question one day and a response might be posted the next.

- ePALS.com is a web site that creates classroom communities by connecting over 5.5 million students and educators from more than 190 countries. Students and teachers can email one another to learn from peers around the world. Students and teachers can also exchange information with one another through discussion boards. A multitude of topics allows users to explore new ideas or find a place to post a question. For example, on the “Teacher Resources” board one teacher from the United Kingdom explained that she was given the task to develop a school assembly on Christmas traditions from around the world. She asked others to submit ideas for use in the assembly based on their home country. Several teachers responded by posting examples of traditions from their country.

There are also discussion boards for parents to exchange ideas, concerns, and questions with one another. One parent, for example, asked others how they handled learning their child had cheated in school. Students have a place for their discussions as well, such as sharing what songs are popular in their country or what they think of school lunch.

Using curriculum materials provided by ePALS, teachers can involve their students in ePALS projects. Once they have explored a topic they can discuss what they have learned on the project discussion board. Students in “Olympic Talk” discuss why athletes sometimes use steroids and students in “Healthy Wetlands. Healthy You.” discuss what their class is

doing to protect local wetlands. (<http://www.epals.com>) (ePALS Classroom Exchange, 1996-2006.)

Blogs

The term “blog” is short for web log. Blogs are relatively new forms of communication over the Internet and are still evolving. There are multiple definitions of a blog, but all blogs share certain features. At their basic level, blogs are publicly accessible personal journals, updated on a regular, and often daily basis. Blog postings appear in reverse chronological order, they contain unfiltered content, and they have responses or posts from readers. A blog may also have links to other web sites and images or video. Generally, blogs relay an informal attitude and reflect the personality of the author or authors. Blogs exist on the World Wide Web and can be created using blogging software. Individuals, organizations, businesses, or almost any entity can create a blog. (Just What is a Blog, Anyway?, 1999-2005; Blog, Webopedia, n.d; Blog, Wikipedia, n.d.)

Relative to discussion boards and chat rooms, blogs are one of the newer Internet phenomena. According to a 2005 report from the Pew Internet & American Life Project, 6% of the entire U.S. adult population (Internet users and non-users alike) have created blogs, nearly one out of every 20 people. One in six people, or 16% of all U.S. adults, are blog readers. (Pew Internet & American Life Project, 2005.)

Blogs are used in a variety of ways in education. For example, schools may have a blog to share information with parents and teaches; teachers may have a blog for parents and students highlighting classroom activities; teachers may have a blog to post student

activities and assignments; educational organizations may have a blog to highlight products, services, or help educators connect with one another; and the list goes on. The possibilities for blogs in education are only limited by the creator's imagination.

- Blogger.com is a web site that allows anyone to create a blog or find a blog to read. Many teachers have blogs on this site. When one enters a blog they can read a profile of the author, view photos posted by the author, and read the author's posts. (Blogger.com, 2006.) "First Year Teacher," for example, is a blog started by a North Carolina school teacher that chronicles the author's experiences in the classroom over the past three years. Others can read the blog and post responses to what the author wrote and link to their own blogs. This type of setting creates a virtual community where people who have never met and probably will never meet can feel connected. Blogs allow anyone to share their thoughts on any topic and feel that someone might read them and relate to them. For the reader, a blog may be a source of humor, entertainment, or a way to explore what others are experiencing in their lives. Responses to "First Year Teacher" include everything from sympathetic "I know what you are going through, hang in there" comments to "hey, it's not worth it, move to another school." (<http://www.blogger.com>) (First Year Teacher, n.d.)
- In Mrs. Cassidy's Classroom Blog, Kathy Cassidy shares what her first grade students are learning on a regular basis. Parents and students can find several new posts per week with pictures and short explanations of daily activities. The blog does not list students' names or even the name or location of the school, presumably to protect the identity of the children.

(http://classblogmeister.com/blog.php?blogger_id=1337) (*Mrs. Cassidy's Classroom Blog*, 2005.)

Educational Games

A wide array of digital educational games are available, both on the World Wide Web and on CD-ROM. Their complexity varies from simple interactive word puzzles to animated games utilizing media players for sounds and graphics.

- The official Smokey Bear web site contains a variety of educational games for elementary school children. Some of the games require users to download a free media player to support the interactive graphics used to run the game. The games include colorful graphics and sound. One example is a game called Smokejumper where players become firefighters who must jump from an airplane and put out fires and save a given number of trees. The focus of the games is on wildfire education and prevention. (<http://www.smokeybear.com/kids/>) (*Smokey Kids*, n.d.)
- The National Arbor Day Foundation has a children's educational web site called Carly's Kids Corner. One of the choices on the Fun and Games portion of the page is "Who Wants to be a TREEllionaire?" Once the players choose to begin, questions appear on the screen and players must click on the correct answer. There are options to ask for additional information, get help from the computer, or eliminate half of the choices. The game uses simple text and graphics to encourage players to learn more about trees.
(<http://www.arborday.org/kids/carly/>) (*Carly's Kids Corner*, n.d.)

- Extraordinary Road Trip (XRT) is an educational game produced on CD-ROM by the Wisconsin Department of Natural Resources and partner organizations.

Described as “edutainment,” XRT allows users to analyze transportation variables affecting air quality to improve their imaginary world. The purpose of the game is to illustrate how making sound transportation choices can improve air quality.

(Extraordinary Road Trip, 2005.)

Simulations and Animations

A simulation is a representation of the functioning of a system or process. A simulation can exist in many forms, including digitally. An animation is a series of still images seen in quick succession to give the impression of movement. Animations first became popular in television and film, but can be created today using computers. Simulations and animations can both be used to convey educational information and are popular because their interactivity and movement capture the attention of the viewer to a greater degree than just written information or still images. To create complex animations and simulations, specialized software and computer programming must be used. There are many examples of educational simulations and animations available on the World Wide Web.

- The BrainPOP web site is a collection of over 500 animated movies on topics ranging from hibernation to Mark Twain. Movies cover the core curriculum subjects of science, social studies, math, English, health, and technology. Consistent characters are featured in the animated movies and explain ideas in kid-friendly terms. Each movie is accompanied by a 10-question interactive quiz, experiment, comic strip, timeline, and printable activities. An interactive State

Standards tool, lesson plans, and ideas for using BrainPOP in the classroom are available. A two-week trial version of the site is available, but for consistent access one must purchase a paid subscription. (<http://www.brainpop.com>) (*BrainPOP*, n.d.)

- MyPhysicsLab is a web site containing interactive physics simulations. Users choose a concept to explore, such as a pendulum, and an animated object appears. The user interacts with the object by manipulating a variety of variables such as gravity, mass, angle, and speed. A graph of the object can be observed as well as equations related to the object. (<http://www.mypphysicslab.com>) (*MyPhysicsLab – Physics Simulation*, 2004.)
- MEDtropolis features a virtual body web site that allows users to explore the brain, skeleton, heart, and digestive system of a human. Using graphics, animations, sound, and text, viewers can learn about various parts of the body and even build a system by clicking on organs and moving them around the computer screen. (<http://www.medtropolis.com/VBody.asp>) (*The Virtual Body*, n.d.)
- Net Frog is a virtual frog dissection on the World Wide Web that includes images and text to guide students through the process of correctly dissecting a frog. (<http://curry.edschool.virginia.edu/go/frog/>) (*Net Frog*, n.d.)

Audio Materials

An array of audio materials are available digitally. Music comprises by far the largest category, but other audio materials include sounds from nature such as bird calls and animal noises, speeches and lectures, and even word pronunciation in languages from

around the world. On a computer, sound files may be played by a simple operating system sound player, or a media player such as RealPlayer or Windows Media Player.

- FindSounds is a web site that searches the Internet for sound files. Users can type nearly any sound into the search engine will and it will search millions of web sites to create a list of the possible options and file types available. Some of the possibilities include a jet airplane, a person screaming, a zipper, tap dancing, lightning, a catbird, a hippopotamus, and a cello. (<http://www.findsounds.com>) (*FindSounds.com*, 2006.)
- The online speech bank of the American Rhetoric web site is an index to over five thousand full text, audio, and video versions of public speeches, sermons, legal proceedings, lectures, debates, interviews, and other recorded media events. The site also contains over 200 stylistic figures of speech illustrating such things as alliteration and simile. (<http://www.americanrhetoric.com>) (*American Rhetoric*, 2001-2006.)

Digital Video

Digital video can be distributed on DVD, CD-ROM, and the Internet. Digital video files are commonly in MPEG format, which is a compressed file that allows the distribution of data that would otherwise be too large to fit on a CD-ROM or take too long to download over the Internet. (CD, TechEncyclopedia, 2007; Compact Disk, Wikipedia, n.d.; Digital Video, TechEncyclopedia, 2007; Digital video, Wikipedia, n.d.) Any type of video can be reproduced digitally. This means one may find everything from old Super 8 movies to the latest videos in high definition (HD) technology on the World Wide Web. All video is compressed by different methods. For a computer to read the video, it must have the

correct Codec (compressor/decompressor) installed. Codecs encode pieces of information for storage and decode them for viewing. (Codec, MSN Encarta Dictionary, 2007; Codec, TechEncyclopedia, 2007; Codec, Wikipedia, n.d.)

Digital video is provided to users over the Internet via two methods. One is to provide the video files for users to download in their entirety and then watch. The second uses streaming, in which the media is continuously viewed while it is being received. Both methods require the use of some type of media viewer such as Windows Media Player, Macromedia Flash, or Real Player. Many media viewers are available for free download.

- On the History Channel web site, users can view hundreds of speeches and video clips from the early 1900s through today. Clips range from 1929 black and white video of Sir Alexander Fleming receiving recognition for his discovery of penicillin to 1969 footage of the moon landing.

(<http://www.historychannel.com/broadband/home/>) (*Speeches & Video*, n.d.)

- The San Diego Zoo has live web cams in several of their animal enclosures. Internet users can watch streaming video of the animals from their computer. Anyone anywhere in the world can see elephants roaming in the wild animal park, pandas sleeping and playing, or apes swinging from trees as long as the animals are in front of the cameras. (<http://www.sandiegozoo.org/videos/index.html>) (*Live Web Cams and Zoo Videos*, 2006.)

Images or Visual Materials

A digital image is a representation of a two-dimensional picture composed of a finite number of pixels. The number of pixels determines the resolution or clarity of the image.

Digital images are created by tools such as digital cameras and scanners. (Digital image, Wikipedia, n.d.) The end use of digital image determines the desirable resolution. For viewing on screen, images need only be 72 dpi (dots per inch). For print quality, 300 dpi is optimum.

- Image libraries are a common source of digital photographs on a particular topic or subject. The Forestry Images web site is an archive of high quality images related to forest health and natural resource images. Users can sign up for a free membership and have access to over 34,000 images of nature including everything from lions to bark beetles for free use.

(<http://www.forestryimages.org>) (*Forestry Images*, n.d.)

- The Fine Arts Museums of San Francisco has digital images of over 82,000 objects from their collections available for viewing on their web site. Users can search by category to find digital images of paintings, sculptures, and other objects and artifacts. (<http://www.thinker.org/gallery/index.asp>) (*My Gallery*, n.d.)

Digital Storytelling

Digital storytelling embodies the same spirit as traditional verbal or visual storytelling, but it uses technology and computers as the means for sharing information. Media-rich stories that utilize digital video, sound, and images are shared on the Internet, DVD, or through other electronic means. Digital storytelling is used by businesses to sell products through first-person accounts, in museum exhibits to engage visitors, and by educators to provide students with new and engaging tools of expression. (*Center for Digital Storytelling*, no date; *What is Digital Storytelling*, 2000.)

- The Scott County Schools in Georgetown, Kentucky use digital storytelling in grades one through twelve to turn their writing pieces into digital masterpieces. Three-minute videos that include photos, artwork, objects, music, and the writer's own voice become powerful pieces for communicating with a diverse audience. A local public library houses a digital storytelling center where community members can also produce their creative works. Digital stories from the Scott County school teachers, students, and community members are housed on a web site. Topics range from “my hero” to “my favorite holidays” to “practice makes perfect.” (<http://www.scott.k12.ky.us/technology/digitalstorytelling/ds.html>) (*Digital Storytelling in the Scott County Schools*, 2001.)
- PBS provides a lesson plan on their web site for teachers who want to use multimedia storytelling to explore the concept of family with their students. Using the PBS series *American Family* as a context, the lesson provides the steps and resources for leading sixth through twelfth grade students through the process of creating a digital story. (<http://www.pbs.org/americanfamily/teacher3.html>) (*Multimedia Storytelling*, 2004.)

Digitized Text Documents

Any type of text document can be scanned or photographed to produce a digital file. The format in which the files are made available varies. They range from text documents that can be manipulated using word-processing software to PDF (Portable Document Format) documents anyone can view using free Adobe Acrobat Reader software. Thousands of books traditionally only available in print are now available online. Readers can browse

pages of text and images, save materials to their computer, or print pages in full color if they so choose.

- Holt, Rinehart and Winston textbooks offers online versions of their textbooks with editions for teachers and students to access. The online resources contain the traditional text and images in addition to visual slide presentations, assessment tools that provide immediate feedback, and multimedia presentations that support various concepts. (<http://www.hrw.com/it/index.htm>) (*Holt Online Learning*, 2006.)

Maps

Just as there are a seemingly endless number of printed maps available, from the streets in a town to the topography of Africa, there is also a wealth of digital maps available. Digital maps vary in the amount of interactivity they allow. Some are simply maps of an area, appearing exactly as a printed map would. Others are “zoomable” – they show a large region and allow users to click on an area to zoom in or out. Still others are fully interactive, allowing users to choose features they would like to see on the map such as boundary lines, areas of water, roads, or forest cover. Digital mapping software allows users to input real data and create maps that can be manipulated on computers or printed and distributed.

- The National Geographic MapMachine is an online atlas of the world customizable to an individual user’s needs. Nearly any place on Earth can be viewed by population, climate, etc. Users can also browse antique maps or plan an outdoor adventure using trail maps. There are conservation maps, street maps, topographic maps, weather maps, census maps, and the list goes on. The maps are

interactive and when users find one they like, they can order it in large format and have it sent directly to them. (<http://plasma.nationalgeographic.com/mapmachine>) (*MapMachine*, 1996-2006.)

- Google Earth is like having a digital globe inside a computer. The images for Google Earth are created by satellite technology and range from a view of the entire planet from space to the location of restaurants in individual cities. Users can rotate a 3-dimensional rendering of Earth and the program will zoom in from space to any location on the planet or users can type in an address and the program will “fly” to an aerial view of the location. (<http://earth.google.com>) (*Google Earth*, 2005.)

Data Sets

A vast array of scientific data is available on the World Wide Web. A quick search for air pollution data will bring up national statistics from the Environmental Protection Agency (EPA) (*Air Data*, 2004) and a search for rainfall data will produce results from locations worldwide. The data available on the World Wide Web ranges from a simple list of bird species sighted in a given location as part of the North American Breeding Bird Survey (2005) to spreadsheets of technical data on cave deposit thickness and chemical makeup from the National Oceanographic & Atmospheric Administration’s (NOAA) paleoclimatology site. (*Speleothem [Cave Deposit] Data*, 2005.) Often it is the dedicated work of a creative teacher who transforms raw data sets into meaningful learning experiences for students.

- Using Data in the Classroom (2005) is a web site that is part of the Digital Library for Earth System Education (DLESE) (n.d.). The site contains links to information

on how to prepare data for classroom use as well as links to ready made lessons that involve students in data manipulation. One lesson for teaching entry level geoscience, for example, has students compare carbon dioxide data from the Mauna Loa Observatory, Barrow (Alaska), and the South Pole over the past 40 years to help them better understand what controls atmospheric carbon dioxide. (<http://www.dlese.org/dds/>) (*The Modern Atmospheric CO₂ Record*, 2005.)

- The Center for Innovation in Engineering and Science Education (CIESE) specializes in creating quantitative, inquiry-based science and mathematics web-based curricula that utilizes real-time data from government and commercial databases. Students can participate in hands-on activities and use real-time data to study factors affecting weather and climate, track a real airplane flight and learn how vectors and trigonometry are used for aviation navigation, use earthquake data to explore the relationship between earthquakes and plate tectonics, and more. (<http://www.ciese.org/realtimeproj.html>) (*CIESE – Real Time Data Projects*, 2007.)

Reference Resources

Digital reference resources include online versions of common printed reference materials such as dictionaries, encyclopedias, thesauruses, almanacs, atlases, phone books, etc.

- Merriam-Webster OnLine allows users to type in any word and look it up instantly in a dictionary or thesaurus. Special features include word games, lists of newly added words, and a version of the dictionary just for children. (<http://www.m-w.com>) (*Merriam-Webster OnLine*, 2005-2006.) The World Wide

Web hosts many specialty dictionaries as well, such as the Urban Dictionary, the Dictionary of Computing, and the Rhyming Dictionary.

- Wikipedia is a free online encyclopedia with nearly a million articles. This reference tool is unique in that anyone can edit and add to it. A wiki is a piece of software that allows users to freely edit web page content using their browser. (What is Wiki, 2002.) The amount of information on Wikipedia grows as users contribute to it. Users create descriptions for new word entries, add information to existing entries, or even edit another person's work. Pages with questionable information are marked and checked for accuracy by experienced Wikipedia editors. (<http://wiki.org/wiki.cgi?WhatIsWiki>) (Wiki, Wikipedia, n.d.)

News or Other Media Sources

Many television stations, newspapers, and magazines can be accessed on the World Wide Web. These media sources can make instant updates to their web sites and provide the latest news to millions of people before it can be printed or shown on television.

- At CNN.com, one can quickly and easily navigate to U.S. news, world news, sports, entertainment, and more. Archives of video clips from top stories and transcripts from live broadcasts are accessible on the site. (Web site: <http://www.cnn.com>) (*CNN.com*, 2006.)
- Readers of USA Today can go online to find the latest edition of the paper along with general interest stories presented in interactive media format, video and audio clips, and the day in pictures featuring striking photos of events from around the world. (<http://www.usatoday.com>) (*USA Today*, 2006.)

Curriculum, Lesson Plans, Activities

Educators can find many web sites containing curriculum materials such as lesson plans and activities. Some sites are maintained by teachers who share their classroom activities with other educators, while others are maintained by organizations devoted to providing educational materials to the public.

- The IDEAS web site is sponsored by the University of Wisconsin System and University of Wisconsin-Extension. IDEAS provides Wisconsin educators access to high-quality, teacher-reviewed web-based resources for curricula, lesson plans, and professional development. Users can search the site for material by grade level, subject area, and model academic standards. Each listing has a description of the resource, list of Wisconsin Model Academic Standards met, information on who posted the resource, and a link to the resource.
(<http://www.ideas.wisconsin.edu>) (*IDEAS*, 2006.)
- Educators can find a wealth of lesson plans and activities in the Digital Library for Earth Science Education (DLESE). The web site allows users to conduct a search by choosing from a variety of criteria including grade level and key word. Each listing features a link to the resource, description of the resource, and opportunities for submitting reviews and teaching tips. The library is funded by the National Science Foundation and includes many types of digital resources in addition to lesson plans and activities. (<http://www.dlese.org/dds/>) (Digital Library for Earth Science Education, n.d.)

Portals (Web Links)

Many web sites dedicate a page to providing links to other related sites. Some sites serve only as portals or a source for links to other web sites, and contain no original information of their own. Generally portals are organized by a theme or topic. They are useful for finding an array of web sites on a particular topic quickly without wasting time on Internet searches. Portals are only as useful as the sites to which they link. Since sites are constantly adding, moving, and deleting pages, portals must be updated regularly to reflect changes in the linked sites.

- Cumberland County, New Jersey has a web site “media center” containing pages of themed web site lists. Topics such as birds, food and nutrition, and poetry are used to organize lists of web sites with descriptions and a rating based on site content. Since it is a resource for teachers, the site also has sections devoted to listing web sites containing lesson plans and activities.

(<http://www.cumbavac.org>) (Cumberland County AVA Center, n.d.)

- KidsSites.com is the self proclaimed “leading site to the best in kid’s web sites.” It features lists of web pages with descriptions in many categories, each of which has been approved by their staff. Kid-friendly images give users an idea of what they may find on the web sites. (<http://www.kidsites.com>) (*KidsSites.com*, 1997-2006.)

Digital Libraries

A digital library is a coherent, organized collection of documents that have been compiled and produced in digital format. Digital libraries are available to users via the Internet or CD-ROM. Depending on the specific library, a user may be able to access

resources such as magazine articles, books, images, sound files, videos, etc. Most of the digital resources provided as examples in this section of the literature review can be part of a digital library. Often digital libraries bring resources, such as web site links, together from many entities and place them in one convenient location for users to browse.

(*National Science Digital Library*, 2006; Digital Library, 2000-2005.) There are digital libraries available on numerous topics from the sciences to the humanities.

- Traditional libraries often house digital libraries as part of their resource collection. The Cornell University Library Digital Collection, for example, houses many types of digital resources available to users on the World Wide Web, like collections of the historical literature of agriculture and Icelandic sagas. Many of these include scanned versions of original documents, text, and images.

(<http://moa.cit.cornell.edu/>) (*Cornell University Library Digital Collections*, 2005.)

- The National Science Digital Library houses resources for K-12 teachers, librarians, university faculty, and the general public. The library was created by the National Science Foundation in an effort to assist educators, in efficiently locating quality resources for science, technology, engineering, and mathematics (STEM) education and research. Resources available are projects of the National Science Foundation or have been reviewed by their staff. (*National Science Digital Library*, 2006.) One example directs users to the Animal Diversity Web, a searchable encyclopedia of the natural history of animals that includes information, pictures, specimens, and sounds from hundreds of species.

(<http://animaldiversity.ummz.umich.edu/site>) (*Animal Diversity Web*, 2005.)

IV. Existing K-12 Forestry Education Digital Resources

IV.A. LEAF's Digital Resources

As of December of 2005, LEAF had a variety of digital resources available to educators.

The resources can be divided into three categories based on distribution format: CD-ROM, World Wide Web, and Email.

IV.A.1. CD-ROM

LEAF produced the *Wisconsin K-12 Forestry Lesson Guide CD-ROM* in 2005. It contains all units of the LEAF Lesson Guide and the *LEAF Conceptual Guide to K-12 Forestry Education in Wisconsin*. The lesson materials on the CD are identical to the printed guides with two exceptions. A set of 41 full-color tree identification cards were included as part of a unit 7-8 lesson. A full-color land cover map (which is only in black and white in the printed guide) was included for a lesson from unit 9-12. The CD-ROM was mailed to all teachers who participated in past LEAF workshops and is given to all current workshop participants. It is not available to the general public. (LEAF, 2005, *Wisconsin K-12 Forestry Education Lesson Guide CD-ROM*.)

IV.A.2. World Wide Web

The LEAF web site (www.uwsp.edu/leaf) was developed in 2001 and has grown in response to the program's and users' needs. Originally the site served as an informational center for LEAF Program development. As LEAF services have increased, so too have the site's services. Forestry education resources are continually being added to basic program information. All information on the LEAF web site can be accessed by anyone – no portions are password protected

or subscription based. At the time of this study, the site included the following pages:

- *About Us* – program background, mission, goals, latest news, staff, adjunct faculty, advisory committee
- *Services Offered* – professional development, school forest program, consulting, e-newsletter, community connections
- *Conceptual Guide* – overview of the LEAF Conceptual Guide
- *LEAF Lesson Guide* – rationale, introduction, unit-based approach, overview of units, getting the guide
- *LEAF Courses/Workshops* - Forestry Education for the Wisconsin K-12 Classroom, Teaching Selected Forestry Topics in the K-12 Classroom, School Forest Programs and Administration, Human Influence on Wisconsin's Forests, non-formal educator workshops, forest landowner workshops
- *School Forests* – history, value, registration, summit, articles, awards, handbook, education, resource management, facilities, visit, policy, environmental monitoring
- *Urban Forestry* – conceptual guide, links
- *Wildland Fire* – rationale, development process
- *Tree Identification* – online tree identification key, identification resources, web links
- *Opportunities/Resources* – activities, books, educator opportunities, grant opportunities, LEAF Field Experience Providers, terms/vocabulary, web sites

(LEAF, 2006.)

IV.A.3. Email

The LEAFlet is the LEAF Program's electronic newsletter produced four times per year. An overview of the information in the LEAFlet is sent via email to everyone in LEAF's database unless people request their name be removed from the distribution list. As of December 2005, distribution was over 2,200. The email that is sent contains links to the LEAFlet e-newsletter web pages. The LEAFlet contains two sections: general news and school forest news. Information included may be a listing of LEAF workshop locations, program updates, forestry-related articles and news, educator opportunities, teaching resources, school forest

program updates, and a school forest spotlight. Past issues of the LEAFlet are archived on the LEAF web site. (*LEAF Publications – LEAF Newsletter*, 2006.)

IV.B. Other Forestry Education Programs' Digital Resources

Wisconsin is currently the only state with a legislated statewide K-12 forestry education program. Several states do, however, have organizations and programs that have created state-based forestry education resources for educators and students. A few examples of digital resources follow.

- Kentucky has a multimedia web site that takes students on an electronic field trip to the forest. Kentucky Educational Television partnered with the Kentucky Division of Forestry and the USDA Forest Service to create a video about three teenagers who begin a simple hike through the woods, meet a forester, and end up learning all about Kentucky's forests. The web site resources that accompany the video, which is available on the web site, include an educational game, a slide show, facts on forest products and careers, and a teacher's guide with activities for grades four through eight. (*Electronic Field Trip to the Forest*, 2006.)
- The Idaho Forest Products Commission has a forestry web site with sections for kids, teachers, and the general public. The kids section features text-based information and images on a variety of forest-related topics. The teacher section contains many resources including lesson plans and information on ordering videos and posters. There is an "ask a forester" page where users can email a question to an Idaho forester or read questions and answers from other users.

There is also a wealth of general background information on Idaho's forests and their management. (Idaho Forest Products Commission, 1998-2006.)

- Several states have created CD-ROMs containing state-specific forestry education information. South Dakota has a *Forest and Water Adventures* CD-ROM containing interactive games with messages about good forest and water quality practices that was developed by the South Dakota Department of Environment and Natural Resources. (*South Dakota Forest and Water Adventures*, 2000.) The *Michigan Forests Forever* CD-ROM contains videos, games, and interactive media that help learners explore the many values of Michigan forests. This CD-ROM was produced by the Michigan Forest Resource Alliance. (*Michigan Forests Forever*, 2000.) Wisconsin has a similar *Wisconsin Forests Forever* CD-ROM produced by the Wisconsin Forest Resources Education Alliance. (*Wisconsin Forests Forever*, 2000.) Other states have similar Forests Forever CD-ROMs.

V. Technology in Education

V.A. History

A report produced by the North Central Regional Education Laboratory describes computer use in the classroom as evolving in three phases. Starting in the 1980s, educational software took the form of textbooks in electronic format. Teachers' roles consisted mostly of taking students to a computer lab for drill and practice type activities or electronic tutorials. Students found themselves selecting predetermined answers from within the computer programs. Some evolution in computer-based education occurred

during this phase as researchers began to see learning with technology as a means for developing problem-solving skills and learner autonomy. Researchers began to consider the way people learn rather than just how people respond. Studies show that during this phase instructional programs using technology had a positive impact on student achievement. (Valdez, et al., 1999.)

Phase two of the computer evolution in classrooms occurred in the early to mid-1990s. During this time, education focused more on the quality of learning and using computers as tools for learner-centered activities rather than just content delivery mechanisms. Teachers moved from facilitating isolated learning activities to applications that involved group work. Students could view information in interactive hypermedia formats and share what they learned through desktop publishing. Technology evolved greatly during this time and learning included the use of CD-ROMs, sound, pictures, video, maps, and three-dimensional animations. Students were given opportunities to visualize phenomena formerly invisible. For example, students could manipulate a computer generated model of the planets in space and compare the rotation time of the planets around the sun. They could explore, inquire, and make connections to prior knowledge with new-found information. Studies on student achievement during phase two found increased student-teacher interaction, cooperative learning, and problem solving and inquiry. A challenge that arose during this time was the need for a shift in curriculum and instructional goals, which meant teachers had to accept the use of technology in education and learn how to use it. (Valdez, et al., 1999.)

Education is currently in phase three of the technology evolution. Stand-alone computers running short applications of drill and practice are no longer the norm. People are now connected to a global network of multimedia information with countless online learning opportunities. These opportunities have a cost however; they require building and maintaining expensive technology infrastructures in schools. In this early stage of phase three, technology is rapidly developing and evolving. Research shows that technology is most successful when used strategically in particular contextual settings and content areas. Students and teachers need to be engaged in teaching and learning relationships that focus on data-driven content decision making. Technology offers opportunities for students to have increased control in their learning and a chance to develop higher self-esteem. To support these opportunities, changes need to be made to curriculum, instruction, and assessment, which requires new kinds of professional development. (Valdez, et al., 1999.)

V.B. Benefits to Students

Until the computer became a regular part of classrooms, the technology available for teaching was limited to audiovisual devices and distance learning by television. Use of these basic tools put the teacher in an active role and the students in a passive role. Computers changed that balance because learning could be a result of doing, not just watching. Students are not limited to learning about frogs by dissecting them anymore. They can be asked to design frogs, to build an animal with frog-like behavior, and to modify that behavior using computers. When students play with the information they are given, the material takes on more meaning. (Negroponte, 1995, p. 199.)

Researchers at the North Central Regional Educational Laboratory conducted a research review and found that technology helps students develop diverse skills. They note that technology can:

- make learning more interactive
- enhance the enjoyment of learning
- assist in individualizing curriculum to match learners' needs and interests
- capture and store data for decision making
- enhance collaborative ability
- offer opportunities for learner-control and increased motivation
- help students make connections to the real world

When implemented systematically, technology can enhance student achievement.

Ultimately the use of technology in schools may transform education to motivate students to be life-long learners. (Valdez, et al., 1999.)

In an intensive study of student computer use in an urban high school, one researcher found that students perceived computer work to be enjoyable, while standard lectures were considered boring. Computer use led to heightened motivation, interest, and involvement due to increases in student interactions, increased ability of students to link learning to personal goals and interests, and increased personal challenge leading to active thinking as opposed to passive assimilation of knowledge. (Schofield, 1995, p. 90.)

The teacher's role generally changes when computers are used for instruction. Rather than lecturing the whole class with an expectation that students will assimilate the information presented, the teacher becomes a facilitator or coach to guide students. (Schofield, 1995, p. 227.)

Using a computer in teaching does not ensure success, just as using models and hands-on activities does not ensure students will have better retention of information. Educators must use technology to create good learning experiences that challenge students to solve problems through research, information analysis, making judgments, and then creating interesting products to communicate what they have learned. Technology should be used as a tool to enrich learning experiences and motivate students to gather information from sources they would not otherwise have access to, process information in various ways, and share information with others in dynamic ways. When used wisely, technology can help students obtain, analyze, and integrate knowledge about real world problems while meeting state education standards. (Levine, 2001-2003.)

V.C. Teachers' Perceptions

Many teachers believe that computers improve the climate for learning because technology increases student motivation. (Valdez, et al., 1999.) The use of multimedia and the web can help students who are disenchanted or struggling with conventional learning media. For example, a student with writing disabilities can use sound and images to develop ideas and then use software to turn those ideas into creative writing. When students enjoy what they are doing, they are more motivated to learn. (Rose & Meyer, 2002, p. 127.)

In a 2004 survey of over 11,000 teachers, 87% of respondents indicated that technology was important or very important to their value as a teacher. One teacher stated that, “lesson plans are richer because of information from the Internet.” (NetDay, 2004, p. 6.)

Teachers also indicated technology was valuable in education because it led to more engaged learners and personalized education. Seventy five percent of teachers responded that they always or sometimes incorporated new Internet materials into new or existing lesson plans. Along the same line, 78% of teachers felt that technology use was an asset to meeting state and federal standards. (NetDay, 2004, p. 2.)

Older teachers responding to the survey were just as likely to have positive views on technology as younger ones. Like their students, teachers used technology and web tools regularly. The most common technology devices used on a weekly basis by teachers included computers, cell phones, and digital cameras. When asked how they learned about new technology and Internet sites, 25% of respondents said they explore on their own, 22% consult their peers, and 22% use the expertise of district technology staff or site based media coordinators. (NetDay, 2004, p. 7-8.)

Teachers felt that their work conditions mostly encouraged technology use (75%) and also indicated that effective use of technology was a top or middle priority for administrators in their school (85%). (NetDay, 2004, p. 7.) As for training provided by their district, 35% of teachers felt that training provided by their district very much met their needs and 91% of teachers felt that their district at least somewhat adequately prepared them for using technology with instruction. Obstacles to technology or Internet use at their school included lack of time in the school day, not enough computers, computers that did not work, slow Internet access, and school filters and firewalls. (NetDay, 2004, p. 12.)

V.D. Requirements for Success

The extent to which teachers receive professional development in the use of computers to support learning plays a major role in whether the technology has a positive impact on student achievement. (Schofield, 1995; Valdez, et al., 1999.) Teachers need to know how to use technology, as well as how to effectively incorporate it into their instruction.

Without professional development on best practices for technology integration, teachers use technology in the same way they use traditional text-based materials, which does not utilize technology to its full potential. Sending students to a computer to read a passage written by Shakespeare instead of having them use a book is not an effective use of technology. Having students use a computer to listen to someone reading a Shakespearean passage with correct inflection and then researching criticisms of that work offers students something they could not get from the book. Professional development is most effective when presented in a number of different formats such as training workshops, presentations at conferences, online courses, and self-guided learning. (Hanson & Carlson, 2005.)

To be successful, teachers must see technology as a valuable resource. This may require some teachers to change their beliefs about teaching and learning. Teachers need to have openness to change and time to make changes if they have been relying on purely traditional methods. (Hanson & Carlson, 2005.) To achieve maximum success, the type of technology chosen for use in a particular application must provide students optimal benefits. The amount of effort put into learning must balance with what there is to be gained from the effort. Additionally, physical changes in the learning environment may

be required – technology is most effective when computers are located in the areas where learning is taking place, such as the classroom, rather than in a lab or resource center.

(Valdez, et al., 1999.)

VI. Educational Theory

VI.A. Students in the Digital Age

The students of today are referred to as the Millennial Generation; born between 1980 and 2000. Unlike people born during the Baby Boom or the Generation X era, they are the first generation to grow up surrounded by digital media. They expect to be able to connect with others at any time in any place. Cell phones, the Internet, digital cable, and email are just as common to them as toasters, dishwashers, and garage door openers.

Compared to previous generations, the Millennials have heightened technology skills and the practical knowledge and ability to access information. (Oblinger, 2006; Raines, 2002.)

One study (Oblinger, 2006) found that by the age of 21, Millennials will have spent 10,000 hours playing video games, sent 200,000 emails, spent 10,000 hours on cell phones, but spent fewer than 5000 hours reading. This is significant because most educational materials are still in a written format and meant to be read. Today's learners have no fear of devices and technology. They are connected to others continually through cell phones, instant messaging, and the Internet. They learn by doing rather than being told, expect immediate responses, and prefer social group learning. Flooded by media such as television, music, cell phones, and games, Millennials thrive on stimulation and

need to be engaged in order to learn. In general, they are also interested in things that they feel matter and make a difference, such as service learning. (Oblinger, 2006; Wilson, 2005.)

How does this generation of students affect education? This group of learners sees teachers not as experts, but as people with expertise. This means educators have to acknowledge their changing role. Students prefer to learn by doing, which can be achieved with some modification to traditional teaching methods. For example, a virtual lab where students can practice skills on a computer before doing a real lab, is preferred over reading a lab manual. (Oblinger, 2006; Wilson, 2005.)

VI.B. Multiple Intelligences

Harvard psychologist, Dr. Howard Gardner, developed the theory of Multiple Intelligences which outlines at least eight forms of intelligence that all humans possess. Each person has a different blend of these intelligences, creating unique learning style preferences. Of the eight intelligences – linguistic, logical-mathematical, musical, spatial, bodily-kinesthetic, naturalist, interpersonal, and intrapersonal – formal schooling favors linguistic and logical-mathematical. Gardner believes that educators should fashion teaching and learning in a way that provides students who have an array of styles opportunities to learn and demonstrate what they have learned in ways that utilize their strengths. (Gardner, 2000.) Technology in the classroom is one way to do this because it can make materials vivid, easy to access, and provide a rich array of experiences for students. Using computers can address the multiple ways of knowing that humans

possess and allow teachers to create challenges that engage a full range of learning styles. (Gardner, 2000; O'Connor, n.d.)

Veenema and Gardner (1996) wrote that educators should try to teach in ways that are consistent with, or stretch, individuals' current mental representations. They believe individuals should be given opportunities to share their understanding using media and representations that make sense to them. Veenema and Gardner further believe that technologies like the CD-ROM that are capable of displaying images and text can show material from different perspectives and allow students to come up with their own interpretations and justifications of information. This type of media can assist students in developing deeper meanings. As a result, the students should be provided new ways of demonstrating what they have learned. (Veenema & Gardner, 1996.)

Likewise, Ross and Schulz (1999) believe the Web can be a powerful learning tool to provide new learning opportunities to various types of learners. Online animations, clickable diagrams, and video clips can increase user interactivity for visual learners. Recorded lectures and audio passages from poems and books can serve the auditory learner. Online experiments, moveable objects, and interactive simulations meet needs of kinesthetic learners. Other types of learners can benefit from chat rooms, discussion groups, online glossaries, video case studies, and online PowerPoint slides.

VI.C. Learning Objects

The Internet has created a multitude of teaching opportunities for educators. Resources abound on the World Wide Web and teachers can piece together lessons using elements from multiple sources. A high school biology teacher doing a lesson on frogs, for example, may show a video clip from a web site of frogs in their natural habitat. They may then have students participate in a virtual frog dissection on the World Wide Web before attempting an actual dissection in the lab. The teacher may conclude by having students create a PowerPoint presentation about the adaptations of frogs they observed during dissection that help them survive in their natural habitat.

A virtual frog dissection is an example of a learning object. Learning objects are digital resources educators can use to aid students in grasping complex ideas. Learning objects are digital (often web-based), self-contained, and can be reused to support learning. Each learning object is small enough to fit into a larger activity, unit, or course. Learning objects are the basic building blocks of an activity or lesson and can be grouped or stand alone. Types of learning objects are simulations, animations, assessments, case studies, and demonstrations. (Wiley, n.d; Wisc-Online, 2005.)

Learning objects have many benefits that include their portability, adaptability, and ability to be used in a variety of learning environments across multiple disciplines. They are self-directed, as students can access them on their own time, at their own pace, and repeat them as many times as desired. Learning objects can meet the needs of multiple types of learners with features such as video, sound, text, and manipulation or interaction.

Educators have found that because learning objects break large concepts into smaller parts, they make information easier for students to grasp. (Wisc-Online, 2005.)

Wisc-Online is the Wisconsin Online Resource Center, a web site containing over 2,000 learning objects developed primarily by faculty from the Wisconsin Technical College System. Once users go through a simple registration process and log in, they have access to learning objects on a variety of topics. The most popular learning object on the site is “A Typical Animal Cell,” where learners identify the parts of an animal cell and its organelles. When the object is opened, a colorful cell diagram appears on the computer screen. As the cursor is moved over various parts of the diagram, the name of the part is highlighted and a description appears. As a review, various parts of the cell are highlighted and users must identify the name of the part from a list. (Wisc-Online, 2005.)

The learning object concept is important in this study because new objects can be created to meet the needs identified by teachers surveyed or existing objects can be sought to fill teachers’ needs and housed by LEAF in a digital library for easy access.

VI.D. Universal Design for Learning

In a book published by the Association for Supervision and Curriculum Development, Universal Design for Learning (UDL) is described. UDL is an approach to teaching that includes the use of digital resources to individualize the criteria for student success, modify teaching methods, and allow new means of student expression. The approach leaves behind the traditional classroom model of a teacher in front of the class imparting

truth and then using a test to see if students understood the material. This traditional model has always posed a problem for some students, and with increasing diversity in student needs, the number of struggling students rises. (Rose & Meyer, 2002, p. 7.)

Teachers can choose materials and methods that either enhance opportunities for student learning or create barriers. If teachers understand how students learn they can choose new technologies to support diverse student needs. (Rose and Meyer, 2002, p. 8.) Traditional media for teaching includes speech, text, and images – because they are so ingrained in teaching methods and curriculum, their use is rarely questioned. With a wealth of digital resources now available, teachers have more opportunities to be creative in meeting students’ needs. Different types of media have different strengths and weaknesses, which should be carefully considered. The suitability of different media should match the desired instructional goal. (Rose & Meyer, 2002 , p. 41.)

Consider the use of Dr. Martin Luther King’s “I Have a Dream” speech in a classroom setting. A teacher could hand out a printed copy of the text for students to read. Students could study the words used and the power behind them. If the speech was played to students as a sound clip, they could hear Dr. King’s vocal inflections, pauses, volume, and pitch as tools used to convey a powerful message. The speech could also be viewed as a video clip so students could analyze body movement, facial expression, and gestures. Each format might give students a new perspective on the famous speech. The various formats would also be received differently depending on each students’ personal learning style. (Rose & Meyer, 2002, p. 43.) The use of technology and digital resources allows

teachers to present information to students in a variety of formats and meet the needs of many types of learners. Digital media includes text, audio, and video, but it is flexible enough to go even further.

Digital media is versatile and can display content in a variety of formats. For example, text and video could be used together or sound and text can be combined. Media can be manipulated on a computer. Text and images can be made larger or smaller, sound and graphics can be turned on or off, and software can turn text to speech and vice versa. Some digital media can also be marked by students and teachers. Text can be highlighted, deleted, expanded, and modified. Another benefit of digital media is that it can be shared from teachers to students, from students to students, and from classrooms to classrooms on a global scale. All these digital media options support Universal Design for Learning and ultimately benefit students by providing a multitude of options to meet individual needs. (Rose & Meyer, 2002, p. 64-66.)

VII. Summary

Current studies and literature highlight the benefits of digital resources in the classroom that provide students with rich and meaningful learning experiences. This coincides with current learning theory that finds students retain more when they are allowed to learn in ways that make sense to them. Existing technology allows learning materials to be created in a digital format that can be distributed to educators in many ways. The realm of K-12 forestry education, especially Wisconsin's LEAF Program, can enhance teachers' use of educational materials through the creation of new digital resources.

CHAPTER THREE METHODOLOGY

I. Introduction

II. Subproblem 1

A. Survey Development

- 1. Rationale of Survey Methods**
- 2. Questionnaire Design**
- 3. Questionnaire and Associated Materials**
- 4. Survey Review**
- 5. Survey Pilot**
- 6. Survey Population**

B. Survey Implementation

- 1. Survey Process**
- 2. Response Rate**

C. Data Analysis

III. Subproblem 2

IV. Summary

I. Introduction

To address the goal of this study and determine what type of digital resources teachers felt would enhance their use of the LEAF Lesson Guide, a survey was conducted of all teachers who had taken a LEAF workshop prior to September 1, 2005. A mailed questionnaire was determined to be an effective tool to gather survey data within the project budget. The questionnaire was designed using current research recommendations and was reviewed for validity by multiple individuals. A pilot of the survey was used to further refine the questionnaire. A strict survey implementation process and timeline was developed to maximize response rate. Objectives for each question on the questionnaire were identified and aligned with the type of data analysis best suited to provide the desired information.

II. Subproblem 1

A) Develop a survey for teachers using the LEAF Lesson Guide to determine what type of digital materials they believe would enhance their use of the Guide.

II.A.1. Rationale of Survey Methods

Survey research is a powerful, scientific tool that can be used to gather accurate and useful information. Surveys are done to find out the characteristics, behavior, or opinions of a particular population. If done successfully, a survey can produce sound data that can be translated into valuable information. (Salant & Dillman, 1994, p. 9-11; Scheuren, 2004.) A survey is conducted by asking people questions and tabulating their answers. Types of surveys include interviews, focus groups, and questionnaires.

This study utilized a questionnaire as the survey instrument. The questionnaire was administered to all teachers who received a LEAF Lesson Guide by taking a LEAF workshop between July 1, 2003 (first LEAF workshop offered) and September 1, 2005. Mail surveys have several strengths such as the comparatively low amount of resources required to conduct them versus face-to-face or telephone surveys. They are generally easier for the novice researcher to conduct than other types of surveys. Mail surveys benefit the recipient in that they provide a sense of privacy. They also reduce biases that may be imposed by an interviewer and reduce the tendency for recipients to provide answers that they think the interviewer wants to hear, rather than their actual thoughts. (Salant & Dillman, 1994, p. 35-36; Scheuren, 2004.)

Weaknesses of mail surveys include the possibility of nonresponse. People with a greater interest in the topic of the survey will be more likely to respond. (Salant & Dillman, 1994, p. 36-37; Scheuren, 2004.) To increase response rate in this study, personalized letters were sent with the questionnaire, graphic design was user-friendly, follow up mailings were sent, and incentives were offered.

Another weakness of mail surveys is that the researcher cannot control what happens to the surveys once they are mailed. There is no guarantee that the survey will reach the intended recipient. (Salant & Dillman, 1994, p. 36-37.) To reduce the likelihood of this occurring, a reminder was sent via email eight days after the initial questionnaire mailing. This served as a second means for ensuring the survey information reached the intended recipients. Additionally, the questionnaire mailing occurred within one month of another LEAF mailing to the same group of people. Although not related to this study, this LEAF mailing helped to verify and correct addresses of those on the mailing list, therefore increasing the likelihood of the survey reaching the intended recipients.

A third weakness of mail surveys is that the researcher cannot control whether the questionnaires are filled out completely before they are returned. (Salant & Dillman, 1994, p. 36-37.) A well designed questionnaire can help to counteract this. (Salant and Dillman, 1994, p. 102-103.) The questionnaire for this study was designed following guidelines in Salant and Dillman's book, *How to Conduct your own Survey* to reduce the likelihood of respondents returning incomplete surveys.

II.A.2. Questionnaire Design

According to Salant and Dillman (p. 102), people respond to mail surveys when they think the effort of filling out a questionnaire is worth their time. The questionnaire cannot be too long or difficult. Mail questionnaires must stand on their own because there is no researcher or interviewer to present them. People avoid cluttered pages. They prefer minimal instructions laid out clearly. Salant and Dillman (p. 103-121) recommend that a questionnaire be printed in booklet format on folded white legal paper. The front cover should be attractive, stimulating, interesting, and show that someone has worked hard to develop the questionnaire. Elements of the front cover include an informative title, illustration, study's sponsor, and return address. All questions on the inside should relate to the theme of the study, the flow of the questions should be easy to follow, and the pages should contain sufficient white space. The back cover should contain space for the recipient to make comments and include a thank you for filling out the questionnaire.

II.A.3. Questionnaire and Associated Materials

The questionnaire developed for this study consisted of two sections. The first section included questions that asked for a response on a Likert-type scale as well as open-ended questions. Eleven questions were written to gather information about the respondents' perceptions and use of digital resources. Some of the questions contained multiple parts. The second section of the questionnaire consisted of five multiple choice and short answer demographic questions. One question related to the respondents' desire and ability to pilot and provide feedback on a sample set of digital materials in a given timeframe. Another question asked about the type of gift certificate the respondent would

prefer if they were chosen to receive one of the three incentive gifts given away to survey participants.

Institutional Review

Research conducted at the University of Wisconsin-Stevens Point must follow protocol established by the Institutional Review Board for the Protection of Human Subjects (IRB). An initial training must be taken online by all persons wishing to conduct research that includes human participants. An application must then be submitted to the IRB committee along with a proposal abstract, description of the study, sample questions, and sample statement of participant rights. After the draft questions for the survey questionnaire were developed for this study, they were submitted along with the other required materials to the IRB for review. Permission was granted to use the questions as written and proceed with the survey. Per University requirement a statement about participant rights was included in the survey mailing. (See Appendix documents A, B, C.)

II.A.4. Survey Review

Four members of the LEAF staff (one of whom is also on the graduate committee) and the graduate committee for this study reviewed a draft of the questionnaire, cover letter, and IRB insert. All the reviewers were asked to comment on readability, flow, and content. They were also asked how well the potential answers for each question appeared to match the objectives of the question. To assist in this process, the researcher provided the reviewers with review instructions and a list of the questions and the objective for including each in the survey. (See Appendix documents D, E, F.) Additionally, reviewers

were asked to evaluate two types of validity: face validity, or whether the questionnaire looks valid to those who take it, and content validity, which relates to whether or not the questions address the needs of the study. (Trochim, 2002.) The graduate committee was given an additional task of determining if each question served the overall objectives of the research study.

II.A.5. Survey Pilot

After the initial review, the questionnaire was piloted with five teachers from the survey database before being sent to the larger survey population. The pilot group consisted of those teachers who had responded promptly and effectively to previous requests by LEAF staff for feedback on other projects. This was done to ensure efficient feedback and honest, thoughtful comments. The researcher believed that randomly selected teachers would be less likely to respond promptly and as effectively as teachers who communicated with LEAF Program staff on a regular basis. The researcher contacted the pilot teachers via email to request their participation and to explain the purpose and execution of the questionnaire pilot. (See Appendix document G.) As incentive and a thank you for participation, all the pilot teachers were mailed a book titled, *One Hundred Years of Wisconsin Forestry: 1904-2004*. The thank you package, including a handwritten note on LEAF stationery, was mailed to pilot participants after their surveys and comments were returned.

The pilot mailing included:

- a cover letter similar to that sent with the actual survey but modified to provide instructions to pilot participants

- a copy of the University of Wisconsin-Stevens Point Internal Review Board (IRB) insert explaining research participants' rights
- a copy of the questionnaire
- a form for comments on the questionnaire
- a postage paid reply envelope

The pilot teachers were sent a letter asking them to complete the questionnaire along with a feedback form to collect information about confusing wording and misleading questions. (See Appendix documents H, I.) Pilot participants were given two weeks to respond. Once returned, the questionnaire was analyzed to determine if the responses to the questions matched the type of responses intended by the researcher. Information on the comment form was also used to help determine if modifications to the survey were necessary. It was determined prior to the pilot that if the questionnaire changed significantly, answers to the questions from the pilot teachers would not be included in the final results and the pilot participants would be sent a second survey with the rest of the participants. If the questionnaire did not change significantly, the pilot teachers' answers would be included in the results and they would not be asked to fill out the questionnaire a second time.

II.A.6. Survey Population

The survey population consisted of K-12 classroom teachers in Wisconsin who received the LEAF Lesson Guide through a LEAF training between July 1, 2003 and September 1, 2005. The population represents the total number of K-12 classroom teachers in Wisconsin who received the LEAF Lesson Guide prior to September 1, 2005.

For the purpose of this study, a LEAF training is a workshop, course, or in-service taught by LEAF staff or adjunct faculty. Between July 1, 2003 and September 1, 2005, LEAF trainings varied in length and format but had these common factors:

- Background information on Wisconsin's forests
- Overview of the LEAF Lesson Guide
- Model teaching of LEAF Lessons

All participants received a printed copy of one unit of the LEAF Guide along with a CD-ROM containing the other units.

II. Subproblem 1

B) Implement the survey.

II.B.1. Survey Process

The basic procedure for conducting a mail survey includes four steps:

- 1) Send all members of the sample a personalized advance letter notifying them that they have been chosen to participate in a survey and they will be receiving a questionnaire.
- 2) Send the questionnaire, including a personalized cover letter and stamped reply envelope, approximately one week after the initial letter.
- 3) Send a follow-up postcard thanking those who have already responded and requesting response from those who have not. This should be mailed four to eight days after the questionnaire.
- 4) Send a new personalized cover letter, questionnaire, and stamped reply envelope to those who have not yet responded. Making repeated, personalized, and well-timed contact with survey participants sends the message that their participation is essential to

the success of an important study. The more contacts made with people, the higher the response rate is likely to be. (Salant & Dillman, 1994, p. 138-147; Scheuren, 2004.)

This study utilized a four-step survey process modified to meet the financial and organizational reality of the LEAF Program based on Salant and Dillman's (1994) recommendations.

1) **Advance Notice** - In lieu of an advance letter notifying survey participants of an upcoming mailing, teachers were notified of the survey by two alternate means. In December of 2005, the entire survey population received a mailing from the LEAF Program. The mailing included a newly developed CD-ROM of the entire LEAF Guide, as well as a flyer with general program information. One section of the flyer was devoted to explaining the upcoming survey and invited participants to respond with an opportunity to have their name put in a drawing for a prize. (See Appendix document J.) Also in December of 2005, the LEAF Program's quarterly electronic newsletter was distributed via email. The newsletter contained a section with similar information to that on the CD mailing flyer explaining the upcoming survey and inviting teachers to participate. All of the teachers in the survey population for which an email address is known received the electronic newsletter. (See Appendix document K.)

These two methods of advance notice were used in part due to the limited project budget and also because they are the traditional means by which the LEAF Program communicates with teachers. It was determined that of the four steps in the survey

process, the advance notice was one that could be modified without significant negative impact on survey response.

2) **Survey Mailing** - The survey mailing for this study was sent to participants via First Class Mail from the University of Wisconsin-Stevens Point mailroom. Teachers' school addresses were used whenever possible. Home addresses were used as the alternative.

The mailing consisted of:

- a cover letter explaining the purpose of the survey, return date, and incentives for completing and returning the questionnaire
- an IRB letter explaining the purpose of the survey and the benefits and risks involved
- the questionnaire
- postage paid reply envelope

Survey recipients were given an incentive beyond that of just assisting with the research project for returning the questionnaire. If participants chose, they could have their name entered into a drawing for one of two \$50 gift certificates of their choice from REI, Recreation Equipment, Inc.; Acorn Naturalists, teaching supplies; or Forestry Suppliers, Inc., forestry equipment. The incentive was offered in appreciation of teachers' participation, while serving to increase response rate. Based on surveys of teachers done by the LEAF Program in 2002 and 2005 where a similar incentive was offered, gift certificates were found to be an item valued by teachers.

Research shows that monetary incentives are an effective means to increase survey response. Generally, the larger the value the incentive has, the greater the increase in response. Monetary incentives are also less likely to bias response than other types of

rewards such as rulers or bookmarks which do not have universal appeal. Participants who have no use for a particular reward may be less likely to respond. Most studies indicate that including monetary incentive in the survey mailing is most effective. (Salant & Dillman, 1994; *Survey Incentives...; Why Use an Incentive...*) Although an attractive idea, offering a monetary incentive to all participants of the survey was not within the range of this project's budget.

Survey recipients were given two weeks to complete the questionnaire and return it to the LEAF office using a reply envelope or answering the questions online via a web form. A web site address to access the form was provided in the cover letter along with a password for accessing the web form to prevent non-survey participants from filling out the survey. The questions on the web form were identical to those on the paper questionnaire.

The online survey form was chosen as an additional delivery method for several reasons. Web surveys can increase the accuracy of responses with forms designed to only allow data to be entered in the correct place and which require participants to enter all specified information. Online surveys are relatively inexpensive to design and administer. They can also add flexibility and save time with data entry, since information is received in electronic form and does not have to be reentered into a computer. (Nesbary, 2000, p. 42.)

3) **Follow up Reminder** - An email was sent to all survey participants for whom an email address was known one week after the initial mailing. The email thanked participants who had already returned the questionnaire and reminded the others of the benefits of participation and deadline for response.

Email was used as the means for sending the follow up reminder for two reasons. First, it was less expensive than sending a paper mailing. In addition, it offered participants another means for responding to the questionnaire. Studies related to email survey response show mixed results. Response time tends to be quicker than with traditional mail surveys, but response rate with email is not necessarily higher than with traditional mail surveys. (Nesbary, 2000, p. 42.) By giving participants three options of returning their questionnaire, the expectation was that response rate would be maximized as much as possible, while reducing the bias associated with any one option.

4) **Second Survey Mailing** - Two weeks after the initial survey was distributed, a second mailing was sent. The total survey population did not receive the second mailing due to budget constraints. To determine who received the second mailing, the following method was used. Those people who responded to the first survey and provided their name and contact information were noted in the survey database as having responded. This group was eliminated from the possibility of receiving the second mailing. The remaining people in the database were those who had not responded or those who responded anonymously. From this population, a random sample totaling fifty percent of the initial survey population was chosen. This group received a second mailing identical to the first

with the exception of a modified cover letter and a survey booklet printed on green paper instead of white. Participants were still eligible for the incentive drawing and were given a week and a half to return their questionnaire via traditional mail or web form.

II.B.2. Response Rate

Various ways to increase response rate on mailed questionnaires are identified in research texts. Leedy and Ormond (p. 192-195) describe six simple guidelines for increasing response rate:

- 1) consideration of the survey timing
- 2) making a good first impression
- 3) motivating potential respondents
- 4) including a self-addressed envelope with return postage
- 5) offering the results of the survey
- 6) being gently persistent

Each of these six guidelines was followed for this survey. (Leedy & Ormond, 2005.)

- 1) The survey was sent in mid to late January. This is a time when teachers and students have returned to a routine schedule following the holidays and generally does not overlap with statewide testing.
- 2) A good first impression was made with a well-written cover letter and well-designed questionnaire.
- 3) Motivation for participating in the survey included the gift certificate incentive and participants having a voice in materials being developed for their use.

- 4) The survey included a self-addressed postage paid envelope. Respondents also had two additional means of responding to the questionnaire using the web form or email.
- 5) There was an offer for participants to receive the results of the survey if they so chose.
- 6) Participants were gently and persistently encouraged to respond through two advance notifications, a survey mailing, an email reminder, and a second survey mailing.

II. Subproblem 1

C) Summarize teachers' responses to the survey.

Data Analysis

Quantitative methods are used to establish, confirm, or validate relationships among data.

The information gathered is used to develop generalizations that contribute to a theory.

Descriptive quantitative research explores possible correlations among two or more phenomena. (Leedy & Ormrod, 2005, p. 179.) Qualitative research methods are used to better understand complex situations. (Leedy & Ormrod, 2005, p. 95.)

Data from the questionnaires was coded and entered into a Microsoft Access database created for this study. Questions that required participants to respond on a Likert-type scale were analyzed quantitatively using statistical software. Where appropriate, data from two or more questions was correlated to establish relationships. Open-ended questions were analyzed qualitatively and trends in the data were identified.

III. Subproblem 2

Provide recommendations for the creation of digital materials that will enhance teachers' use of the LEAF Lesson Guide.

Recommendations for the creation of digital materials that will enhance teachers' use of the LEAF Lesson Guide were based on three factors: the results of the survey, the research conducted for the literature review portion of this study, and the researcher's experience working as a Forestry Education Specialist with the LEAF Program for nearly five years. The recommendations include:

- suggestions for the type of digital materials that should be created
- description of how the digital materials will enhance teachers' use of the LEAF Lesson Guide
- suggested means of distribution
- prioritization of digital material creation

The survey results and recommendations were written into a report and presented to the LEAF staff. The researcher will serve as a reference to answer questions and provide guidance in the development of digital materials beyond the completion of this research project.

IV. Summary

Several planning steps were taken to ensure the success of this study. The mailed questionnaire used to gather survey data was carefully designed, reviewed, and piloted to reduce potential flaws and ensure the information gathered would be useful. Developing an organized procedure for implementing the survey maximized the response rate. Clearly identifying the objectives for each question on the questionnaire provided the

opportunity to predetermine how each question would be analyzed – quantitatively or qualitatively to extract the most useful information from the data.

CHAPTER FOUR

RESULTS

I. Introduction

II. Subproblem 1

A. Survey Development

- 1. Rationale of Survey Methods**
- 2. Questionnaire Design**
- 3. Questionnaire and Associated Materials**
- 4. Survey Review**
- 5. Survey Pilot**
- 6. Survey Population**

B. Survey Implementation

- 1. Survey Process**
- 2. Response Rate**

C. Data Analysis

III. Summary

I. Introduction

This chapter presents the survey implementation process and results. Included are the timeline for survey creation, the objectives and purpose for each question on the questionnaire, the review and pilot process used to refine the survey materials, and information about the survey population. A timeline for survey implementation is included along with details about the process used to conduct the survey. Along with a summary of the survey responses, an explanation of the quantitative and qualitative methods used for evaluating survey data is provided as well.

II. Subproblem 1

A) Develop a survey for teachers using the LEAF Lesson Guide to determine what type of digital materials they believe would enhance their use of the Guide.

To facilitate the development of the survey, the following timeline was utilized:

Table 4.1: SURVEY DEVELOPMENT TIMELINE	
Task to Complete	Date of Completion
Complete online Institutional Review Board (IRB) training	10/19/05
Research good survey techniques/questions	11/13/05
Create questionnaire number one	11/15/05
Have graduate committee chair review questionnaire number one	11/17/05
Create materials/do paperwork for IRB	sent 11/18/05
IRB review process	approval 11/28/05
Finalize materials for first survey mailing	12/09/05
Have LEAF staff review materials for first survey mailing	12/22/05
Have graduate committee review materials for first survey mailing	12/29/05
Modify materials for survey number one based on comments	12/29/05
Develop coding system for survey mailing number one	12/29/05
Identify pilot teachers for survey, email invitation	1/03/06
Prepare survey mailing, guidelines, and feedback form for pilot teachers	1/09/06
Send survey materials to pilot teachers for feedback	1/09/06
Gather feedback from pilot teachers	1/27/06
Develop online form for questionnaire	1/18/06
Create database for questionnaire (program assistant created)	1/18/06
Modify survey materials based on pilot teacher feedback	1/26/06
Print survey number one materials/prepare mailing	1/31/06
Test online questionnaire with LEAF staff	2/08/06

II.A.1. Rationale of Survey Methods

Using a mailed questionnaire as a survey instrument has inherent weaknesses as described in Chapter 3. One weakness relates to the proportion of responses related to survey topic interest. Although efforts were made to ensure a high response rate, some participants did not respond. One must be cautious when extrapolating the data to the entire population of teachers who have taken a LEAF workshop. It could be assumed that teachers who responded to the survey are most likely those who use or will be using the

LEAF Lesson Guide. The teachers who did not respond may have less interest in the LEAF Guide and therefore may not use it. It is also possible that the teachers who responded are more interested in digital resources than those who did not, and therefore support for digital resources appears to be greater than it actually is within the entire population of LEAF Guide users.

A second weakness described in Chapter 3 relates to the possibility of questionnaires not reaching the people for which they were intended. Only one known instance of this occurred in the study so this weakness did not have a significant impact on the study.

The third weakness described in Chapter 3 relates to the degree in which questionnaires are fully completed. Some questionnaires were returned with incomplete or unanswered questions. The data from these surveys was used. The data from answered questions was not compromised by unanswered questions because analysis was based on the number of responses for each question instead of the total population.

II.A.2. Questionnaire Design

The design of the questionnaire used in this survey closely followed recommendations from Salant and Dillman (1994). It was printed in black ink on legal size (8.5" X 14") paper and made into a booklet folded and stapled in the center. The booklet was printed on white paper for the first mailing and green paper for the second. The cover had a simple design that included the title of the study in a large leaf shape created from the LEAF Program logo. The program contact information and year of the study were also on

the cover. The inside pages had one inch margins and 11 point Arial font. Instructions for specific questions were placed in gray shaded boxes. Space was left on the back cover for additional comments and included a thank you note. The entire survey consisted of six back-to-back pages. (See Appendix document L.)

An online version of the survey was created in addition to the paper version. The web form was developed in Microsoft Front Page with design features similar to the LEAF web site. The questions on the web form were identical to those on the paper questionnaire. The LEAF staff was asked to test the web form for functionality and revisions were made as needed. A web address to access the form was given to participants in the cover letter of the survey mailing and the form. A password was given to participants for accessing the web form to prevent non-survey participants from finding and filling out the survey. Once participants entered the password, they were automatically sent to a page containing instructions and a link to the questionnaire. After survey participants filled out and submitted the online questionnaire they were sent to a confirmation page that indicated the form had been sent successfully and thanked them for their participation. When submitted, an email was sent to the researcher containing the participant's responses. (See Appendix documents M, N, O, P.)

II.A.3. Questionnaire and Associated Materials

Objectives and a purpose were identified for each question included on the survey. The objectives specified the information needed to meet the goal of the study. The purpose

validated the reason for including the question on the questionnaire. Following are a list of the questions and their respective objectives and purposes.

Question 1

1. Please indicate which of the following statements best describes your use of the LEAF Lesson Guide to teach students about Wisconsin's forests...[amount of guide use]

Objectives of question 1:

- To determine if respondents are using the LEAF Lesson Guide.
- To encourage respondents to return the questionnaire even if they are not using the LEAF Lesson Guide.
- To categorize Guide users into three groups – those who intend to use it, those who do not use it regularly, and those who use it at least once per school year.

Purpose of question 1:

- To increase response rate by getting non-Guide users to return their questionnaires.
- If respondents who use the Guide indicate that additional resources will increase their use of the Guide it gives strong evidence for the need to create digital materials.

Question 2

2. I teach students about Wisconsin's forests using the LEAF Lesson Guide...[number of times Guide is used]

Objectives of question 2:

- To find out how often respondents are using the LEAF Lesson Guide.

Purpose of question 2:

- To provide general information about the survey respondents.
- Comparisons will be made between the types of materials requested by each category of respondents in question two.

Question 3

3. I teach students about Wisconsin's forests using other resource materials in addition to the LEAF Lesson Guide...[list of other resource materials]

Objectives of question 3:

- To find out if respondents are teaching about Wisconsin's forests to students using materials other than the LEAF Lesson Guide.

Purpose of question 3:

- To provide general information about the survey respondents.
- To help respondents think about and distinguish between forestry education taught with the LEAF Guide versus other forestry education materials.

Question 4

4. To what degree would the following digital forestry education resources enhance your use of the LEAF Lesson Guide to teach students? Please indicate by checking the boxes below...[list of several types of digital resources]

Objectives of question 4:

- To generate a list of digital resource needs respondents have related to the LEAF Lesson Guide.

- To provide examples of digital materials so that questions 5-8 are better understood.

Purpose of question 4:

- If multiple respondents identify the same specific needs related to lessons in the LEAF Guide, emphasis will be given to the creation of digital resources to fill those needs.

Question 5

5. Please describe forestry-related resources that would enhance your use of the LEAF Lesson Guide. This includes materials that would enhance your students' understanding of forestry concepts. Be as specific and descriptive as possible. Describe as many as you can think of. Add additional pages if needed. [space for open answers]

Objectives of question 5:

- To find out what forestry education resources would enhance survey respondents' use of the LEAF Lesson Guide and student understanding of the concepts in the LEAF Lesson Guide. The open ended question is an opportunity for participants to brainstorm and dream big.

Purpose of question 5:

- To generate a list of all the possible forestry education materials that respondents feel would enhance their use of the LEAF Lesson Guide. The listed resources will be incorporated into recommendations for the LEAF Program.

Question 6

6. Are there any specific activities in the LEAF Lesson Guide that could be enhanced with digital materials? Please use the spaces below to list. Add additional pages if needed. [blank space for answers]

Objective of question 6:

- To provide respondents an opportunity to identify digital resources that would enhance a specific activity or lesson.

Purpose of question 6:

- To generate a very specific list of digital resources that could be created.
- Responses from question 6 will be compared to responses from questions 4 and 5 to determine if respondents want more general (enhance the whole Guide) or more specific (enhance specific lessons) resources.

Question 7

7. Overall, my use of the LEAF Lesson Guide would be enhanced if I had access to new digital forestry education resources that support activities in the LEAF Lesson Guide...[Likert-type scale]

Objectives of question 7:

- To determine if providing respondents digital forestry education materials would enhance their use of the LEAF Lesson Guide.

Purpose of question 7:

- If the majority of respondents answer not at all, fewer resources will be put toward the creation of digital resources to support the LEAF Lesson Guide. If

the majority of survey respondents answer a lot, the purpose of the study will be reinforced.

Question 8

8. If new digital forestry education resources were available to me, the number of times I use the LEAF Lesson Guide to teach students about Wisconsin's forests in one school year would...[Likert-type scale]

Objectives of question 8:

- To determine if additional digital resources would increase respondents' use of the Guide.

Purpose of question 8:

- If respondents' use of the guide would increase as a result of additional digital materials, the creation of materials is justified and more resources will be put toward their development.

Question 9 (Note: a new question 9 was added to the survey based on pilot feedback.

This question became number 10 on the questionnaire.)

9. For each of the items below, please check the box that indicates the type of access you have for viewing or printing educational materials...[list of computer resources and amount of access]

Objective of question 9:

- To find out what support resources respondents have access to.

Purpose of question 9:

- The resources available for use directly influence the types of digital materials that should be developed to benefit the maximum number of educators.

Question 10 (Note: a new question 10 was added to the survey based on pilot feedback.

This question became number 11 on the questionnaire.)

10. If you have computer(s) in your classroom for student access, how many do you have? [space for number]

Objective of question 10:

- To determine how many computers respondents' have access to in their classrooms for student use.

Purpose of question 10:

- If computers for student use are limited it will affect the type of digital resources that should be created.

The remaining questions were used to gather demographic information about the survey participants. The demographic information was used in data analysis to group respondents by unit used and grade level(s) taught.

Question 11 (Note: this became question 12.)

11. Which unit(s) of the LEAF Lesson Guide do you use to teach students? (circle all that apply) [list of LEAF Guide units]

Question 12 (Note: this became question 13.)

12. What grade level(s) do you teach? (circle all that apply) [list of grade levels]

Question 13 (Note: this became question 14.)

13. Please describe your role with students (e.g., science teacher, administrator, special needs teacher, etc.). [blank space]

The original design of this research study included the creation and pilot of a sample set of digital materials. For this reason, the following question was included on the questionnaire.

Question 14 (Note: this became question 15.)

14. Sample digital resources will be created for use with the LEAF Lesson Guide as a result of this survey. Pilot participants will teach a LEAF lesson, use the new sample materials, and provide feedback. A stipend will be provided. Would you be willing and able to participate in a pilot of the new resources in May of 2006? [yes or no]

After the survey was conducted, the project design was modified and the pilot of a sample was eliminated. This question would not have been part of the survey if the pilot of a sample not been included in the original research design.

The final section of the questionnaire related to the gift certificate incentive drawing.

Question 15 (Note: this became question 16.)

Would you like your name entered into the drawing to win one of the two \$50 gift certificates that will be given away? (*You must fill in the contact information below to be entered into the drawing*). [no or yes and choice of gift certificates]

Name

Name of School

Address of School

City

State

Zip

Best email address at which to contact you

Best phone number at which to contact you

Best time to call

II.A.4. Survey Review

The survey materials were reviewed by:

LEAF Staff

- Sterling Strathe, Program Director
- Sarah Gilbert, Forestry Education Specialist
- Jeremy Solin, School Forest Education Specialist
- Jessica Tomaszewski, Program Assistant

Graduate Committee

- Dr. Dennis Yockers (Committee Chair), Associate Professor of Environmental Education
- Dr. Brenda Lackey, Assistant Professor of Environmental Education and Interpretation
- Dr. Perry Cook, Professor of Education
- Sterling Strathe, LEAF Program Director

Changes to the survey materials based on LEAF staff and graduate committee review were mainly related to formatting, sentence structure, and the correction of grammatical errors. Some of the questions were reworded for the purpose of clarification. (See Appendix document Q.) The revised version of the questionnaire was reviewed by the graduate committee chair and approved as being valid and serving the overall objectives of the study.

II.A.5. Survey Pilot

The survey pilot was mailed on January 9, 2006 and responses were returned by January 27, 2006. The five survey pilot teachers were:

- Krisy Bogacz, Lena School District
- Dana Westedt, Reedsburg School District
- David Scholz, Phillips School District
- Michael Johnson, La Crosse School District
- Tracy Cassidy, Crandon School District

Based on pilot comments, one question on the questionnaire was reworded and an additional question was added. Two modifications were made to the way the demographic information was gathered as well. (See Appendix document R.) Before making final changes to the questionnaire, the modifications were reviewed by one member of the LEAF staff and the chair of the graduate committee.

The data from the pilot teachers was important and warranted inclusion in the final survey results. To prevent the pilot teachers from having to fill out the entire questionnaire a second time, they were sent an additional questionnaire at the same time as the larger population with a modified cover letter explaining the changes and asking

them to fill out only the modified and new questions. (See Appendix document S.) This ensured that the pilot teachers had an opportunity to respond to all the same questions as the general survey population. Note: One of the pilot teachers never returned the pilot questionnaire. This person was mailed a questionnaire with the general survey population and it was returned completed.

II.A.6. Survey Population

The total number of teachers who took a LEAF workshop between July 1, 2003 and September 1, 2005 was 593. Six teachers were eliminated from the survey because they lived outside Wisconsin. These people participated in a LEAF workshop and received the LEAF Lesson Guide under special circumstances. The LEAF Program's target audience for which program funding is received is limited to teachers in Wisconsin. Resources specific to non-Wisconsin audiences are not created. Because the out-of-state teachers did not fit the profile of the LEAF target audience, they were eliminated from the survey. There was one teacher who lives in Illinois, but teaches in Wisconsin. This person fit the profile of teaching Wisconsin students about Wisconsin's forests and was included in the survey. The total survey population after removals was 587.

There are two study limitations related to the manner in which survey participants received their LEAF Guides. 1) Not all participants received their Guide at the same type of workshop taught by the same instructor. Participants may have taken a credit course, workshop, or in-service taught by one of 12 potential instructors. Instructor's teaching styles vary, as does the length of LEAF trainings. 2) Based on when they participated in a

LEAF training, not all survey participants had their LEAF Guide for the same amount of time. The depth of guide use and number of additional forestry education resources used may vary with the length of time someone has a LEAF Guide. The researcher believes that neither of these limitations compromised the survey data to a significant degree.

II. Subproblem 1

B) Implement the survey.

To facilitate survey implementation the following timeline was utilized:

Table 4.2: SURVEY IMPLEMENTATION TIMELINE	
Task to Complete	Date of Completion
Mail questionnaire number one	2/07/06
Create email reminder for questionnaire number one	2/13/06
Data entry	Ongoing
Send email reminder for questionnaire number one	2/15/06
Collect questionnaire responses	Ongoing
Prepare survey mailing number two	2/20/06
Send second mailing	2/20/06
Collect questionnaire responses	3/14/06 deadline
Complete Data entry	3/17/06

II.B.1. Survey Process

This study utilized a four step survey process modified to meet the financial and organizational reality of the LEAF Program based on Salant and Dillman's (1994) recommendations.

1) **Advance Notice** - Two types of advance notice were used to inform participants of the upcoming survey. One was a description of the study on a flyer inserted into a mailing being sent to all previous LEAF workshop participants. The other was a description of the study in an electronic LEAF newsletter that all past workshop participants are sent via

email. A comment from a survey participant illustrates the benefits of advance notice, “Also, it was an excellent prompt to have sent out notice in advance that you would be asking about the guide as that was my incentive to look at it right away.”

2) **Survey Mailing** - Prior to mailing the survey, contact information for the survey participants was pulled from the LEAF database by the LEAF Program Assistant and given to the researcher in a Microsoft Excel spreadsheet. The database was reviewed by the researcher to correct misspellings and incomplete addresses, increasing the likelihood of mail getting to the recipients as efficiently as possible. Mailing labels were created from the database. The labels were 3 1/3" X 4" white mailing labels with the LEAF logo printed in color in the upper left corner. The LEAF return address was centered at the top of the label and below a black line the recipients' name, name of school, and address were printed.

The survey mailing for this study was sent to participants via First Class Mail from the University of Wisconsin-Stevens Point mailroom in a 9" X 12" manila envelope. Teachers' school addresses were used for all but 18 survey participants. A home address was used for the others. The mailing consisted of:

- a cover letter explaining the purpose of the survey, return date, and incentives for completing and returning the questionnaire (printed on LEAF letterhead) (See Appendix document T.)
- an IRB letter explaining the purpose of the survey and the benefits and risks involved (ivory colored paper) (See Appendix document C.)

- the questionnaire (white paper) (See Appendix document L.)
- postage paid reply envelope (3 7/8" X 8 7/8" white envelope with UWSP logo and UWSP address. "S. Buchholz" with LEAF address was added in recipient line.)
(See Appendix document U.)

Survey recipients were given two weeks to complete the questionnaire and return it to the LEAF office. Survey recipients had the option to return the questionnaire using the reply envelope or to answer the questions online via a web form.

3) **Follow up Reminder** - An email reminder was sent to participants who had not responded to the mailed questionnaire or who had responded anonymously. The email thanked participants who had already returned the questionnaire and reminded the others of the benefits of participation and deadline for response. (See Appendix document V.) The emails were sent individually with each person's name in the greeting. If both a home and school email address were known, an email was sent to each address.

Table 4.3: EMAIL REMINDER SUMMARY	
Total survey population (including pilot teachers)	587
Number of paper questionnaires returned prior to email reminder (for which a name was included)	72
Number of people with no known email address	28
Number of emails sent	487
Number of emails that came back undeliverable	42
Number of emails believed to have reached participants	445

Consistent with research on email survey response, the rate of reply to the emails sent was quicker than with the mail surveys. The majority of people who responded to the email did so within one or two days, many responding almost immediately after receiving

the email. Based on comments returned via email, this was a successful follow up method since some participants never received the mailed paper version. Select comments related to the email reminder include:

- “I finished it online. Must have missed it in the mail.”
- “I never did see the other survey that you referred to.” [The paper version.]
- “I changed buildings this year and sometimes don’t get all my mail. I did not receive a survey. I will answer the survey on line. Sorry for the mix up.”
- “The repetitious emails about completing it got me to sit down and do it...Life just gets so busy!”

4) **Second Survey Mailing** - Two weeks after the initial survey mailing, a second paper mailing was sent. The total survey population did not receive the second mailing. A total of 300 questionnaires were resent. To determine who received the second mailing, the following method was used. The 72 participants who responded to the first survey and provided their name and contact information were eliminated from the possibility of receiving a second mailing. The 65 participants who did not receive an email reminder because an address was unknown or the email sent could not be delivered were automatically sent a second mailing. The remaining people in the database were those who had not responded or those who responded anonymously. From this population, a random sample of 245 people was chosen. Assistance in determining a random selection technique was provided by the graduate committee chair. All the potential recipients in the database were sorted alphabetically by last name. Starting with the first record, two records were chosen, and then one was skipped. This pattern was repeated to the end of the database. The initial review of list generated 228 people. The remaining 7 were chosen in the same manner as the first starting at the beginning of the list with the remaining names. This group received a second mailing identical to the first with the exception of a

modified cover letter and a survey booklet printed on green paper versus white. (See Appendix document W.) Participants were still eligible for the incentive drawing and were given a week and a half to return their questionnaire via traditional mail or web form.

Table 4.4: SECOND SURVEY MAILING SUMMARY	
Total number of survey participants	587
Total number of questionnaires returned with contact information	72
Number of potential participants to receive a second mailing	515
Total number of questionnaires to be resent	300
Number of participants who were not contacted by email*	65
Remaining participants to be chosen	245
Total number of participants who did not respond to the first mailing and did not receive a second mailing	215

* There were actually 70 people who could not be contacted via email. When the email reminder was sent there were some messages that could not be delivered immediately due to participants having server-related issues. Delivery was delayed for several days. During this time the second mailing list was being generated. After the selection process for the second mailing was completed some of the delayed messages came back as undeliverable. The researcher chose not to redo the selection process because all of the participants in question had the potential of being chosen to receive a second mailing in the random selection process.

II.B.2. Response Rate

Prior to mailing the questionnaire the researcher and graduate committee chair discussed the desirable response rate. It was decided that a rate of 25% or higher would provide enough useable data to continue with the research study. The actual response rate of useable questionnaires was 42.8% (251 of 587 useable surveys).

Table 4.5: RESPONSE RATE SUMMARY	
Total number of surveys mailed	587
Number of surveys returned as undeliverable	2
Number of survey responses	256
Number of duplicate responses removed	2
Number of unusable survey responses removed	3
Total number of useable surveys	251

As a result of participants having multiple methods for returning the questionnaire, two people responded twice using different methods. These duplicate responses were removed. Three questionnaires were determined to be unusable due to the following reasons: one person had moved out of Wisconsin since taking a LEAF workshop, one person had not originally been mailed a questionnaire but received it from a coworker who had, and one person was registered for a LEAF workshop that had not yet occurred and was mailed a questionnaire in error. Data from the duplicate and unusable questionnaires were able to be removed because each of those participants provided their contact information. It is possible that there were unidentifiable duplicates from participants that responded anonymously. This is noted as a study limitation. It is likely that this limitation had minimal effect on the data analysis.

The following is a summary of the response rate by method used.

Table 4.6: RESPONSE RATE BY METHOD SUMMARY		
Method	Number	Percent of Total
Total number of surveys mailed	587	100%
Number of surveys returned by email	24	9.6%
Number of surveys returned by online form	80	31.9%
Number of surveys returned by mail	147	58.5%
		Percent of Mail Surveys
Number of first mailing surveys returned	113	45.0%
Number of second mailing surveys returned	34	13.5%

II. Subproblem 1

C) Summarize teachers' responses to the survey.

Data Entry

Data from the questionnaires was entered into a Microsoft Access database created for this study. (See Appendix document X.) A code number was applied to all possible responses for each question on the questionnaire. The database was developed to automatically assign coded numbers to each response. For example, if a participant's response to Question 2 was "occasionally," the database would convert it into a number 1 when entered into the database. Numerically encoded answers were necessary for statistical analysis of the data.

After all data was entered into the database, each answer was double checked by the researcher or LEAF Program Assistant. The data was also visually scanned and corrected as needed after it was entered into the database to eliminate obvious errors such as information entered in the incorrect field or missing numeric codes.

Incentive Give Away

The recipients of the two \$50 gift certificates were chosen randomly from 177 people who indicated they wanted to be entered into the drawing. Each person who returned a survey was given an automatic number by Access as the data was entered into the database. The automatic numbers of potential winners were entered into a table in SPSS 14.0. A random sample tool was then used to choose two of the numbers. Those numbers

were cross referenced with the Access database to locate the respondent's name and contact information.

Quantitative Analysis

Questions 1, 2, 3, 4, 7, 8, 9, 10, 11, 12, and 13 were analyzed quantitatively using SPSS 14.0. Portions of questions 3, 7, 8, and 9 containing comments were analyzed qualitatively. Where appropriate, data from two or more questions was correlated to establish relationships. It was especially important to correlate the unit used by survey respondents with each answer because any resources created as a result of this study should be developed in an age appropriate manner. Because the LEAF Guide is unit based, resources are generally created for users of particular units. Categorizing the data by unit also led to the appearance of trends for the use of particular resource types by differing unit users.

To statistically analyze the data in SPSS, the numerically coded responses from each individual question were transferred from the Access database into an SPSS table. The coded responses from question 12 (unit used) were also transferred into the SPSS table for each question. For questions 1, 2, 7, 8, 9, 11, 12, and 13 an overall response rate to each answer was generated along with a corresponding pie chart or bar graph. To analyze answers by unit used, each question's individual table that had been generated was divided. The subtables contained one of the possible answers for a question along with the participant's corresponding response to question 12 (unit used). Analysis was then done for each portion of each question based on unit used, resulting in the generation of

an associated pie chart or bar graph. To obtain the most comprehensive results, every answer to each question was analyzed a total of six times (once for each unit potentially used).

Qualitative Analysis

Questions 5, 6, and 11 along with the comments from questions 3, 7, 8, and 9 were analyzed qualitatively. According to Ritchie and Lewis (2003, pg. 219-220) making sense of qualitative data depends on both the method/tool used to categorize the data and the analyst's rigor, clarity, and creativity in his or her conceptual thinking. Therefore, one can assume that using an organized, systematic approach to analyzing the data will lead the researcher to reveal more meaning from the raw survey responses.

An analysis framework is widely used by qualitative researchers to facilitate data management and allows a researcher to move easily between abstract concepts and raw data. (Ritchie & Lewis, 2003, pg. 220.) To analyze qualitative data, analysis focuses on a few key questions the data will be used to answer. The steps for analyzing qualitative data include:

- 1) becoming familiar with the data, identifying recurring themes, and constructing an index (the analysis framework)
- 2) indexing (coding) the data
- 3) grouping similar data
- 4) summarizing the data including highlighting key comments

5) categorizing and refining information to find connections between ideas that originally appeared to be separate. To get a rough estimate of relative importance, the number of times a particular theme arises can be counted. The final step is to create a list of important findings that develops from categorizing and sorting the data. (Ritchie & Lewis, 2003, pg. 220-233; Taylor-Powell & Renner, 2003.)

For the questions in this study requiring qualitative analysis, the steps described above were used. First, the responses from each question were copied from the Access database into a Microsoft Excel table.

- 1) The answers for each question were read and reread and a list of possible topics was generated under which responses could be categorized.
- 2) Each topic was given a two to four letter code and those codes were applied to each response. Responses falling into more than one category were given multiple (up to three) codes. There was a space in the Excel table to include comments for future reference.
- 3) Responses were then grouped by their primary code.
- 4) Each group of responses with like codes was studied for similarities and summarized with a phrase. Responses with multiple codes were reviewed at this time to ensure their inclusion into more than one summary.
- 5) The summaries for each question were used to develop the recommendations for digital resource creation developed for the LEAF Program. Numerical ranking was given to emergent themes in some questions to show relative importance.

An example of the coding method used for this research can be found in Appendix document Y.

Question 5 required an additional step in the qualitative analysis process. Because it was a completely open-ended question, respondents could present multiple ideas in their answers. To account for this, each response was color coded, with each color representing a separate idea. Answers were then broken into parts and each idea treated as a separate piece of data for analysis.

Having questions that included both quantitative-type and qualitative-type answers illustrated a weakness of mailed surveys without follow up to resolve discrepancies. In question 7, two respondents indicated answers on the Likert-type scale that directly conflicted with their written comments. These respondents chose “disagree” that their use of the LEAF Guide would be enhanced with access to new digital forestry education resources. Yet, their written comments were, “I’m just starting more forestry lessons – any help would be appreciated,” and “Any new up-to-date resources, especially color prints, would keep the use of lessons fresh.” Both of these responses were not included in the analysis of question 7 because of the conflicting information.

Results

Complete analysis and results can be found in Appendix document Z. The following is a brief summary of results for each question.

QUESTION 1: Please check the following statement that best describes your use of the LEAF Lesson Guide to teach students about Wisconsin’s forests:

- I have never used the LEAF Lesson Guide to teach students about Wisconsin’s forests and do not intend to. *Please continue to question 16.*

- I have not yet used the LEAF Lesson Guide to teach students about Wisconsin's forests but I intend to. *Please continue to question 3.*
- I have used the LEAF Lesson Guide to teach students about Wisconsin's forests but do not do so every school year. *Please continue to question 3.*
- I use the LEAF Lesson Guide to teach students about Wisconsin's forests at least once per school year. *Please continue to question 2.*

Of the 251 people that responded to the survey, 90.8% indicated that they intend to use the LEAF Guide, use the LEAF Guide but not every year, or use the LEAF Guide at least once per year. Over half of the respondents (55.8%) use the LEAF Guide at least once per year.

QUESTION 2: I teach students about Wisconsin's forests using the LEAF Lesson Guide: (please circle one)

- Occasionally (1-2 lessons in a school year)
- Often (3-4 lessons in a school year)
- Frequently (5-6 lessons in a school year)
- Very Frequently (more than 6 lessons in a school year)

Of the 251 survey respondents, 140 or 55.8% indicated that they use the LEAF Lesson Guide at least once per year. Of those, 74.3% use it occasionally or often (between one and four lessons per year). Approximately a quarter (25.7%) of the respondents use the Guide for more than five lessons per year.

QUESTION 3: Other than the LEAF Lesson Guide and associated materials, I use the following resources to teach students about Wisconsin's forests: (check all that apply)

- | | |
|---------------------------------|---------------------------|
| a. None | g. Video tapes |
| b. Project Learning Tree | h. Web sites |
| c. Other lesson/activity guides | i. CDs |
| d. Reference books | j. DVDs |
| e. Story books | k. Other, please describe |
| f. Posters | |

The following numbers represent the percent of respondents (who use or intend to use the Guide) that use specific materials in addition to the LEAF Lesson Guide to teach students about Wisconsin's forests:

- Other lesson or activity guides = 53.0%
- Reference books = 47.8%
- Video tapes = 46.1%
- Posters = 45.7%
- Story books = 42.7%
- Web sites = 40.9%
- Project Learning Tree (PLT) = 40.1%
- Other materials = 20.7%
- DVDs = 17.7%
- CDs = 12.2%
- Only the LEAF Guide = 5.6%

QUESTION 4: To what degree would the following digital forestry education resources enhance your use of the LEAF Lesson Guide to teach students? Please indicate by checking the boxes below.

- 1 = Not at all
2 = Slightly
3 = Moderately
4 = Very much
? = Not sure what the resource is

Computer-based Resource

- | | |
|--|---|
| <input type="checkbox"/> Images for computer viewing | <input type="checkbox"/> Chatroom or discussion board for students |
| <input type="checkbox"/> Images for printing | <input type="checkbox"/> LEAF blog |
| <input type="checkbox"/> Maps for computer viewing | <input type="checkbox"/> Educational game |
| <input type="checkbox"/> Maps for printing | <input type="checkbox"/> Simulations or animations |
| <input type="checkbox"/> Posters for computer viewing | <input type="checkbox"/> Digital video |
| <input type="checkbox"/> Posters for printing | <input type="checkbox"/> Audio material (interviews, music, etc.) |
| <input type="checkbox"/> Scientific data | <input type="checkbox"/> Web site links |
| <input type="checkbox"/> Printable background information | <input type="checkbox"/> Ask an expert web page |
| <input type="checkbox"/> Printable lessons/activities | <input type="checkbox"/> Online tree identification key |
| <input type="checkbox"/> Printable resource lists | <input type="checkbox"/> Virtual field trip |
| <input type="checkbox"/> Chatroom or discussion board for teachers | <input type="checkbox"/> Citizen science monitoring (students enter data) |

The following numbers represent the percent of respondents (who use or intend to use the LEAF Guide) that indicated particular types of digital resources would be moderately or very useful to enhance their use of the Guide in teaching students about Wisconsin's forests:

- Printable lessons/activities = 86.3%
- Educational game = 81.5%
- Images for printing = 77.4%
- Online tree identification key = 76.9%
- Printable background information = 76.4%
- Web site links = 75.0%
- Simulations and animations = 73.6%
- Virtual field trip = 72.4%
- Maps for printing = 72.2%
- Images for computer viewing = 70.8%
- Digital video = 69.5%
- Maps for computer viewing = 67.1%
- Posters for printing = 64.5%
- Printable resource lists = 64.5%
- Ask an expert web page = 64.2%
- Scientific data = 63.1%
- Audio material = 51.6%
- Posters for computer viewing = 51.4%
- Citizen science monitoring = 42.6%
- Chatroom or discussion board for teachers = 25.8%
- LEAF blog = 17.3%
- Chatroom or discussion board for students = 15.6%

QUESTION 5: Please describe digital forestry-related resources that would enhance your use of the LEAF Lesson Guide. This includes materials that would enhance your students' understanding of forestry concepts. Be as specific as possible and list as many ideas as you can think of. Add additional pages if needed.

Survey respondents made a variety of suggestions for the type of digital resources that would be beneficial as well as specific topics to which the resources should relate.

Resource categories in order of most to least number of comments include video, online tree identification, digital images, maps, simulations, PowerPoint resources, educational

games, virtual field trips, GIS/GPS, printable lesson materials, WebQuests, audio materials, field activities, literature, independent research materials, ask an expert feature, animations, citizen science monitoring, scavenger hunts, teacher pages, *Wisconsin Forest Tales*, web site links, forestry individuals. Requests for materials related to specific subjects include career information, forestry information related to a wider variety of subject areas, and county-level forestry information.

QUESTION 6: Are there any specific activities in the LEAF Lesson Guide that could be enhanced with digital materials?

An array of suggestions was made for enhancing specific activities in the LEAF Guide.

The type of resource most requested was digital images to illustrate various topics covered in LEAF lessons.

QUESTION 7: Overall, my use of the LEAF Lesson Guide would be enhanced if I had access to new digital forestry education resources that support activities in the LEAF Lesson Guide.

Strongly Disagree
Disagree
Neutral
Agree
Strongly Agree

Comments:

Of the 217 respondents who use or intend to use the LEAF Guide, 61.9% agreed or strongly agreed that their use of the Guide would be enhanced if they had access to new digital forestry education resources. There is some variation based on the unit used as illustrated by Table 4.7 (next page). Select comments about digital resources in this

question include: “they help student understanding,” “they keep student attention,” “they make lesson preparation easier,” and “they give students independence.”

Table 4.7: QUESTION 7 RESULTS	
Unit used	Percent agreeing or strongly agreeing
K-1	55.6%
2-3	66.7%
4	65.0%
5-6	58.3%
7-8	64.3%
9-12	73.6%

QUESTION 8: If new digital forestry education resources were available to me, my use of the LEAF Lesson Guide to teach students about Wisconsin’s forests would:

Decrease
Remain the same
Increase
Not sure

Comments:

Of the 218 respondents who use or intend to use the LEAF Guide, nearly half (49.1%) indicated that new digital forestry education resources would increase the amount of time they use of the Guide. There is some variation based on the unit used as illustrated by Table 4.8. Select comments about digital resources in this question include: “it would be more user-friendly and I could be more effective with less time necessary to prep.”

Table 4.8: QUESTION 8 RESULTS	
Unit used	Percent indicating increased use
K-1	55.6%
2-3	47.2%
4	37.2%
5-6	50.0%
7-8	54.4%
9-12	60.4%

QUESTION 9: My comfort level in using digital resources for teaching students is:

Very Low
Low
Moderate
High
Very High

Comments:

Of the 219 respondents who use or intend to use the LEAF Guide, 88.5% indicated that their comfort level in using digital resources for teaching students is moderate to very high.

QUESTION 10: For each item below, please check the box that indicates the type of access you have for viewing or printing educational materials.

Rarely Available
Sometimes Available
Readily Available

- DVD player (for use with students)
- Black and white printer
- Color printer
- LCD projector and computer
- Computer with speed and memory acceptable to you
- Computer for your use in your classroom
- Computer(s) for students' use in your classroom
- Computer lab
- Internet for your use
- Internet for student use

Over 95% of the respondents who use or intend to use the LEAF Guide indicated that a computer in their classroom is sometimes or readily available to them for viewing or printing educational materials. Over 90% of those with computer access indicated that it had acceptable speed and memory. Nearly all of the respondents (97.8%) have access to the Internet and a black and white printer (98.6%).

The following numbers represent the percentage of respondents who indicated that the following are sometimes or readily available to them for viewing or printing educational materials:

- Internet for student use = 91.4%
- Computer lab = 91.0%
- DVD player = 85.2%
- LCD projector = 83.0%
- Color printer = 77.9%
- Computer(s) for student use in their classroom = 67.7%

QUESTION 11: If you have computer(s) in your classroom for student access, how many do you have?

Of 186 survey respondents who indicated the number of computers they have in their classroom for student access, 19.4% have no computer, 33.9% have one computer, 18.3% have two computers, and 5.4% have 20 or more computers.

QUESTION 12: Which unit(s) of the LEAF Lesson Guide do you use to teach students? (circle all that apply)

- K-1
- 2-3
- 4
- 5-6
- 7-8
- 9-12

There were more users of the 7-8 unit than any other unit as illustrated by Table 4.9. Of the 215 respondents who indicated the unit they use, 58 (27.0%) use more than one unit of the LEAF Guide.

Table 4.9: QUESTION 12 RESULTS	
Unit used	Number of respondents using
K-1	38
2-3	37
4	45
5-6	50
7-8	73
9-12	55

QUESTION 13: What grade level(s) do you teach? (circle all that apply)

- Kindergarten
- 1st grade
- 2nd grade
- 3rd grade
- 4th grade
- 5th grade
- 6th grade
- 7th grade
- 8th grade
- 9th grade
- 10th grade
- 11th grade
- 12th grade

Figure 4.1: Number of respondents by grade level taught

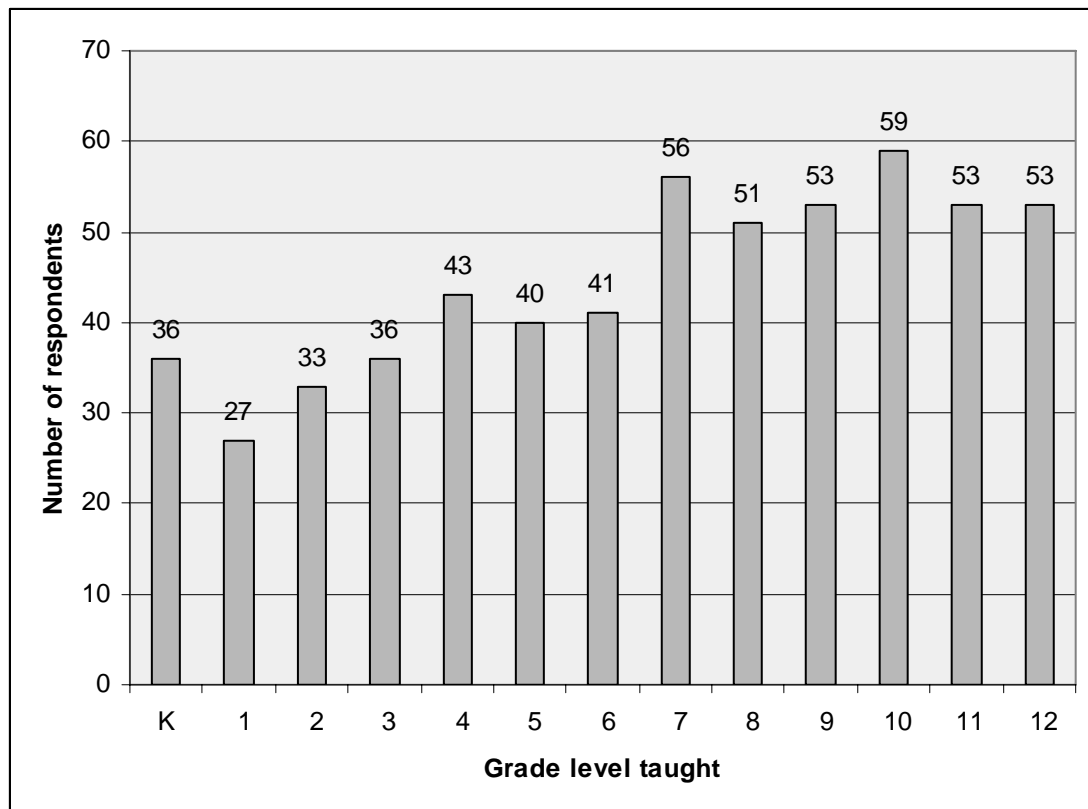


Figure 4.1 shows the number of survey respondents grouped according to the grade level they teach.

QUESTION 14: Please describe your role with students.

By grade

- 16 kindergarten teachers
- 4 first grade teachers
- 1 first and second grade teacher
- 7 second grade teachers
- 2 second and fourth grade teachers
- 8 third grade teachers
- 2 third and fourth grade teachers
- 12 fourth grade teachers
- 12 fifth grade teachers
- 1 fifth and sixth grade teacher
- 4 sixth grade teachers
- 3 seventh and eighth grade teachers
- 5 teachers of three or more grade levels

By subject

- 16 agriculture education teachers
- 6 environmental education/school forest educators
- 1 environmental studies teacher
- 6 English language arts teachers
- 3 math teachers
- 1 math and science teacher
- 71 science teachers
- 1 music teacher
- 3 physical education teachers
- 13 special education teachers
- 3 social studies teachers
- 4 technology education teachers
- 3 teachers of multiple subjects
- 3 title one teachers
- 2 at risk teachers
- 2 gifted and talented teachers
- 1 at risk and gifted and talented teacher

III. Summary

This chapter identified the processes that were used to meet the goal of the study – providing recommendations for the development of digital resources that enhance teachers’ use of the LEAF Lesson Guide. A questionnaire was the instrument used to collect survey data. The objectives and purpose for each question on the questionnaire were identified and guided the face and content validity reviews. Based on the review process and a pilot of the survey, modifications were made and the questionnaire finalized. All teachers who participated in a LEAF workshop prior to September 1, 2005 were included in the survey population. The survey process included providing advance notice about the survey to participants, mailing the survey, sending an email reminder, and sending a follow up mailing. The surveys were returned via postal mail, email, or with an online form. An opportunity to win a \$50 gift card was offered as an incentive to participants for returning the survey. The survey response rate was 42.8% (251 of 587 surveys).

Survey data was entered into a Microsoft Access database and double checked for errors. For Likert-type questions, SPSS was used to run quantitative analysis. Open-ended questions were qualitatively analyzed. The survey results show that 61.9% of teachers agreed or strongly agreed that digital resources would enhance their use of the LEAF Guide. Nearly half (49.1%) of respondents indicated that digital resources would increase the amount of time they use the guide. Using the survey results, recommendations for the creation of specific digital resources were created and provided to the LEAF Program.

CHAPTER FIVE RECOMMENDATIONS AND DISCUSSION

This chapter provides a summary of the recommendations that were given to the LEAF Program for the creation of digital resources based on the survey results. These recommendations fulfill the objective of Subproblem 2 of the study. Also included is a discussion of reoccurring themes that arose during the research process.

Subproblem 2

Provide recommendations for the creation of digital materials that will enhance teachers' use of the LEAF Lesson Guide.

A report was created for the LEAF Program detailing the results of the survey and recommendations for the creation of digital resources that will enhance teachers' use of the LEAF Guide. (See Appendix document Z.) The following information is a compilation of the recommendations that appear in that report.

Table 5.1 on the following page summarizes and prioritizes recommendations for creating digital forestry education resources based on the results of this study (a priority of level 1 is the most important).

Table 5.1: PRIORITIZED RECOMMENDATIONS FOR DIGITAL RESOURCE CREATION

Priority	Recommendation	Justification
1	Develop a plan that outlines how LEAF will serve as Wisconsin's Forestry Education Resource Clearinghouse.	Survey results – over 94% of survey respondents use forestry education materials in addition to the LEAF Guide. Research – teachers have limited time and need to be able to find resources efficiently.
1	Research existing forestry education materials to incorporate into the LEAF Clearinghouse.	Survey results – over 94% of survey respondents use forestry education materials in addition to the LEAF Guide. Research – there are many existing resources that can meet teachers' forestry education needs.
1	Develop a plan for the creation of the LEAF Digital Resources Library.	Survey results – digital resources will enhance and increase teachers' use of the LEAF Lesson Guide. Research – teachers have limited time and need to be able to find resources efficiently.
Incorporate the following into the LEAF Digital Resources Library:		
1	Digital images, maps, and posters	Survey results indicate these resources would enhance respondent's use of the LEAF Guide. Priority is based on the percentage of respondents indicating each resource would be moderately to very useful. (1=70% or greater, 2=50%-60%)
1	Educational games	
1	Expanded LEAF tree identification key	
1	Printable background information	
1	Printable lessons/activities	
1	Simulations and animations	
1	Videos	
1	Virtual field trips	
1	Web site links	
2	"Ask an expert" feature	
2	Audio material	
2	Printable resource lists	
2	Scientific data (or links to scientific data)	
2	GIS/GPS lessons	These two resources were added to the list based on respondents' comments (rather than to question response). Each of these resources was said to be useful by seven or more individuals.
2	WebQuests	
1	When creating resources for the digital library, incorporate respondent suggestions for materials that enhance specific lessons in specific units of the LEAF Guide.	Based on survey respondent suggestions for resources that enhance specific lessons. (Survey question 6)

Recommendations Related to Technology Resources

Overall the availability of technology resources (e.g., computers, printers) to survey respondents is high. Therefore, access to technology resources should not limit the

creation of digital resources. The use of technology continues to increase, which reduces the limitations to technology access.

Whenever possible, alternatives for using a particular technology resource should be suggested so that a topic can be taught without technology. This will be helpful to educators who have limited access to technology. It is better that a teacher have the ability to teach a topic in a low tech manner than not to teach it at all because their computer crashed or the school's Internet connection is down. Educators should be encouraged to print materials well in advance of using them, test Internet resources prior to the day they will use them with students to ensure links are still accessible, and download materials from CD-ROMs or the Internet prior to class time.

Detailed instructions should be provided for accessing technology resources (e.g., downloading, accessing a media player, printing, etc.). Troubleshooting suggestions should also accompany digital resources. It should not be assumed that people will know how to use all types of digital resources or have the ability to get assistance from their information technology staff. LEAF may want to consider providing contact information for a staff person who can assist educators in accessing digital resources.

Nearly all respondents have the ability to view on a screen and print in black and white resources that would be provided on CD-ROM or the Internet. Just over 75% of respondents have access to a color printer. For resources that must be printed in color, LEAF should suggest ways educators can accomplish this, including requesting materials

from the LEAF Program (possibly for a fee). Full-color resources should be developed for both printing and viewing on screen. This will give teachers the option of having students view resources on a computer or with an LCD projector if they do not have access to color printing.

Resources should be created in a manner that allows them to be used and disseminated in multiple ways to provide maximum access. For example, resources provided on a DVD can also be placed in an online LEAF digital resources library, allowing those without a DVD player to access the information online. Items meant for student exploration should be created so that students can use them independently on a computer or in a group setting shown to the entire class using an LCD projector.

Forestry Education Clearinghouse

Because only 5.6% of respondents (who use or intend to use the LEAF Guide) indicated they use the LEAF Guide exclusively, 94.4% of respondents are assumed to use materials in addition to the LEAF Guide to teach about Wisconsin's forests. Therefore, LEAF could enhance its ability to serve educators by becoming **Wisconsin's forestry education resource clearinghouse**.

A clearinghouse coordinates the collection and distribution of information. To become a forestry education clearinghouse, the LEAF Program would gather information about all the forestry education resources available to Wisconsin's teachers and provide instructions on how to access them in an organized manner. This includes all types of

resources including print items such as activity guides and posters, digital resources such as those suggested in this study, human resources such as potential guest speakers, and physical resources such as field trip locations and equipment. The LEAF Program does not have to create all the materials to meet educators' needs. The goal of being a clearinghouse is to help people find the resources they want and make them aware of resources they did not know existed. Becoming a forestry education clearinghouse will ensure that the LEAF Program continues to serve teachers' resource needs long after they participate in a LEAF workshop.

Educators have limited time to prepare for teaching and acquire all the necessary resources that support their lessons. Many survey participants reference lack of preparation time as a barrier to using new resources. Because of their time constraints, educators are most likely to use resources that are well organized and easily accessible. Therefore, the fewer places from which teachers need to acquire resources for a particular topic, the more likely they are to teach the topic.

Digital Resource Library

All information provided by the LEAF Program as Wisconsin's forestry education resource clearinghouse can be organized and disseminated through a digital resources library. This will assist educators in accessing resources as efficiently as possible. A digital resource library is a coherent, organized collection of documents that have been compiled and produced in digital format. The goal of a digital library is to bring different types of resources together from many entities and place them into one convenient

location for users to browse. A digital library is a tool that organizes scattered resources in an accessible framework. Educators can use digital libraries to create tailored experiences for their students that utilize the most current information and cover topics through a variety of methods. (Hanson & Carlson, 2005, pg. 1, 4.)

The LEAF Digital Resource Library should be a web-based tool containing easily navigable sections organized in a consistent manner, such as by topic, resource type, or grade level. There should be information for classroom teachers, students, non-formal educators, and anyone else looking for forestry education materials. The library should have various resource categories such as background information, lessons and activities, digital images, and support materials (e.g., posters, CD-ROMs, DVDs, etc.). General forestry education materials and support materials that tie directly to the LEAF Lesson Guides should also be included.

- **Planning and Development**

The creation of the LEAF Digital Resource Library should be done with careful planning and input from educators. The library should be developed with the assistance of a professional web designer who can create a solid navigation structure, ensure the site has room for growth, and incorporate graphics that enhance users' experience. Once a template is created, LEAF staff can update and expand the library. The library should be maintained on a continual basis to avoid outdated information and broken links. New information must be added regularly to encourage return visitation. The library should be advertised not only to LEAF

teachers, but also to all educators in Wisconsin. People should receive reminders that the library exists and information about new resources that are added.

The forestry resource needs identified in this research should serve as a foundation to develop a digital resource library. The LEAF Program does not need to create every type of resource. Research should be conducted to determine what resources exist and information should be provided as to how to access these materials. To ensure the information is user-friendly, each resource should be described and the grade levels for which it is appropriate should be suggested. Teachers should be continually asked what their forestry education needs are. If LEAF does not have requested resources, the program should consider creating them or find out where they currently exist and provide information on how they can be obtained.

- **Existing LEAF Web Site**

The digital resources library should be a separate entity from the existing LEAF web site, which will allow it to have a look and feel of its own. It will also keep the LEAF web site clean and simple with information about the program that is easy to access. If the resource library is added to the existing LEAF web site the site may become too large and difficult to navigate. When linking to the digital library, users will have the feeling of leaving one site and entering a new, but related, site.

Both sites should share the LEAF logo and color scheme but can have an overall different appearance because they serve different purposes. To organize the two sites, educational resources should be removed from the existing LEAF web site and moved into the digital library. The existing LEAF site should be informational and answer people's questions about the LEAF Program. The digital library should be a place for people to find forestry education resources. For example, the wildland fire section of the existing LEAF web site would contain information about the wildland fire lesson guide supplement, conceptual document, rationale, and workshops. All wildland fire teaching resources would be part of the digital library.

People should be able to connect to one site independently of the other depending on the type of information they need. Each site should have a clearly identified link to the other site with an explanation of the type of information it contains. People may search the World Wide Web and find one site without realizing the other exists.

- **Training**

If the LEAF Program invests resources in the creation of digital resources for teachers, it should also invest resources in providing training opportunities on how to best use the resources. Information should be provided not only on how to access and use digital resources, but also on the benefits of using them to enhance students' learning experiences. Professional development is most effective when

presented in a number of different formats such as training workshops, presentations at conferences, online courses, and self-directed learning.

To be successful, teachers need to see technology as a valuable resource. This may require a change in belief about teaching and learning. Teachers need to be open to change and take time to make changes if they have been relying on purely traditional methods. Research shows that the extent to which teachers receive professional development in using computers for learning plays a role in whether the technology has a positive impact on student achievement. Teachers need to know how to use the technology, as well as how to effectively incorporate it into their instruction.

Suggestions on various ways educators can incorporate digital resources into their forestry education lessons should be part of the digital resources library, providing educators with options to best meet the needs of their particular teaching situation. For a school forest educator, printing digital images of various plants may be their most effective use of digital resources. For a classroom teacher with access to a computer lab, an independent student WebQuest on the various forest types of Wisconsin may be their best option. Teachers need to see and understand what options are available to them.

General Recommendations Based on Survey Results

These recommendations are based on survey respondents indicating they use a variety of forestry education resources in addition to the LEAF Guide.

- LEAF should continue to produce support materials of various types to assist teachers in incorporating forestry education into their curriculum.
- A joint LEAF and Project Learning Tree (PLT) workshop could be offered, possibly as part of a comprehensive forestry education resources workshop.
- LEAF could identify PLT lessons that support lessons in each unit of the LEAF Guide. PLT could do the same by correlating LEAF lessons to their materials. This effort would enhance teachers' incorporation of forestry education into their curriculum by raising their awareness of connections between multiple resources.
- If the LEAF Program becomes a forestry education clearinghouse for Wisconsin, every effort should be made to inform teachers about and provide access to an array of forestry education lesson/activity guides. This ensures that teachers will continue to access the LEAF Program for all their forestry education needs. This also increases the visibility of the LEAF Program, while encouraging teachers to take LEAF workshops and use LEAF materials. If teachers access their forestry education resources through the clearinghouse, LEAF staff can monitor the quality of the materials and ensure they present appropriate information.
- Further research should be done with teachers to assess the specific types of lesson/activity guides they are using in addition to the LEAF Guide. This will assist LEAF staff in providing teachers access to a full array of resources. It would also be beneficial to determine the forestry-related subjects teachers are using in their units so

materials can be developed to meet those needs. For example, if teachers are consistently using water-related lessons to enhance their forestry education units, LEAF could develop specific lessons and activities related to water and forests.

- Provide teachers with information about reference materials that relate to each LEAF lesson. This information is currently printed at the end of each lesson but could be expanded in digital format and added to a digital library. Each lesson of each unit of the LEAF Guide could have a list of references online with links to those that available in digital format.
- Expand the list of books provided at the end of each LEAF lesson.
- Put the book list related to each LEAF lesson in a digital resource library on the LEAF web site.
- Have teachers submit book reviews for their favorite forestry-related story books. Place teachers' reviews and suggestions on how they use the books to enhance their forestry education units in a digital resource library.
- When opportunities to provide educators with free resources arise, consider story books as important items to include. Seek funding for the purchase of story books that can be provided to LEAF teachers at no cost.
- Use story books as incentives for teachers to participate in LEAF workshops, etc.
- Continue to provide posters as resources to teachers. As new posters become available, provide a means for teachers to obtain them. The posters could be sent to teachers who request them either from the LEAF web site or from a mailing sent to teachers listing new resources.

- Research existing types of forestry-related posters. Describe the posters on the LEAF web site, make connections between the posters and LEAF lessons, and provide information on how teachers can obtain the posters. This may include requesting them from LEAF or the DNR or purchasing them through identified distributors.
- Research existing types of forestry-related videos. Describe the videos on the LEAF web site, make connections between the videos and LEAF lessons, and provide information on where teachers can obtain the videos.
- Continue to research all types of forestry education web sites. Provide links to those sites from the LEAF web site. Suggest ways in which particular web sites can be used to enhance specific LEAF lessons.
- Provide descriptions of, LEAF lesson connections to, and information about obtaining existing forestry education CD-ROMs on the LEAF web site.
- Research existing types of forestry-related DVDs. Provide descriptions of the DVDs on the LEAF web site, make connections between the DVD content and LEAF lessons, and provide information on where teachers can obtain the DVDs.
- Have teachers suggest various types of resources they use in their forestry units. Post suggestions for use and information on how to obtain such resources on the LEAF web site.

Conclusions and Suggestions Based on Survey Results

The following conclusions and suggestions are based on the percentage of teachers indicating particular digital resources would be moderately to very useful to enhance their use of the LEAF Guide in questionnaire question 4.

Images for Computer Viewing and Images for Printing

Of the 216 people who responded, 70.8% indicated that images for computer viewing would be moderately or very useful while 77.4% indicated that images for printing would be moderately or very useful.

Conclusion:

A digital image library should be created for teachers using the LEAF Lesson Guide.

This could be one of the resources offered as part of a comprehensive statewide forestry education clearinghouse. Digital images should be made available through the LEAF Digital Resources Library.

Suggestions:

- Whenever images are obtained for the digital image library, the highest quality possible should be sought to allow for screen viewing and printing. A 4 inch by 6 inch image should have a resolution of 300 dots per inch (dpi) or higher. (General information: TIFF (.tif) files can be modified countless times without losing quality. JPEG (.jpg) files lose quality each time they are modified and resaved. JPEG files are smaller than TIFF files. JPEG files should be made available for printing in the digital image library as the smaller file size allows for faster downloading. However, keeping an original TIFF file is recommended as LEAF may use it for purposes beyond the digital image library.)
- All images posted to the digital image library should be made available in two formats. One should be a 72 dpi image file for computer viewing. This is the maximum image resolution needed for on screen images and digital projections and keeps page load time as low as possible. The second image should be high

enough quality for printing and made available through a link near the first image.

The printable image should be a JPEG file of 300 dpi and at least 4 inches by 6 inches. This maximizes the usefulness of every image in the digital library, while satisfying teachers' needs for displaying and printing the graphics.

Maps for Computer Viewing and Maps for Printing

Of the 213 people who responded, 67.1% indicated that maps for computer viewing would be moderately or very useful and 72.2% indicated that maps for printing would be moderately or very useful.

Conclusion:

A library of digital maps should be created for teachers using the LEAF Guide. This could be one of the resources offered as part of a comprehensive statewide forestry education clearinghouse. Maps should be made available through the LEAF Digital Resources Library.

Suggestions:

- The same suggestions hold true for digital maps as for digital images. Digital maps are essentially a specific type of digital image. Exceptions to this are interactive maps that can be manipulated by the user. Such maps require sophisticated programs to function. Links to interactive maps that currently exist on the World Wide Web could be listed in the same section of the digital image library as the standard maps.

Posters for Computer Viewing and Poster for Printing

Of the 210 people who responded, 51.4% indicated that posters for computer viewing would be moderately or very useful and 64.5% indicated that posters for printing would be moderately or very useful.

Conclusion:

Digital posters should be made available to teachers using the LEAF Lesson Guide. This could be one of the resources offered as a part of a comprehensive statewide forestry education clearinghouse. Posters should be made available through the LEAF Digital Resources Library. This study found that teachers will use digital images and maps slightly more than posters. Thus, focus should be on creating image and map resources first and posters second.

Suggestions:

- Posters should be designed for printed on a standard size printer (one using 8.5 inch by 11 inch paper). The same poster can also be created in a larger size if there are instructions on how to print it – for example, on 11 inch by 17 inch paper or on multiple pieces of 8.5 inch by 11 inch paper taped together.
- An example of an interactive poster can be found on the DNR's EEK! web site at: <http://www.dnr.state.wi.us/org/caer/ce/eeek/nature/habitat/forest1.htm>. It is a digital version of a poster distributed by the DNR. The poster contains drawings of forest animals. When a user clicks on an animal, a window opens with a picture of that animal and information about it.

Scientific Data

Of the 214 people who responded, 63.1% indicated that scientific data would be moderately or very useful.

Conclusion:

Scientific data should be part of a comprehensive digital resource library created for teachers using the LEAF Lesson Guide. This could be one of the resources offered by LEAF in an effort to be the comprehensive statewide forestry education clearinghouse.

Suggestions:

- The focus of scientific data in the digital resource library should be on information that enhances the 5-12 units of the LEAF Lesson Guide.
- Highly technical, scientific data should include interpretation for the average reader, or at minimum an explanation of how it relates to specific activities in the LEAF Lesson Guides.

Printable Background Information

Of the 212 people who responded, 76.4% indicated that printable background information would be moderately or very useful.

Conclusion:

Printable background information should be part of a comprehensive digital resource library created for teachers using the LEAF Lesson Guide. This could be one of the resources offered as part of a comprehensive statewide forestry education clearinghouse.

Suggestions:

- The information should be on forestry-related topics addressed in the LEAF Lesson Guide as well as topics of timely importance.
- The information should be written in language that the average reader can understand, generally a sixth grade level would be appropriate for most middle and high school student and adult users.
- The information should be in Adobe Acrobat Portable Document Format (PDF) format, with consistent layout and formatting from one topic to the next, at a length of approximately one page per topic.
- The information could be gathered from existing sources, written by LEAF staff, or solicited from LEAF stakeholders.
- Another potential source for information is the LEAF online course, as it addresses all subconcepts identified in the *LEAF Conceptual Guide to Wisconsin K-12 Forestry Education*. Various sections of the online course could be referenced and linked from the digital resource library. The online course should be designed so that each topic can be read on screen as well as printed in PDF format. This will allow greater flexibility in use.

Printable Lessons/Activities

Of the 219 people who responded, 86.3% indicated that printable lessons/activities would be moderately or very useful.

Conclusion:

Printable lessons/activities should be made available to educators as part of a digital resources library. This could be one of the resources offered as part of a comprehensive statewide forestry education clearinghouse.

Suggestions:

- Continue to expand upon the non-LEAF forestry-education lessons/activities currently available on the LEAF web site.
- Make some of the LEAF lessons or portions of lessons from each unit available online as examples of units content and to entice people to take a workshop to obtain an entire unit of the Lesson Guide.
- To encourage return visitation to the digital library, continue to create short activities and post them online. The activities can include simple instructions in a one page format and can be relevant to a particular grade level, topic, season, or subject area. Various LEAF staff can take turns creating them on a monthly basis. In addition to the LEAF digital resources library, they can also be included in the LEAFlet electronic newsletter. Activities could also be solicited from teachers who develop extensions to the LEAF lessons.
- Consider making the entire LEAF Lesson Guide available online. This could increase the use of LEAF materials and visibility of the program. Users could be required to enter contact information before accessing the lessons so statistics could be generated on user numbers. Each lesson is written with complete background information, providing educators with sufficient information to teach the lessons. LEAF workshops could focus on enhancing teachers' abilities to

incorporate forestry education topics into their existing curriculum rather than the current structure which focuses on introducing teachers to lessons.

Printable Resource Lists

Of the 209 people who responded, 64.5% indicated printable resource lists would be moderately or very useful.

Conclusion:

Include printable resource lists as part of the LEAF digital resources library. This could be one of the resources offered as part of a comprehensive statewide forestry education clearinghouse.

Suggestions:

- Solicit ideas from users of the LEAF Lesson Guide as to the types of resource lists that would be most helpful to them. These lists may include resource professionals willing to speak in classrooms, places to obtain forestry-related field equipment, potential field trip sites, etc.
- Make the resource lists user-friendly by categorizing them (e.g., by topic, by grade level, by region of the state, etc.).
- Ensure the resource lists are kept up-to-date.

Chatroom or Discussion Board for Teachers or Students

Of the 213 people who responded, 25.8% indicated that a chatroom or discussion board for teachers would be moderately or very useful and 15.6% indicated that a chatroom or

discussion board for students would be moderately or very useful.

Conclusion:

Due to the low number of respondents indicating that a chatroom or discussion board for teachers or students would be moderately to very useful, it is not recommended that LEAF create these types of resources.

LEAF Blog

Of the 209 people who responded, 17.3% indicated that a LEAF blog would be moderately or very useful.

Conclusion:

Due to the low number of respondents indicating that a LEAF blog would be moderately to very useful, it is not recommended that LEAF create this type of resource.

Educational Game

Of the 222 people who responded, 81.5% indicated that an educational game would be moderately or very useful.

Conclusion:

LEAF should provide educators access to forestry-related educational games. This could be one of the resources offered as part of a comprehensive statewide forestry education clearinghouse.

Suggestions:

- Take advantage of opportunities to create or obtain forestry-related educational games and place them in the LEAF digital resources library.

- Provide educational games for various age groups on differing topics. Survey LEAF teachers to find out which topics they would find most helpful if provided for students in game format.
- Ensure that educational games do not require uncommon software to operate. The games should utilize technology that is available in most schools. Download time should be kept to a minimum. Keep the technical complexity of games minimal because schools do not always have the fastest computers or most up-to-date equipment.

Simulations and Animations

Of the 216 people who responded, 73.6% indicated that simulations and animations would be moderately or very useful.

Conclusion:

Take advantage of opportunities to create or obtain forestry-related simulations and animations and place them in the LEAF digital resources library.

Suggestions:

- Focus the development of simulations/animations on concepts in the 4, 5-6, 7-8, and 9-12 units based on a trend of increasing usefulness indicated on the questionnaire from K-1 unit users to 9-12 unit users.
- Ensure that simulations and animations do not require uncommon software to operate. The simulations and animations should utilize technology that is available in most schools. Download time should be kept to a minimum. Keep the

technical complexity of these resources minimal because schools do not always have the fastest computers or most up-to-date technology resources.

Digital Video

Of the 213 people who responded, 69.5% indicated that digital video would be moderately or very useful.

Conclusion:

Take advantage of opportunities to create or obtain forestry-related videos and place information on how to obtain them in the LEAF digital resources library.

Suggestions:

- Research existing forestry education videos. Provide information on how to obtain videos. Review the videos to ensure the content and quality is appropriate for use in Wisconsin classrooms.
- Have teachers recommend videos they use and describe how they enhance their ability to teach forestry education. Make this information available to other educators.
- When possible make forestry education video clips available to teachers via the Internet. Provide links to downloadable clips teachers can play from their computers using readily accessible software such as Windows Media Player or Real Player. This can include the already existing video that supports LEAF lessons in the 7-8 and 9-12 units. The information is likely to be useful to many educators, not only those using specific units of the LEAF Guide.

Audio Material

Of the 213 people who responded, 51.6% indicated that audio material would be moderately or very useful.

Conclusion:

Take advantage of opportunities to create or obtain forestry-related audio material and place it in the LEAF digital resources library.

Suggestions:

- Initial efforts should focus on providing audio material for users of the K-1, 2-3, 4, and 5-6 units based on survey responses.
- Take advantage of opportunities to provide educators with forestry-related audio material. However, since audio material was not indicated as moderately to very useful to as many respondents as other materials, focus more heavily on the development of other types of resources before creating audio resources.

Web Site Links

Of the 216 people who responded, 75.0% indicated that web site links would be moderately or very useful.

Conclusion:

Provide web site links as part of the digital resources library.

Suggestions:

- Continue to expand the list of links currently on the LEAF web site by including more topics and more links within each topic. Move the link list to the LEAF digital resources library.

- Cross categorize links to make them easy to use. Group them in multiple ways including by topic, type of resource, and grade level appropriateness.
- Provide separate link sections for students and teachers.
- Always include a description of the linked web site so users can quickly evaluate usefulness.
- Create a place in the digital resources library for resources organized by unit and include the links listed in the additional resources sections of each unit of the LEAF Lesson Guide.
- Periodically check for broken links and update them regularly. Users are frustrated by links pages leading to web sites that no longer exist or have changed their address.

“Ask an Expert” Web Page

Of the 212 people who responded, 64.2% indicated that an “ask an expert” web page would be moderately or very useful.

Conclusion:

Include an “ask an expert” feature as part of a digital resources library.

Suggestions:

- An “ask an expert” feature would be a resource that provides incentive for people to revisit the LEAF web site. It would also be a way for LEAF to connect with forestry stakeholders who would offer their expertise to answer questions.
- Research existing “ask an expert” web pages and speak with the web site owners to determine how to make the resource effective and useful.

- Continually solicit questions from students and teachers to keep the feature active and current.
- Invite a variety of resource professionals to serve as experts so answers come from different sources. Provide profiles of the experts so students can learn more about forestry professionals.

Online Tree Identification Key

Of the 217 people who responded, 76.9% indicated that an online tree identification key would be moderately or very useful.

Conclusion:

Include the LEAF tree identification key and associated resources as part of the digital resources library.

Suggestions:

- Expand the tree identification key that currently exists to include more Wisconsin tree species, especially those on the printed tree identification key in the 7-8 unit.
- Market the tree identification key to workshop participants and the general forestry education audience, encouraging them to visit the LEAF web site.
- Consider expanding the key or adding a second one that features common forest shrubs.
- Give users the ability to click on images in the key and view or print higher resolution versions.

Virtual Field Trips

Of the 214 people who responded, 72.4% indicated that a virtual field trip would be moderately or very useful.

Conclusion:

Create virtual field trips and include them in the LEAF digital resources library.

Suggestions:

- Begin with topics that appeal to an array of grade levels and become more specific to particular grade level needs as time allows. For example, a virtual field trip to various forest communities would benefit students of all grade levels. Whereas a virtual field trip to a sawmill would be more suitable for middle and high school students.
- Focus grade level appropriateness to K-6 students unless specific needs of 7-12 students are being targeted based on questionnaire responses.
- Poll LEAF Lesson Guide users as to the type of virtual field trips they would find most useful.

Citizen Science Monitoring

Of the 216 people who responded, 42.6% indicated that citizen science monitoring would be moderately or very useful.

Conclusion:

Do not focus efforts on creating citizen science monitoring programs as part of LEAF due to low responded interest. Promote existing programs in the state. Provide information on

what citizen science monitoring is, why it is important, and how teachers and students can become involved.

Suggestions:

- Any citizen science monitoring activities created should focus on users of upper grade level units, namely 7-8 and 9-12 based on participant responses.
- Include links to existing citizen science monitoring projects in the LEAF digital resources library.

Summary

The LEAF Program should serve as Wisconsin's forestry education clearinghouse and provide educators with a comprehensive digital resources library to supply materials that meet all of educators forestry resource needs. The development of new digital forestry education resources should include images, maps, and posters for screen viewing and printing; links and suggestions for use of scientific data and printable background information; printable lessons/activities and resource lists; educational games, simulations, and animations; digital video and audio; web site links, an "ask an expert" web page; expansion of the LEAF online tree identification key; and virtual field trips based on educators' responses to the survey. Chatrooms for teachers and students, blogs, and citizen science monitoring programs should not be a major focus development efforts but links to existing resources of these types can be included in a digital resources library. Teachers will get the most benefit from digital resources if they receive professional development stressing the benefits of these materials and offering suggestions for incorporating them into their curriculum.

DISCUSSION

This section addresses themes that recurred throughout the research study. Examples and quotes from survey participants are used to illustrate topics noted by the researcher. The LEAF Program can utilize this information as it develops and promotes new digital forestry education resources.

Addressing Concerns about Outdoor Experiences

Concerns were noted from some survey participants over the need to emphasize outdoor and/or hands-on experiences and that computer-based resources would not accomplish this. One teacher wrote, “I don’t use digital resources at the school forest. It’s as much hands on as we can get.” Digital resources are in no way meant to replace authentic personal experiences in the outdoors. However, digital resources can be used to enhance such experiences and teachers may need examples of how this can be done. A comment from one survey participant illustrates the benefits of digital resources, while at the same time highlighting the conflict some educators see between technology and hands-on education, “Although having digital resources would really enhance the students’ understanding of the forestry concepts, I think it is just as important to have relevant, hands-on activities that apply to their own situation. ...” Describing how a digital resource could enhance students’ experiences at the school forest, the participant continues, “... For example, if we could find a source of digital maps from 1800-present at different time periods for our own school forest this would be great. I take my students to our school forest but don’t think they can envision too well what it was like 100 years ago.”

Addressing the Need for Training

Based on participant comments on the questionnaire, it appears there are some educators who do not understand the benefit and potential usefulness of digital resources. Having workshops or training opportunities focused on digital resources is especially important for these educators. An illustration of the disconnect some educators experience comes from a survey participant who was neutral about his/her use of the LEAF Guide being enhanced with access to new digital resources. The educator commented, “I work with 7, 8, and 9 year-olds. I believe that our forestry experiences should be outdoors whenever possible. For my lesson preparation I have used Google images to create posters.” It is obvious from this educator’s statement that digital resources would be beneficial. Having access to a digital image library containing forestry images would reduce the amount of time he/she spends searching the World Wide Web for images. The resources can and are being used to enhance forestry education without negatively impacting outdoor learning experiences. Yet, the participant did not indicate on the survey that such resources would enhance his/her use of the LEAF Guide.

Addressing Teacher’s Lack of Time

Survey participants commented on their lack of time to incorporate forestry education into their curriculum, for planning, and for incorporating new resources into their existing lessons. One participant commented, “Time only allows for a few weeks to spend on forestry. The materials provided are used to make the most of that time.” Another remarked, “I have the equipment, just not the time to integrate it all – yet.” Because several educators commented on their limited time, it will be important for the LEAF

Program to stress how digital resources can streamline their planning and preparation time. When promoting new digital resources, it should be emphasized that the LEAF Digital Resources Library brings all the materials needed to create a comprehensive forestry lesson or unit together in one easy to access location. Key time-saving features of the Library should be highlighted such as search features, organizational features (subject and grade level references), and options for using materials in multiple formats.

Digital Resource Development

A three year study culminating in 2005 that looked at teachers' use of digital resources in STEM (Science, Technology, Engineering and Mathematics) subjects shows how digital resources, including digital libraries, have the potential to transform education. The research report explains the ways educators can benefit from using technology when given the right support such as professional development and effective models of use. The researchers point out that at times there tends to be little connection between those who develop digital resources and the educators who use them. As a result, the design and organization of the resource may reflect what the developer wants to provide educators, but not what meets the needs of the teachers and students who use the resources. Developers must be cautious to not focus on technology capacity or their personal interests, but to focus on what the end users want and need. (Hanson & Carlson, 2005, pg. 1.) Based on this information, this researcher strongly suggests that the LEAF Program continually seek feedback from teachers as new digital resources are created. The program may find it useful to develop an advisory group of educators who are

willing to provide feedback on the content and design of digital resources as they are created.

Implications for Future Research

Further research related to the use of educational technology will help assure that forestry education stays current with today's society. Future research should expand upon the literature review conducted for this study. Due to the constant evolution and growth of technology it is essential for future researchers to fully understand the most current capabilities of technology for educational purposes.

When this study was conducted the use of computer-based technology in environmental education was more limited than in other fields such as biology, mathematics, and social studies. Based on survey responses, it was clear that some participants did not have a clear understanding of the ways technology could support outdoor or environmental education. Future research should ensure that all participants understand the different types of technology and how they can be used to support education. This would reduce the number of responses negatively influenced by incomplete understanding of computer-related terminology, uses, and value.

Some educators in the environmental education community question the value of technology in a field aimed at helping people understand and make wise decisions about the environment. Generally, environmental educators strive to provide students with meaningful outdoor experiences. Using technology as part of those experiences runs

counter to some educators' view of how environmental education has traditionally and been done and should continue to be done. Technology is an important and growing aspect of today's society and educational process. This research identifies many types of technology-based resources that can be used to enhance environmental education without negatively impacting outdoor experiences. Future research should demonstrate the benefits of technology use in environmental education and how it can help to advance the goals of environmental education. This can be done by introducing examples of successful programs where technology is used to enhance outdoor experiences.

Conclusion

The LEAF Program provides educators with exceptional forestry education resources that are used to enhance students' understanding of the economic, ecologic, and social importance of Wisconsin's forests. Students are the future forest users and managers and therefore deserve the most comprehensive forestry education experience possible. By developing digital resources that enhance teachers' use of the LEAF Lesson Guide, the LEAF Program can meet the diverse needs of today's learners and provide them a stimulating and engaging opportunity to discover the wealth of benefits Wisconsin's forest resources provide.

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APPENDIX

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A. UWSP Instructional Review Board Application

University of Wisconsin-Stevens Point
Institutional Review Board for the Protection of Human Subjects

Protocol for Original Submissions

A complete protocol must be submitted to the IRB for approval prior to the initiation of any investigations involving human subjects or human materials, including studies in the behavioral and social sciences.

Send: 11 copies of (1) the completed protocol; (2) project abstract; and (3) samples of informed consent forms to the IRB chairperson. PROTOCOLS LACKING ANY ONE OF THESE THREE ELEMENTS WILL NOT BE APPROVED. In addition, copies of questionnaires or interview questions MUST be attached.

PLEASE TYPE

Project Title: **Digital Resource Recommendations for the LEAF Wisconsin K-12 Forestry Education Lesson Guide**

Principal Investigator: **Sunshine R. Buchholz**

Department: **Human Dimensions of Natural Resources** Rank: **Graduate Student**

Campus Mailing Address: **LEAF, 110 WCEE/CNR**

Telephone: **346-2014** E-mail address: **sbuchhol@uwsp.edu**

Faculty Sponsor (if required): **Dr. Dennis Yockers**
(Faculty sponsor required if investigator is below rank of instructor.)

Expected Starting Date: **Jan. 23, 2006 (survey mailed)** Expected Completion Date: **Dec. 2006 (graduation)**

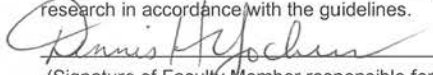
Are you applying for funding of this research? Yes _____ No **X**

If yes, what agency? _____

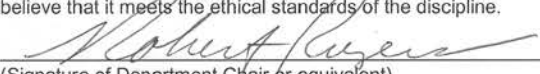
Please indicate the categories of subjects to be included in this project. Please check all that apply.

☒ Normal adult volunteers _____ Minors (under 18 years of age)
_____ Incarcerated individuals _____ Mentally Disabled
_____ Pregnant women _____ Other _____ (specify)

(Faculty Member) I have completed the "Human Subjects Protection Training" (available at <http://www.uwsp.edu/special/irb/start.htm>) and agree to accept responsibility for conducting or directing this research in accordance with the guidelines.

 11-17-05
(Signature of Faculty Member responsible for research)

(Department Chair or equivalent) I have reviewed this research proposal and, to the best of my knowledge, believe that it meets the ethical standards of the discipline.

 11-17-05
(Signature of Department Chair or equivalent)

***** Do not write below this line – for IRB use only *****

IRB approval _____ Date _____
(Signature of IRB Chair)

Approval for this research expires one year from the above date.

If research is not completed by this date, a request for continuation must be filed and approved before continuing.

Revised form: January 2001

B. IRB Proposal Abstract

The goal of this study is to provide recommendations for the development of digital materials that enhance teachers' use of the LEAF Wisconsin K-12 Forestry Education Lesson Guide. This will be accomplished by analyzing teachers' needs, developing sample digital materials, and gathering feedback from teachers about the sample materials. Information about teachers' needs will be collected by an initial mail survey in early 2006. A sample set of materials will be created for pilot based on survey results. Select teachers from the initial group will be asked to pilot the sample materials and provide feedback via a mailed questionnaire.

LEAF is Wisconsin's K-12 Forestry Education Program. LEAF is a partnership program between the Wisconsin Department of Natural Resources – Division of Forestry and the Wisconsin Center for Environmental Education (WCEE). LEAF is housed in the WCEE in the College of Natural Resources. The mission of LEAF is to facilitate the development, dissemination, implementation, and evaluation of forestry education in Wisconsin Schools.

Please complete the following questions for all research.

1. Describe the characteristics of the subjects, including gender, age ranges, ethnic background, health/treatment status and approximate number.

The subjects are all Wisconsin K-12 classroom teachers. Each of them has participated in a LEAF workshop previously. They are both male and female, range in age from 22 to 60, are of varied ethnic background and health conditions. Representation of these characteristics within the subjects would be similar to that found in the total population of Wisconsin K-12 classroom teachers. Sex, age, ethnicity, and health will have no bearing on the subjects' participation and no data will be gathered on these characteristics. Approximately 630 people will be mailed a questionnaire in the initial survey. Approximately 10 people from the initial group of subjects will be asked to pilot sample materials and provide feedback.

2. Indicate how and where your subjects will be obtained. Describe the method you will use to contact subjects.

All subjects participated in a LEAF workshop between July 2003 and September 2005. Subjects will receive the initial questionnaire via mail. If clarification is needed by the researcher on specific answers, subjects will be contacted via email or telephone. A small number of subjects who answered the initial questionnaire will be asked to pilot sample materials based on their interest level (indicated on the first questionnaire). Those subjects will be contacted via telephone and mailed the sample materials and feedback form.

3. What are you going to ask your subjects to do (be explicit) and where will your interaction with the subjects take place?

In the initial survey, I am asking subjects to fill out a questionnaire and mail it back to me using an enclosed reply envelope. The questionnaires will be mailed to the subject's school address in most cases and home address if a school address is not available. In the pilot of the sample materials, subjects will be asked to teach a Lesson from their LEAF Guide in their classroom using the sample materials and then provide feedback on the sample materials via questionnaire. No questions related to specific students or their identities will be asked.

B. IRB Proposal Abstract Continued

4. Will deception be used in gathering data? Yes _____ No **X**
If yes, describe and justify.
5. Are there any risks to subjects? Yes _____ No **X**
If yes, describe the risks (consider physical, psychological, social, economic, and legal risks) and include this description on the informed consent form.
6. What safeguards will be provided for subjects in case of harm or distress? (Examples of safeguards include having a counselor/therapist on call, an emergency plan in place for seeking medical assistance, assuring editorial rights to data prior to publication or release where appropriate.)

Subjects will be given the contact information of Dr. Dennis Yockers if they have any questions or concerns about participation.

7. What are the benefits of participation/involvement in this research to subjects?
(Examples include obtaining knowledge of discipline, experiencing research in a discipline, obtaining course credit, getting paid, or contributing to general welfare/knowledge.) Be sure to include this description on the informed consent form.

Benefits to subjects include having their opinion taken into consideration in the development of additional forestry education resources that will be available to them in the future from the LEAF Program. Participants may also be given the opportunity to pilot sample materials. Participants who so choose will also have their name entered into a drawing for a gift certificate as a thank you for their time.

8. Will this research involve conducting surveys or interviews? Yes **X** No
If yes, please attach copies of all instruments or include a list of interview questions.

See attached questionnaires.

9. If electronic equipment is used with subjects, it is the investigator's responsibility to determine that it is safe, either by virtue of his or her own experience or through consultation with qualified technical personnel. The investigator is further responsible for carrying out continuing safety checks, as appropriate, during the course of the research. If electronic equipment is used, have appropriate measures been taken to ensure safety? Yes **X** No

Participants can choose to respond to the initial survey via a form on the Internet made available from the LEAF website. Using their personal computer to do so will be at their own risk.

10. During this research, what precautions will be taken to protect the identify of subjects and the confidentiality of the data?

Only the researcher will have access to participants' identities. Participants can choose to remain anonymous if they desire. Survey data will be coded for use in presentation of the results.

11. Where will the data be kept throughout the course of the study? What provisions will be taken to keep it confidential or safe?

B. IRB Proposal Abstract Continued

Data will be stored in a file cabinet at the desk of the researcher in the LEAF Program office in the WCEE in the CNR throughout the course of the study. This file cabinet can be locked if deemed necessary. The office of the researcher is shared with one other person (separate workstation behind a divider). The office door is locked during non-working hours.

12. Describe the intended use of the data by yourself and others.

The data will be used by the researcher to provide recommendations for the creation of digital resources for use with the LEAF Lesson Guide. It will also be used to develop a set of sample materials to be pilot tested by a limited number of teachers.

13. Will the results of the study be published or presented in a public or professional setting?

Yes **X** No _____

If yes, what precautions will be taken to protect the identity of your participants? **State whether or not subjects will be identifiable directly or through identifying information linked to the subjects.**

Only the researcher will have access to participants' identities. Participants can choose to remain anonymous if they so choose. Survey data will be coded for use in presentation of the results.

14. State how and where you will store the data upon completion of your study as well as who will have access to it? What will be done with audio/video data upon completion of the study?

Data will be stored in a file cabinet at the desk of the researcher in the LEAF Program office in the WCEE in the CNR after the study. This file cabinet can be locked if deemed necessary. The office of the researcher is shared with one other person (separate workstation behind a divider). The office door is locked during non-working hours.

C. Statement of Participants Rights

Below is a statement of your rights as a survey participant. It is required for all research done at UW-Stevens Point. It is intended to assure you that your personal information will not be shared outside the scope of this study and no harm will come to you as a result of your participation.

Informed Consent to Participate in Human Subject Research

Sunshine Buchholz, Forestry Education Specialist with the LEAF Program, is conducting research under the guidance of Dr. Dennis Yockers, Associate Professor of Environmental Education at the University of Wisconsin-Stevens Point. She would appreciate your participation in a research study designed to provide recommendations for the creation of digital resources that will enhance teachers' use of the LEAF Lesson Guide.

You are being asked to complete a questionnaire that should take no more than 15 minutes to complete. You may be contacted by the researcher after the survey to clarify your answers if needed. You may provide your answers anonymously if you so choose.

We anticipate no risk to you as a result of your participation in this study other than the inconvenience of the time to complete the survey.

The study is designed to benefit you through the creation of additional forestry education resources. By returning the questionnaire, you ensure your thoughts will be heard. You also have the opportunity to be entered into a drawing for a gift certificate as a thank you for your participation.

The information that you provide on the questionnaire will be recorded in anonymous form. Information that could identify you will not be released. All completed surveys will be kept in a file cabinet in the LEAF Program office and will not be available to anyone not directly involved in this study.

If you want to withdraw from the study at any time, you may do so without penalty. Once the study is completed, we would be glad to give you the results. In the meantime, if you have any questions, please contact:

Dr. Dennis Yockers
Wisconsin Center for Environmental Education
University of Wisconsin-Stevens Point
Stevens Point, WI 54481
(715) 346-4943

If you have any complaints about your treatment as participant in this study, please call or write:

Dr. Sandra Holmes, Chair
Institutional Review Board for the Protection of Human Subjects
Department of Psychology
University of Wisconsin-Stevens Point
Stevens Point, WI 54481
(715) 346-3952

Although Dr. Holmes will ask your name, all complaints are kept in confidence.

Your completion and submission of the questionnaire to the researcher represents your consent to serve as a subject in this research.

This research project has been approved by the UWSP Institutional Review Board for the Protection of Human Subjects.

D. LEAF Staff Review Instructions

12/12/05

Name,

Thank you for agreeing to serve on the validity panel for my questionnaire. Below are some suggestions for your review of materials. You can mark directly on the materials I have provided. Please let me know if you have any questions. Return the materials to me by December 30, 2005.

Cover Letter

- Content
- Flow
- Readability

IRB Form

- Content
- Flow
- Readability

Questionnaire

- Content
- Flow
- Readability
- Question wording - are the questions worded in such a way that they will provide the intended response? (See the Question Rationale for the objectives of each question)
- Face validity – does the questionnaire look valid to those who take it?
- Content validity – are all the questions there that should be there? Are there extraneous questions?

Thanks for your assistance,

E. Graduate Committee Review Instructions

12/12/05

Committee Member,

Thank you for agreeing to serve on the validity panel for my questionnaire. Below are some suggestions for your review of materials. You can mark directly on the materials I have provided. Please let me know if you have any questions. Please return the materials to me no later than December 30, 2005.

Cover Letter

- Content
- Flow
- Readability

IRB Form

- Content
- Flow
- Readability

Questionnaire

- Content
- Flow
- Readability
- Question wording - are the questions worded in such a way that they will provide the intended response? (See the Question Rationale for the objectives of each question)
- Face validity – does the questionnaire look valid to those who take it?
- Content validity – are all the questions there that should be there? Are there extraneous questions?
- Are the questions valid for the objectives of this study?

Thanks for your assistance,

F. Questionnaire Rationale

Questionnaire Rationale

The goal of this study is to provide recommendations for the development of digital materials that enhance teachers' use of the LEAF Wisconsin K-12 Forestry Education Lesson Guide. This will be accomplished by analyzing teachers' needs, developing sample digital materials, and gathering feedback from teachers about the sample materials.

Subproblem: Develop and conduct a survey of teachers using the LEAF Lesson Guide to determine what type of digital materials they believe would enhance their use of the Guide.

Questionnaire Purpose: To gather teachers' thoughts about the creation of digital materials to enhance the use of the LEAF Lesson Guide. The results of this study will determine what materials will be created in the future.

Question 1

1. Please indicate which of the following statements best describes your use of the LEAF Lesson Guide to teach students about Wisconsin's forests...

Objectives of question 1:

To determine if respondents are using the LEAF Lesson Guide.

To encourage respondents to return the questionnaire even if they are not using the LEAF Lesson Guide.

To categorize Guide users into three groups – those who intend to use it, those who do not use it regularly, and those who use it at least once per school year.

Purpose of question 1:

To increase response rate by getting non-Guide users to return their questionnaires.

If respondents of options two and three indicate that additional resources will increase their use of the Guide it gives strong evidence for the need to create digital materials.

Question 2

2. I teach students about Wisconsin's forests using the LEAF Lesson Guide...

Objectives of question 2:

To find out how often respondents are using the LEAF Lesson Guide.

Purpose of question 2:

To provide general information about the survey respondents.

Comparisons will be made between the types of materials requested by each category of respondents in question two.

F. Questionnaire Rationale Continued

Question 3

3. I teach students about Wisconsin's forests using other resource materials in addition to the LEAF Lesson Guide...

Objectives of question 3:

To find out if respondents are teaching about Wisconsin's forests to students using materials other than the LEAF Lesson Guide.

Purpose of question 3:

To provide general information about the survey respondents.

To help respondents think about and distinguish between forestry education taught with the LEAF Guide versus other forestry education materials.

Question 4

4. To what degree would the following digital forestry education resources enhance your use of the LEAF Lesson Guide to teach students? Please indicate by checking the boxes below...

Objectives of question 4:

To generate a list of resource needs respondents have related to the LEAF Lesson Guide.

To provide examples of digital materials so that questions 5-8 are better understood.

Purpose of question 4:

If multiple respondents identify the same specific needs related to lessons in the LEAF Guide, emphasis will be given to the creation of resources to fill those needs.

Question 5

5. Please describe forestry-related resources that would enhance your use of the LEAF Lesson Guide. This includes materials that would enhance your students' understanding of forestry concepts. Be as specific and descriptive as possible. Describe as many as you can think of. Add additional pages if needed.

Objectives of question 5:

To find out what forestry education resources would enhance survey respondents' use of the LEAF Lesson Guide and student understanding of the concepts in the LEAF Lesson Guide. The open ended question is an opportunity for participants to brainstorm and dream big.

Purpose of question 5:

To generate a list of all the possible forestry education materials that respondents feel would enhance their use of the LEAF Lesson Guide. The listed resources will be incorporated into recommendations for the LEAF Program.

Question 6

6. Are there any specific activities in the LEAF Lesson Guide that could be enhanced with digital materials? Please use the spaces below to list. Add additional pages if needed.

Objective of question 6:

To provide respondents an opportunity to identify resources that would enhance a specific activity or lesson.

F. Questionnaire Rationale Continued

Purpose of question 6:

To generate a very specific list of resources that could be created.

Responses from question 6 will be compared to responses from questions 4 and 5 to determine if respondents want more general (enhance the whole Guide) or more specific (enhance specific lessons) resources.

Question 7

7. Overall, my use of the LEAF Lesson Guide would be enhanced if I had access to new digital forestry education resources that support activities in the LEAF Lesson Guide...

Objectives of question 7:

To determine if providing respondents digital forestry education materials would enhance their use of the LEAF Lesson Guide.

Purpose of question 7:

If the majority of respondents answer not at all, fewer resources will be put toward the creation of digital resources to support the LEAF Lesson Guide. If the majority of survey respondents answer a lot, the purpose of the study will be reinforced.

Question 8

8. If new digital forestry education resources were available to me, the number of times I use the LEAF Lesson Guide to teach students about Wisconsin's forests in one school year would...

Objectives of question 8:

To determine if additional resources would increase respondents' use of the Guide.

Purpose of question 8:

If respondents' use of the guide would increase as a result of additional materials, the creation of materials is justified and more resources will be put toward their development.

Question 9

9. For each of the items below, please check the box that indicates the type of access you have for viewing or printing educational materials.

Objective of question 9:

To find out what support resources respondents have access to.

Purpose of question 9:

The resources available for use directly influence the types of materials that should be developed to benefit the maximum number of educators.

Question 10

10. If you have computer(s) in your classroom for student access, how many do you have?

Objective of question 10:

To find out how many computers respondents' have access to in their classrooms for student use.

F. Questionnaire Rationale Continued

Purpose of question 10:

If computers for student use are limited it will affect the type of digital resources that should be created.

Demographic Information

11. Which unit(s) of the LEAF Lesson Guide do you use to teach students?

K-1

2-3

4

5-6

7-8

9-12

12. What grade level(s) do you teach?

Kindergarten

1st grade

2nd grade

3rd grade

4th grade

5th grade

6th grade

7th grade

8th grade

9th grade

10th grade

11th grade

12th grade

13. Please describe your role with students (e.g., science teacher, administrator, special needs teacher, etc.)

14. Sample forestry education materials will be created for use with the LEAF Lesson Guide as a result of this survey. Would you be willing and able to participate in the pilot in May of 2006? Pilot participants must teach a LEAF lesson, use the new sample materials, and provide feedback. A stipend will be provided.

Yes

No

15. Would you like your name entered into the drawing to win one of the (2) \$50 gift certificates that will be given away? (You must fill in the contact information below to be entered into the drawing.)

Yes

No

Circle one

REI - Recreational Equipment, Inc.

F. Questionnaire Rationale Continued

Acorn Naturalists - Educational Supply

Forestry Suppliers, Inc. - Equipment

First Name _____

Last Name _____

Name of School _____

Address of School _____

Best email address at which to contact you _____

Best phone number at which to contact you _____

Best time to call _____

G. Email to Request Pilot Participation

Hello {name}

As a LEAF workshop participant, I am writing to request your assistance with my graduate research project. I am conducting a survey of teachers who have taken a LEAF workshop to find out what resources LEAF can provide to enhance teachers' use of the LEAF Lesson Guide. The new resources will be distributed to teachers digitally (via CD or the World Wide Web). The survey includes a questionnaire that will be mailed to nearly 600 teachers in early February. I would like you to be one of the five pilot teachers who test the questionnaire before it goes to the larger group. As a thank you for your time, LEAF will send you a copy of *One Hundred Years of Wisconsin Forestry: 1904-2004* (\$24.95 Value). This beautiful coffee table book is filled with photos and chronicles the story of Wisconsin's forests through time.

Here is how the pilot will work – if you agree to participate, next week I will mail you a copy of the survey questionnaire. You will fill it out along with an additional feedback form and return them to me within one week. The questionnaire will take approximately 15 minutes to complete and the feedback form will take approximately 10 additional minutes. When I receive your completed questionnaire and form, I will mail you a copy of *One Hundred Years of Wisconsin Forestry*.

Please reply to this email by Friday the 6th and let me know if you are available to help. I would appreciate your assistance, but if you cannot participate in the pilot, you will still receive the questionnaire in February with the rest of the survey group. If you have any questions please don't hesitate to ask.

Thank you for your consideration,
Sunshine

Sunshine Buchholz

Forestry Education Specialist
LEAF Program
Wisconsin Center for Environmental Education
College of Natural Resources
University of Wisconsin-Stevens Point
Stevens Point, WI 54481
(715) 346-2014
sbuchhol@uwsp.edu
www.uwsp.edu/cnr/leaf

H. Cover Letter for Survey Pilot



Learning, Experiences, & Activities in Forestry
Wisconsin K-12 Forestry Education Program

January 9, 2006

Dear [name],

Thank you for participating in the pilot of my survey questionnaire. As a Wisconsin teacher, your thoughts and suggestions are **very important** to LEAF, Wisconsin's K-12 Forestry Education Program. Our purpose is to help you inspire your students while teaching about Wisconsin's forests. To provide you with **new** forestry education resources, we are gathering suggestions from past LEAF workshop participants.

We know your time is valuable. The enclosed survey takes 15 minutes or less to complete. The pilot feedback form takes 10 minutes or less to complete. Your feedback will directly guide the forestry education materials LEAF creates in the future. Even if you have never used your LEAF Lesson Guide, please mark the appropriate box on the questionnaire and return it to us. Once you complete the questionnaire please fill out the enclosed pilot feedback form (green).

Benefits of completing the questionnaire include:

- Having a voice in new materials that LEAF produces
- An opportunity to pilot new materials in your classroom
- A chance to win one of two \$50 gift certificates of your choice

Please mail the questionnaire and pilot feedback form to me using the enclosed postage-paid envelope by **Tuesday, January 17, 2006**. It is important that I hear back from you promptly so I can incorporate your feedback on the revised questionnaire.

Thank you for your time and support of the LEAF Program.
Sincerely,

Sunshine Buchholz
LEAF Forestry Education Specialist

Wisconsin Center for Environmental Education-College of Natural Resources
University of Wisconsin-Stevens Point
Stevens Point, WI 54481
(715) 346-4956

LEAF is a partnership program between the Wisconsin Department of Natural Resources Division of Forestry and the Wisconsin Center for Environmental Education

I. Pilot Participant Feedback Form

Thank you for participating in the questionnaire pilot. Please fill out the questionnaire booklet completely first and then answer the questions below.

Questionnaire Pilot Feedback Form

For use with the 2006 LEAF Digital Resources Needs Assessment

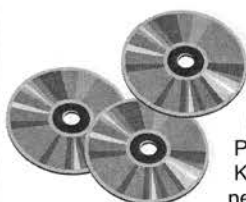
- 1. Please list any questions that were confusing and describe why they were confusing.**
(You may note this directly on the questionnaire booklet if you prefer.)

- 2. Are there any additional questions about digital resources you think teachers should be asked?**

- 3. Please suggest any modifications to the questionnaire that would make it more user friendly.**

J. Advance Notice CD Mailing Insert

LEAF News



CD-ROM ENCLOSED

Enclosed is your CD-ROM of the entire LEAF Lesson Guide. The CD contains PDF documents of all lessons in units K-1, 2-3, 4, 5-6, 7-8, and 9-12. You will need Adobe Acrobat Reader version 5.0 or later to access the documents. A free version of this software can be downloaded from the Adobe website at: www.adobe.com/products/acrobat/readstep2.html. The CD also contains the LEAF Conceptual Guide to K-12 Forestry Education in Wisconsin and a set of full color tree identification cards (in the unit 7-8 file).

To use the CD

- Place the CD in your computer
- Navigate to the CD drive
- Navigate to the folder of information you wish to access on the CD

Win a \$50 Gift Certificate for your Forestry Resource Ideas!



Is there a forestry education resource you wish you had access to? Maybe one that doesn't even exist yet? Here is your opportunity to tell us about it. LEAF will be creating new forestry education resources to accompany the LEAF Lesson Guide. In early 2006, you will receive a questionnaire in the mail asking about your needs. We want to hear about what resources you feel would enhance your use of the LEAF Lesson Guide to teach students about Wisconsin's forests. Please take a few moments to return the questionnaire when you receive it. Even if you are not currently using the LEAF Guide, it is important that we hear back from you. Two names will be drawn from respondents for a \$50 gift certificate of their choice. Thank you in advance for helping us help you.

Additional Units Available for Order

Find more on the CD than you want to print? The K-8 units of the LEAF Lesson Guide are available for purchase by educators who have taken a LEAF workshop. These units are meant for educators who teach multiple grade levels or have switched grades. To learn more or order one today, visit the LEAF website: www.uwsp.edu/cnr/leaf/Courses/740/index.htm (bottom of the page).

Happy Holidays from the LEAF Program

Did you know that Wisconsin has 36,000 acres of holiday trees helping the air, water, soil, and wildlife of our state?

Wisconsin ranks number five in the nation for holiday tree production.

There are 1.8 million holiday trees harvested in Wisconsin annually.



Enriching Students. Sustaining Forests.

www.uwsp.edu/leaf | leaf@uwsp.edu | 715-346-4956
LEAF, WCEE/CNR, UWSP, Stevens Point, WI 54481

OVER →

K. Advance Notice in LEAFlet Electronic Newsletter

LEAF General Newsletter December 2005

Page 3 of 6

So “get” out and see your world. Past participants have found that interactions with new environments such as these have re-ignited their passion for teaching and re-kindled their dedication to Environmental Education. As one participant shared,

“This teacher exchange program has given me more inspiration and fulfillment than any other workshop or inservice ever could. All teachers should expand their classroom to the rest of the world to build a path for future generations.”

GET is currently accepting applications for the 2006 programs. If you are interested in applying, contact GET at 715.346.4818 or GET@uwsp.edu, or visit the web site, www.uwsp.edu/get for more information.

[Back to TOP](#)

Win a \$50 Gift Certificate of Your Choice

Is there a forestry education resource you wish you had access to? Maybe one that doesn't even exist yet? Here is your opportunity to tell us about it. LEAF will be creating new forestry education resources to accompany the LEAF Lesson Guide. In early 2006, participants from LEAF workshops prior to September 1, 2005 will receive a questionnaire in the mail asking about their needs. We want to hear about what resources you feel would enhance your use of the LEAF Lesson Guide to teach students about Wisconsin's forests. Please take a few moments to return the questionnaire when you receive it. Even if you are not currently using the LEAF Guide, it is important that we hear back from you. Two names will be drawn from respondents for a \$50 gift certificate from either REI, Acorn Naturalists, or Forestry Suppliers, Inc. Thank you in advance for helping us help you.

[Back to TOP](#)

LEAF in Action - Crandon Middle School

By Tracy Cassidy, Crandon Middle School

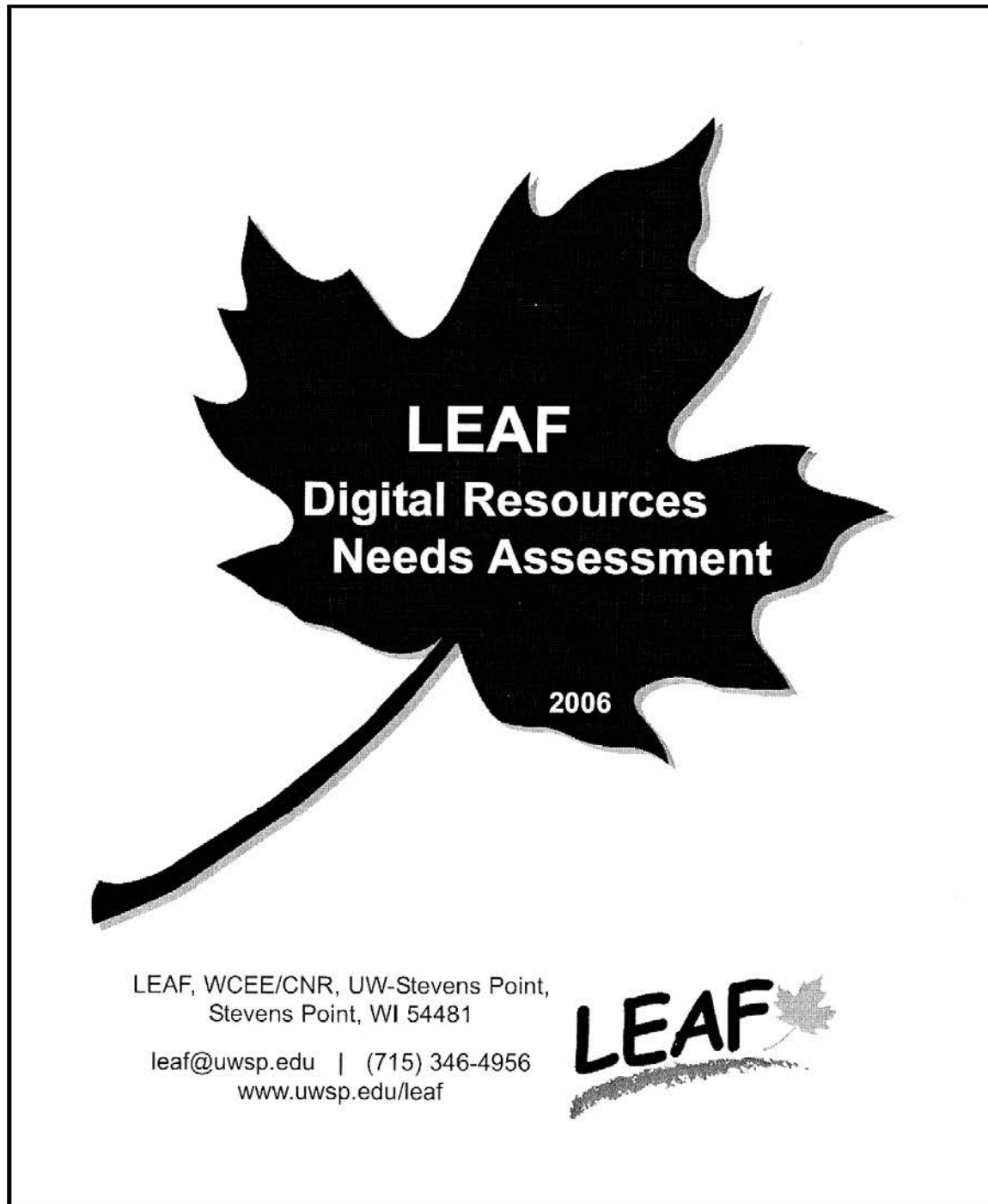
I participated in the first LEAF workshop offered at Trees for Tomorrow in 2003. It was a great motivator and I got so many great ideas and resources, I could not resist using the LEAF lessons in my 7th grade life science class. By far the lesson that my students enjoy the most is the Field Enhancement on tree identification. The students are introduced to dichotomous keys and learn to use them very well. We are lucky enough to have ten acres of upland forest attached to our school so I can take students out as often as I like. We have a good variety of trees and the kids love learning the different species and their characteristics. We have also found a lot of good specimens to identify right in our schoolyard.

After the students learn to identify some of the more popular species of trees, we spend some time discussing forest management. The LEAF guide has a wonderful forest management lesson which contains three great activities. Students are encouraged to discover the multiple uses of forests and they learn how professionals manage forests for the most beneficial

<http://www.uwsp.edu/cnr/leaf/LEAFlet/gnewsD05.htm>

12/21/2005

L. Questionnaire Cover



L. Questionnaire Page 1

The purpose of this questionnaire is to gather your thoughts about the creation of digital materials that will enhance the use of the LEAF Lesson Guide. The results of this study will determine what new materials will be created in the future.

1. Please check the following statement that *best* describes your use of the LEAF Lesson Guide to teach students about Wisconsin's forests:

☐ I have never used the LEAF Lesson Guide to teach students about Wisconsin's forests and do not intend to.

Please continue to question 16 on the last page.



☐ I have not yet used the LEAF Lesson Guide to teach students about Wisconsin's forests but I intend to.

Please continue to question 3.



☐ I have used the LEAF Lesson Guide to teach students about Wisconsin's forests but do not do so every school year.

Please continue to question 3.



☐ I use the LEAF Lesson Guide to teach students about Wisconsin's forests at least once per school year.

Please continue to question 2.



L. Questionnaire Page 2

2. I teach students about Wisconsin's forests using the LEAF Lesson Guide: (please circle one)

Occasionally (1-2 lessons in a school year)

Often (3-4 lessons in a school year)

Frequently (5-6 lessons in a school year)

Very Frequently (more than 6 lessons in a school year)

3. Other than the LEAF Lesson Guide and associated materials, I use the following resources to teach students about Wisconsin's forests: (check all that apply)

☐ None

☐ Project Learning Tree

☐ Other lesson/activity guides

☐ Reference books

☐ Story books

☐ Posters

☐ Video tapes

☐ Web sites

☐ CDs

☐ DVDs

☐ Other, please describe

For this questionnaire:

The term "**enhance**" means to improve the quality of, quantity of, or comfort in using.

The term "**digital**" refers to any material that can be accessed on or printed from a computer (e.g., using a CD-ROM or the World Wide Web).

L. Questionnaire Page 3

4. To what degree would the following digital forestry education resources enhance your use of the LEAF Lesson Guide to teach students? Please indicate by checking the boxes below.

Computer-based Resource	1 <i>Not at all</i>	2 <i>Slightly</i>	3 <i>Moderately</i>	4 <i>Very much</i>	?
Images for computer viewing					
Images for printing					
Maps for computer viewing					
Maps for printing					
Posters for computer viewing					
Posters for printing					
Scientific data					
Printable background information					
Printable lessons/activities					
Printable resource lists					
Chatroom or discussion board for teachers					
Chatroom or discussion board for students					
LEAF blog					
Educational game					
Simulations or animations					
Digital video					
Audio material (interviews, music, etc.)					
Web site links					
Ask an expert web page					
On-line tree identification key					
Virtual field trip					
Citizen science monitoring (students enter data)					

[illegible]

L. Questionnaire Page 5

6. Are there any specific activities in the LEAF Lesson Guide that could be enhanced with digital materials? Please use the spaces below to list. Add additional pages if needed.

Unit _____ Lesson Number _____ Activity Number _____

Describe the need _____

Describe the digital resource that would fill the need

Unit _____ Lesson Number _____ Activity Number _____

Describe the need _____

Describe the digital resource that would fill the need

Unit _____ Lesson Number _____ Activity Number _____

Describe the need _____

Describe the digital resource that would fill the need

L. Questionnaire Page 6

Please circle one answer for each of the following questions.

7. Overall, my use of the LEAF Lesson Guide would be enhanced if I had access to new digital forestry education resources that support activities in the LEAF Lesson Guide.

Strongly Disagree

Comments:

Disagree

Neutral

Agree

Strongly Agree

8. If new digital forestry education resources were available to me, my use of the LEAF Lesson Guide to teach students about Wisconsin's forests would:

Decrease

Comments:

Remain the same

Increase

Not sure

9. My comfort level in using digital resources for teaching students is:

Very Low

Comments:

Low

Moderate

High

Very High

L. Questionnaire Page 7

10. For each item below, please check the box that indicates the type of access you have for viewing or printing educational materials.

Item	Rarely Available	Sometimes Available	Readily Available
DVD player (for use with students)			
Black and white printer			
Color printer			
LCD projector and computer			
Computer with speed and memory acceptable to you			
Computer for your use in your classroom			
Computer(s) for students' use in your classroom			
Computer lab			
Internet for your use			
Internet for student use			

11. If you have computer(s) in your classroom for student access, how many do you have?

L. Questionnaire Page 8

Demographic Information

No identifying information will be used in reporting survey results. The researcher may contact you via phone or email to clarify answers to questions if necessary.

12. Which unit(s) of the LEAF Lesson Guide do you use to teach students? (circle all that apply)

K-1	4	7-8
2-3	5-6	9-12

13. What grade level(s) do you teach? (circle all that apply)

Kindergarten	5th grade	10th grade
1st grade	6th grade	11th grade
2nd grade	7th grade	12th grade
3rd grade	8th grade	
4th grade	9th grade	

14. Please describe your role with students (e.g., science teacher, administrator, special needs teacher, etc.).

L. Questionnaire Page 9

15. Sample digital resources will be created for use with the LEAF Lesson Guide as a result of this survey. Pilot participants will teach a LEAF lesson, use the new sample materials, and provide feedback. A stipend will be provided. Would you be willing and able to participate in a pilot of the new resources in May of 2006?

No **Yes** (please fill in the contact information below)

16. Would you like your name entered into the drawing to win one of the two \$50 gift certificates that will be given away? (You must fill in the contact information below to be entered into the drawing.)

No **Yes** *If yes, please circle one:*

REI - Recreational Equipment, Inc.

Acorn Naturalists - Educational Supply

Forestry Suppliers, Inc. - Equipment

Name _____

Name of School _____

Address of School _____

City _____ **State** _____ **Zip** _____

Best email address at which to contact you _____

Best phone number at which to contact you _____

Best time to call _____

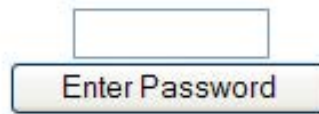
L. Questionnaire Back Cover

Please use this space for any additional comments you have.

Thank you...

for completing this questionnaire and returning it promptly.

M. Online Questionnaire Log In Page



A login form consisting of a rectangular input field for a password, positioned above a button labeled "Enter Password". The button has a light gray background and a thin black border.

**LEAF Digital Resources Needs Assessment 2006.
Please enter the password.**

N. Online Survey Instruction Page



Home	Services Offered	LEAF Publications	LEAF Lesson Guide	LEAF Courses/ Workshops
School Forests	Urban Forestry	Wildland Fire	Tree Identification	Opportunities/ Resources

LEAF Digital Resources Needs Assessment 2006

The purpose of this questionnaire is to gather your thoughts about the creation of digital materials that will enhance the use of the LEAF Lesson Guide. The results of this study will determine what new materials will be created in the future.

[Fill out a survey](#)

Contact us:

LEAF
Wisconsin Center for Environmental Education
College of Natural Resources
UW-Stevens Point
Stevens Point, WI 54481

Email: leaf@uwsp.edu
Fax: 715-346-3025
Phone: 715-346-4956

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O. Online Survey

LEAF Digital Resources Needs Assessment 2006



Home	Services Offered	LEAF Publications	LEAF Lesson Guide	LEAF Courses/ Workshops
School Forests	Urban Forestry	Wildland Fire	Tree Identification	Opportunities/ Resources

1. Please choose the following statement that *best* describes your use of the LEAF Lesson Guide to teach students about Wisconsin's forests:

- ☐ I have never used the LEAF Lesson Guide to teach students about Wisconsin's forests and do not intend to. *Please continue to question 16.*
- ☐ I have not yet used the LEAF Lesson Guide to teach students about Wisconsin's forests but I intend to. *Please continue to question 3.*
- ☐ I have used the LEAF Lesson Guide to teach students about Wisconsin's forests but do not do so every school year. *Please continue to question 3.*
- ☐ I use the LEAF Lesson Guide to teach students about Wisconsin's forests at least once per year. *Please continue to question 2.*

2. I teach students about Wisconsin's forests using the LEAF Lesson Guide: (please choose one)

- ☐ Occasionally (1-2 lessons in a school year)
- ☐ Often (3-4 lessons in a school year)

<http://www.uwsp.edu/cnr/leaf/survey/Survey.htm> (1 of 9) 12/7/2006 9:25:59 AM

O. Online Survey Continued

LEAF Digital Resources Needs Assessment 2006

- ☐ Frequently (5-6 lessons in a school year)
☐ Very Frequently (more than 6 lessons in a school year)

3. Other than the LEAF Lesson Guide and associated materials, I use the following resources to teach students about Wisconsin's forests: (check all that apply)

- ☐ None
☐ Project Learning Tree
☐ Other lesson/activity guides
☐ Reference books
☐ Story books
☐ Posters
☐ Video tapes
☐ Web sites
☐ CDs
☐ DVDs
☐ Other, please describe

For this questionnaire:

The term "enhance" means to improve the quality of, quantity of, or comfort in using.

The term "digital" refers to any material that can be accessed on or printed from a computer (e.g., using a CD-ROM or the World Wide Web).

4. To what degree would the following digital forestry education resources enhance your use of the LEAF Lesson Guide to teach students? Please indicate in the table below.

Computer-based Resource	Not at all 1	Slightly 2	Moderately 3	Very much 4	Not sure what the resource is ?
Images for computer viewing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Images for printing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Maps for computer viewing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Maps for printing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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O. Online Survey Continued

LEAF Digital Resources Needs Assessment 2006

Posters for computer viewing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Poster for printing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Scientific data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Printable background information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Printable lessons/activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Printable resource lists	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Chatroom or discussion board for teachers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Chatroom or discussion board for students	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
LEAF blog	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Educational game	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Simulations or animations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Digital video	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Audio materials (interviews, music, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Web site links	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ask an expert page	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
On-line tree identification key	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Virtual field trip	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Citizen science monitoring (students enter data)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

This is your opportunity to describe any type of forestry education resources we can provide you digitally that would enhance your use of the LEAF Lesson Guide. Materials will be created based on teacher responses.

5. Please describe digital forestry-related resources that would enhance your use of the LEAF Lesson Guide. This includes materials that would enhance your students' understanding of forestry concepts. Be as specific and as possible and list as many ideas as you can think of.

O. Online Survey Continued

LEAF Digital Resources Needs Assessment 2006

6. Are there any specific activities in the LEAF Lesson Guide that could be enhanced with digital materials? Please use the spaces below to list.

Unit Lesson Number Activity Number

Describe the need

Describe the digital resource that would fill the need

Unit Lesson Number Activity Number

Describe the need

Describe the digital resource that would fill the need

Unit Lesson Number Activity Number

Describe the need

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O. Online Survey Continued

LEAF Digital Resources Needs Assessment 2006

Describe the digital resource that would fill the need

Please choose one answer for each of the following questions.

7. Overall, my use of the LEAF Lesson Guide would be enhanced if I had access to new digital forestry education resources that support activities in the LEAF Lesson Guide.

- ☐ Strongly Disagree
☐ Disagree
☐ Neutral
☐ Agree
☐ Strongly Agree

Comments:

8. If new digital forestry education resources were available to me, the number of times I use the LEAF Lesson Guide to teach students about Wisconsin's forests in one school year would:

- ☐ Decrease
☐ Remain the same
☐ Increase
☐ Not sure

Comments:

9. My comfort level in using digital resources for teaching students is:

- ☐ Very Low
☐ Low
☐ Moderate
☐ High
☐ Very High

Comments:

<http://www.uwsp.edu/cnr/leaf/survey/Survey.htm> (5 of 9) 12/7/2006 9:25:59 AM

O. Online Survey Continued

LEAF Digital Resources Needs Assessment 2006

10. For each of the items below, please choose the option that indicates the type of access you have for viewing or printing educational materials.

Item	Rarely Available	Sometimes Available	Readily Available
DVD player (for use with students)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Black and white printer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Color printer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
LCD projector and computer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Computer with speed and memory acceptable to you	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Computer for use in your classroom	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Computer(s) for students' use in your classroom	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Computer lab	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Internet for your use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Internet for student use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

11. If you have computer(s) in your classroom for student access, how many do you have?

DEMOGRAPHIC INFORMATION

No identifying information will be used in reporting survey results. The researcher may contact you via phone or email to clarify answers to questions if necessary.

12. Which unit(s) of the LEAF Lesson Guide do you use to teach students? (check all that apply)

☐ K-1 ☐ 2-3 ☐ 4 ☐ 5-6 ☐ 7-8 ☐ 9-12

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O. Online Survey Continued

LEAF Digital Resources Needs Assessment 2006

13. What grade level(s) do you teach? (check all that apply)

- ☐ Kindergarten
- ☐ 1st grade
- ☐ 2nd grade
- ☐ 3rd grade
- ☐ 4th grade
- ☐ 5th grade
- ☐ 6th grade
- ☐ 7th grade
- ☐ 8th grade
- ☐ 9th grade
- ☐ 10th grade
- ☐ 11th grade
- ☐ 12th grade

14. Please describe your role with students (e.g., science teacher, administrator, special needs teacher, etc.)

15. Sample digital resources will be created for use with the LEAF Lesson Guide as a result of this survey. Pilot participants will teach a LEAF lesson, use the new sample materials, and provide feedback. A stipend will be provided. Would you be willing and able to participate in a pilot of the new resources in May of 2006?

- ☐ No ☐ Yes (please fill in the contact information below)

16. Would you like your name entered into the drawing to win one of the two \$50 gift certificates that will be given away? (You must fill in the contact information below to be entered into the drawing.)

- ☐ No ☐ Yes If yes, please check one
- ☐ REI - Recreational Equipment, Inc.
 - ☐ Acorn Naturalists - Educational Supply

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O. Online Survey Continued

LEAF Digital Resources Needs Assessment 2006

☐ Forestry Suppliers, Inc. - Equipment

First Name
Last Name
Name of School
Address of School
City State Zip
Best email address at which to contact you
Best phone number at which to contact you
Best time to call

Please use this space for any additional comments you have.

Thank You for completing this questionnaire.

Contact us:

LEAF
Wisconsin Center for Environmental Education
College of Natural Resources
UW-Stevens Point
Stevens Point, WI 54481

Email: leaf@uwsp.edu
Fax: 715•346•3025
Phone: 715•346•4956

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P. Online Survey Thank You Page



Home	Services Offered	LEAF Publications	LEAF Lesson Guide	LEAF Courses/ Workshops
School Forests	Urban Forestry	Wildland Fire	Tree Identification	Opportunities/ Resources

Your form was sent successfully!

Thank you for completing the LEAF Digital Resources Needs Assessment.

A summary of the survey data will be available in late March. Email sbuchhol@uwsp.edu to request a copy.

Contact us:

LEAF
Wisconsin Center for Environmental Education
College of Natural Resources
UW-Stevens Point
Stevens Point, WI 54481

Email: leaf@uwsp.edu
Fax: 715•346•3025
Phone: 715•346•4956

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Q. Questionnaire Modifications Based on LEAF Staff and Graduate Committee Review

Modify Questions Two and Three

(The word “regularly” is not descriptive enough)

Original answer options:

Never	
Occasionally	(1-2 lessons in a school year)
Regularly	(3-4 lessons in a school year)
Often	(5-6 lessons in a school year)
Frequently	(more than 6 lessons in a school year)

New version:

Never	
Occasionally	(1-2 lessons in a school year)
Often	(3-4 lessons in a school year)
Frequently	(5-6 lessons in a school year)
Very Frequently	(more than 6 lessons in a school year)

Add Comment Sections to Questions 7 and 8

(Gather more information for clarification)

Modify Scale in Question 7

(Allows for greater level of specificity)

Original answer options:

Not at all
Somewhat
A lot

New version:

Strongly Disagree
Disagree
Neutral
Agree
Strongly Agree

Add Additional Category to Question 8

(Allow people a level of uncertainty)

Added category:

Not sure

R. Questionnaire Modifications Based on Pilot

Changes in Demographic Information Gathering

(Based on how the pilot participants filled in this section of the questionnaire)

- Instead of separate lines for first and last name, only give one line labeled “name”
- Instead of two blank lines for address, ask for address with one line and city, state, and zip on separate lines

Modify Question Three

(Based on one pilot response it is thought to be misleading because resource materials are not just lesson materials)

Current version:

I teach students about Wisconsin’s forests using resource materials other than the LEAF Lesson Guide:

Never

Occasionally (1-2 lessons in a school year)

Often (3-4 lessons in a school year)

Frequently (5-6 lessons in a school year)

Very Frequently (more than 6 lessons in a school year)

New version:

Other than the LEAF Lesson Guide and associated materials, I use the following resources to teach students about Wisconsin’s forests (please check all that apply):

Lesson/activity guides

Reference books

Story books

Posters

Video tapes

Websites

CDs

DVDs

Other – please describe

None

Add a New Question

(Suggestion from pilot teacher to ask about teachers comfort with digital resources is valid)

Added question:

My comfort level in using digital resources for teaching students is:

Very Low

Low

Moderate

High

Very High

S. Cover Letter for Questionnaire Pilot Participants Post Revisions



ENRICHING STUDENTS. SUSTAINING FORESTS.
Wisconsin K-12 Forestry Education Program

February 6, 2006

Dear [name],

Thank you for your assistance with the pilot of my survey questionnaire last month. The feedback I received was very valuable and resulted in a strong product. One question was modified and one was added based on the pilot comments.

To get a complete set of answers to the questions from you, I am requesting you fill out the two questions that were not on the original survey. Please take just a moment and respond to **only questions 3 and 9**.

Your response must be mailed by **Tuesday, Feb. 21**. You can complete the questionnaire in two ways:

1. Fill out the enclosed booklet and mail it back using the enclosed postage-paid envelope.
2. Use the on-line form at: www.uwsp.edu/cnr/leaf/survey. The password you need to enter is: sunny (all small letters).

Thank you very much for your time and support of the LEAF Program.
Sincerely,

Sunshine Buchholz
LEAF Forestry Education Specialist

Wisconsin Center for Environmental Education - College of Natural Resources
University of Wisconsin-Stevens Point
Stevens Point, WI 54481
(715) 346-4956 | leaf@uwsp.edu | www.leafprogram.org

LEAF is a partnership program between the Wisconsin Department of Natural Resources - Division of Forestry and the Wisconsin Center for Environmental Education

T. Cover Letter for Survey Mailing 1



ENRICHING STUDENTS. SUSTAINING FORESTS.
Wisconsin K-12 Forestry Education Program

February 6, 2006

Dear [name],

As a Wisconsin teacher, your thoughts and suggestions are **very important** to LEAF, Wisconsin's K-12 Forestry Education Program. Our purpose is to help you inspire your students while teaching about Wisconsin's forests. To provide you with **new** forestry education resources, we are gathering suggestions from past LEAF workshop participants.

We know your time is valuable. The enclosed survey takes 15 minutes or less to complete. Your feedback will directly guide what forestry education materials LEAF creates in the future. Even if you have never used your LEAF Lesson Guide, please mark the appropriate box on the questionnaire and return it to us.

Benefits of completing the questionnaire include:

- Having a voice in new materials that LEAF produces
- An opportunity to pilot new materials in your classroom
- A chance to win one of two \$50 gift certificates of your choice (just add your contact information to the last page of the questionnaire)

Your response must be mailed by **Tuesday, Feb. 21**. You can complete the questionnaire in two ways:

1. Fill out the enclosed booklet and mail it back using the enclosed postage-paid envelope.
2. Use the on-line form at: www.uwsp.edu/cnr/leaf/survey. The password you need to enter is: sunny (all small letters).

Thank you for your time and support of the LEAF Program.
Sincerely,

Sunshine Buchholz
LEAF Forestry Education Specialist

Wisconsin Center for Environmental Education - College of Natural Resources
University of Wisconsin-Stevens Point
Stevens Point, WI 54481
(715) 346-4956 | leaf@uwsp.edu | www.leafprogram.org

LEAF is a partnership program between the Wisconsin Department of Natural Resources - Division of Forestry and the Wisconsin Center for Environmental Education



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University of Wisconsin-Stevens Point
Stevens Point, WI 54481-3897



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BUSINESS REPLY MAIL

FIRST-CLASS MAIL PERMIT NO. 121 STEVENS POINT, WI

POSTAGE WILL BE PAID BY ADDRESSEE

S. Buchholz, LEAF, WCEE, CNR
UNIVERSITY OF WISCONSIN-STEVENS POINT
2100 MAIN ST
STEVENS POINT WI 54481-9988



V. Reminder Email

Hello [name],

Last week a questionnaire seeking your opinions about digital resources that support your use of the LEAF Lesson Guide was mailed to you.

If you have already completed and returned the questionnaire to me, please accept my sincere thanks.

If you have not completed and returned the questionnaire, please do so today. I am especially grateful for your help because your responses will be beneficial in determining what forestry education resources LEAF creates in the future.

Even if you do not use the LEAF Guide regularly, your response is very valuable. This questionnaire is part of my graduate research and getting a high return rate will increase the success of my study.

If you did not receive the questionnaire in the mail, or it was misplaced, please call (715) 346-2014 and I will mail you another one today. You can also reply using the on-line form at: www.uwsp.edu/cnr/leaf/survey
password = sunny

An additional option for responding is to reply to this email. Just hit reply and type your responses to the questions below.

Sincerely,
Sunshine

Sunshine Buchholz

Forestry Education Specialist
LEAF Program
Wisconsin Center for Environmental Education
College of Natural Resources
University of Wisconsin-Stevens Point
Stevens Point, WI 54481
(715) 346-2014
sbuchhol@uwsp.edu
www.uwsp.edu/cnr/leaf

1. Please place an "X" next to the statement below that best describes your use of the LEAF Lesson Guide to teach students about Wisconsin's forests:

_____ **I have never used the LEAF Lesson Guide to teach students about Wisconsin's forests and do not intend to.** Please continue to question 16.

_____ **I have not yet used the LEAF Lesson Guide to teach students about Wisconsin's forests but I intend to.** Please continue to question 3.

V. Reminder Email Continued

- _____ I have used the LEAF Lesson Guide to teach students about Wisconsin's forests but do not do so every school year. Please continue to question 3.
- _____ I use the LEAF Lesson Guide to teach students about Wisconsin's forests at least once per year. Please continue to question 2.

2. I teach students about Wisconsin's forests using the LEAF Lesson Guide: (place an "X" next to one)

- _____ **Occasionally** (1-2 lessons in a school year)
- _____ **Often** (3-4 lessons in a school year)
- _____ **Frequently** (5-6 lessons in a school year)
- _____ **Very Frequently** (more than 6 lessons in a school year)

3. Other than the LEAF Lesson Guide and associated materials, I use the following resources to teach students about Wisconsin's forests: (place an "X" next to all that apply)

- _____ **None**
- _____ **Project Learning Tree**
- _____ **Other lesson/activity guides**
- _____ **Reference books**
- _____ **Story books**
- _____ **Posters**
- _____ **Video tapes**
- _____ **Web sites**
- _____ **CDs**
- _____ **DVDs**
- _____ **Other, please describe here:**

For this questionnaire:

The term "**enhance**" means to improve the quality of, quantity of, or comfort in using.

The term "**digital**" refers to any material that can be accessed on or printed from a computer (e.g., using a CD-ROM or the World Wide Web).

4. To what degree would the following digital forestry education resources enhance your use of the LEAF Lesson Guide to teach students? Please indicate by placing one of the following numbers next to each resource below

- (1) Not at all
- (2) Slightly
- (3) Moderately
- (4) Very much
- (?) Not sure what the resource is

- _____ **Images for computer viewing**
- _____ **Images for printing**

V. Reminder Email Continued

- _____ Maps for computer viewing
- _____ Maps for printing
- _____ Posters for computer viewing
- _____ Poster for printing
- _____ Scientific data
- _____ Printable background information
- _____ Printable lessons/activities
- _____ Printable resource lists
- _____ Chatroom or discussion board for teachers
- _____ Chatroom or discussion board for students
- _____ LEAF blog
- _____ Educational game
- _____ Simulations or animations
- _____ Digital video
- _____ Audio materials (interviews, music, etc.)
- _____ Web site links
- _____ Ask an expert page
- _____ On-line tree identification key
- _____ Virtual field trip
- _____ Citizen science monitoring (students enter data)

This is your opportunity to describe any type of forestry education resources we can provide you digitally that would enhance your use of the LEAF Lesson Guide. Materials will be created based on teacher responses.

5. Please describe digital forestry-related resources that would enhance your use of the LEAF Lesson Guide. This includes materials that would enhance your students' understanding of forestry concepts. Be as specific and as possible and list as many ideas as you can think of.

6. Are there any specific activities in the LEAF Lesson Guide that could be enhanced with digital materials? Please use the spaces below to list.

Unit:
Lesson Number:
Activity Number:
Describe the need:
Describe the digital resource that would fill the need:

Unit:
Lesson Number:
Activity Number:
Describe the need:
Describe the digital resource that would fill the need:

Unit:
Lesson Number:
Activity Number:
Describe the need:
Describe the digital resource that would fill the need:

V. Reminder Email Continued

Please choose one answer for each of the following questions. Place an "X" next to your choice.

7. Overall, my use of the LEAF Lesson Guide would be enhanced if I had access to new digital forestry education resources that support activities in the LEAF Lesson Guide.

- _____ Disagree
- _____ Strongly Disagree
- _____ Neutral
- _____ Agree
- _____ Strongly Agree

Comments:

8. If new digital forestry education resources were available to me, the number of times I use the LEAF Lesson Guide to teach students about Wisconsin's forests in one school year would:

- _____ Remain the same
- _____ Decrease
- _____ Increase
- _____ Not sure

Comments:

9. My comfort level in using digital resources for teaching students is:

- _____ Very Low
- _____ Low
- _____ Moderate
- _____ High
- _____ Very High

Comments:

10. For each of the items below, please choose the option that indicates the type of access you have for viewing or printing educational materials.

DVD player (for use with students): _____ Rarely Available _____ Sometimes Available _____ Readily Available

Black and white printer: _____ Rarely Available _____ Sometimes Available _____ Readily Available

Color printer: _____ Rarely Available _____ Sometimes Available _____ Readily Available

LCD projector and computer: _____ Rarely Available _____ Sometimes Available _____ Readily Available

Computer with speed and memory acceptable to you: _____ Rarely Available _____ Sometimes Available _____ Readily Available

V. Reminder Email Continued

Computer for use in your classroom: _____ Rarely Available _____ Sometimes Available _____ Readily Available

Computer(s) for students' use in your classroom: _____ Rarely Available _____ Sometimes Available _____ Readily Available

Computer lab: _____ Rarely Available _____ Sometimes Available _____ Readily Available

Internet for your use: _____ Rarely Available _____ Sometimes Available _____ Readily Available

Internet for student use: _____ Rarely Available _____ Sometimes Available _____ Readily Available

11. If you have computer(s) in your classroom for student access, how many do you have?

DEMOGRAPHIC INFORMATION

No identifying information will be used in reporting survey results. The researcher may contact you via phone or email to clarify answers to questions if necessary.

12. Which unit(s) of the LEAF Lesson Guide do you use to teach students? (place an "X" next to all that apply)

- _____ K-1
- _____ 2-3
- _____ 4
- _____ 5-6
- _____ 7-8
- _____ 9-12

13. What grade level(s) do you teach? (place an "X" next to all that apply)

- _____ Kindergarten
- _____ 1st grade
- _____ 2nd grade
- _____ 3rd grade
- _____ 4th grade
- _____ 5th grade
- _____ 6th grade
- _____ 7th grade
- _____ 8th grade
- _____ 9th grade
- _____ 10th grade
- _____ 11th grade
- _____ 12th grade

14. Please describe your role with students below (e.g., science teacher, administrator, special needs teacher, etc.)

V. Reminder Email Continued

15. Sample digital resources will be created for use with the LEAF Lesson Guide as a result of this survey. Pilot participants will teach a LEAF lesson, use the new sample materials, and provide feedback. A stipend will be provided. Would you be willing and able to participate in a pilot of the new resources in May of 2006?

_____ **No**
_____ **Yes** (please fill in the contact information below)

16. Would you like your name entered into the drawing to win one of the two \$50 gift certificates that will be given away? (You must fill in the contact information below to be entered into the drawing.)

_____ **No**
_____ **Yes** If yes, please check one of the options below:

_____ REI - Recreational Equipment, Inc.
_____ Acorn Naturalists - Educational Supply
_____ Forestry Suppliers, Inc. - Equipment

First Name:

Last Name:

Name of School:

Address of School:

City:

State:

Zip:

Best email address at which to contact you:

Best phone number at which to contact you:

Best time to call:

Please use this space for any additional comments you have.

Thank You for completing this questionnaire.

W. Cover Letter for Questionnaire Mailing 2



ENRICHING STUDENTS. SUSTAINING FORESTS.
Wisconsin K-12 Forestry Education Program

February 27, 2006

Dear [name],

About three weeks ago a questionnaire seeking your opinions about digital resources that support your use of the LEAF Lesson Guide was mailed to you.

If you have already completed and returned the questionnaire, please accept my sincere thanks.

I realize you may not have had time to complete the questionnaire. However, I would genuinely appreciate hearing from you. If you have not completed and returned the questionnaire, please do so today.

I am especially grateful for your help because LEAF will use your responses to determine what forestry education resources will be created in the future. **Even if you do not use the LEAF Guide regularly (or ever), your response is very valuable.** This questionnaire is part of my graduate research and getting a high return rate will increase the success of my study.

In the event that your questionnaire has been misplaced, a replacement is enclosed. By responding no later than **Thursday, March 9th**, you still have an opportunity to win one of two \$50 gift certificates of your choice (just add your contact information to the last page of the questionnaire).

You can complete the questionnaire in two ways:

1. Fill out the enclosed booklet and mail it back using the enclosed postage-paid envelope.
2. Use the on-line form at: www.uwsp.edu/cnr/leaf/survey. The password you need to enter is: sunny (all small letters).

Thank you for your time and support of the LEAF Program.
Sincerely,

Sunshine Buchholz
LEAF Forestry Education Specialist

Wisconsin Center for Environmental Education - College of Natural Resources
University of Wisconsin-Stevens Point
Stevens Point, WI 54481
(715) 346-4956 | leaf@uwsp.edu | www.leafprogram.org

LEAF is a partnership program between the Wisconsin Department of Natural Resources - Division of Forestry and the Wisconsin Center for Environmental Education

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Main Data Collection Table

The purpose of this questionnaire is to gather your thoughts about the creation of digital materials that will enhance the use of the LEAF Lesson guide. The results of this study will determine what new materials will be created in the future. For this questionnaire: The term "enhance" means to improve the quality of, quantity of or comfort in using. The term "digital" refers to any material that can be accessed on or printed from a computer (e.g., using a CD-ROM or the World Wide Web).

AutoNum: [AutoNum]

Question 1 - Please indicate which of the following statements best describes your use of the LEAF Lesson Guide to teach students about Wisconsin's forests: 0

Question 2 - I teach students about Wisconsin's forests using the LEAF Lesson Guide 0

Question 3 - Other than the LEAF Lesson Guide and associated materials, I use the following resources to teach students about Wisconsin's forests:

a. None	0	e. Story books	0	i. CDs	0	Other - Please Describe
b. Project Learning Tree	0	f. Posters	0	j. DVDs	0	
c. Other lesson/activity guides	0	g. Video tapes	0	k. Other	0	
d. Reference books	0	h. Web sites	0			

Question 4 - To what degree would the following digital forestry education resources enhance your use of the LEAF Lesson Guide to teach students? Please indicate in each of the following drop down menus:

a. Images for computer viewing	0	i. Printable lessons/activities	0	p. Digital video	0
b. Images for printing	0	j. Printable resource lists	0	q. Audio material (interview, music, etc.)	0
c. Maps for computer viewing	0	k. Chatroom for discussion board for teacher	0	r. Web site links	0
d. Maps for printing	0	l. Chatroom for discussion board for students	0	s. Ask an expert web page	0
e. Posters for computer viewing	0	m. LEAF blog	0	t. On-line tree identification tree	0
f. Posters for printing	0	n. Educational game	0	u. Virtual field trip	0
g. Scientific data	0	o. Simulations or animations	0	v. Citizen science monitoring (students enter data)	0
h. Printable background information	0				

Please do not forget the second column!

Question 5 - Please describe digital forestry-related resources that would enhance your use of the LEAF Lesson guide. This includes material that would enhance your students' understanding of forestry concepts. Be as specific as possible and list as many ideas as you can think of.

Record: 256 of 256

Form View

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X. Questionnaire Database

X. Questionnaire Database Continued

Microsoft Access

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Main Data Collection Table

Question 6 - Are there any specific activities in the LEAF Lesson guide that could be enhanced with digital materials? Please use the spaces below to list.

A. Unit Lesson Activity

Describe the need

Describe the resource that would fill the need:

B. Unit Lesson Activity

Describe the need

Describe the resource that would fill the need:

C. Unit Lesson Activity

Describe the need

Describe the resource that would fill the need:

Question 7 - Overall, my use of the LEAF Lesson Guide would be enhanced if I had access to new digital forestry education resources that support activities in the LEAF Lesson Guide.

Question 7 Comments:

Question 8 - If new digital forestry education resources were available to me, the number of times I use the LEAF Lesson Guide to teach students about Wisconsin's forests in one school year would:

Question 8 Comments:

Question 9 - My comfort level in using digital resources to teach students is:

Question 9 Comments:

Question 10 - For each of the items below, please check the box that indicates the type of access you have for viewing or printing educational materials.

a. DVD player

b. Black and white printer

c. Color printer

d. LCD projector and computer

e. Computer with speed and memory acceptable to you

Record: 256 of 256

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Main Data Collection Table

f. Computer for your use in your classroom 0

g. Computer(s) for students' use in your classroom 0

h. Computer lab 0

i. Internet for your use 0

j. Internet for student use 0

Question 11 - If you have computer(s) in your classroom for student access, how many do you have?

Demographic Information

Question 12 - Which unit(s) of the LEAF Lesson Guide do you use to teach students? Please select as many as apply? K-1 0 2-3 0 4 0 5-6 0 7-8 0 9-12 0

Question 13 - What grade level(s) do you teach? Please select as many as apply. K 0 1 0 2 0 3 0 4 0 5 0 6 0 7 0 8 0 9 0 10 0 11 0 12 0

Question 14 - Please describe your role with students (e.g., science teacher, administrator, special needs teacher, etc.).

Question 15 - Sample digital resources will be created for use with the LEAF Lesson Guide as a result of this survey. Would you be willing to participate in a pilot of the new resources in May of 2006? Pilot participants will teach a LEAF lesson, use the new sample materials, and provide feedback. A stipend will be provided. 0

Question 16 - Would you like your name entered into the drawing to win one of the (2) \$50 gift certificates that will be given away? (You must fill in the contact information below to be entered in the drawing.) 0

REI: Recreation Equipment, Inc. 0 Acorn Naturalist 0 Forestry Suppliers, Inc. 0

Comments:

First Name: Last Name:

Name of School: Best Email:

Address of School: Best Phone:

City: State: Zip: Best time to call:

Record: 256 of 256

Form View NUM

X. Questionnaire Database Continued

Y. Example of Coded Responses

Coded responses for Question 3: Other than the LEAF Lesson Guide and associated materials, I use the following resources to teach students about Wisconsin's forests: "other, please describe."

Question 3k	Topic	Topic
UWSP curriculum on Human Influence on WI Forests	Cu	
WI Forestree	Cu	
Smokey Bear Guide from DNR	Cu	DNR
Wisconsin Forests Forever Teachers Guide	Cu	
WI Forest Tales - awesome!	Cu	
Forestree	Cu	
DNR information	DNR	
tree measurement equipment (i.e.: biltmore stick, clinometer)	Eq	
Field trips	FT	
The forest	FT	
outdoor education classroom	FT	
school forest/hands-on activity	FT	
school forest	FT	
hands-on field activities	FT	
school forest	FT	
resource people	FT	
field trip	FT	
school forest	FT	
Field trips	FT	
field trip to urban forest	FT	
Visit to our school forest	FT	
outdoor experiences	FT	
field trips	FT	
school forest visits	FT	
field trips	FT	
field trips	GS	
DNR forester guest	GS	DNR
foresters	GS	
invited guests	GS	
Guest speakers	GS	
classroom speakers	GS	
resource people knowledgeable of forests products, etc.	GS	
Local DNR foresters and personnel	GS	DNR
Ranger Rick	Ma	
Trees and Woodlots Magazine	Ma	
DNR magazine	Ma	DNR
science magazine	Ma	
singing songs of WI lumber industry, work songs	Mu	
An Album! Billy B Sings About Trees believe it or not! Do you know if this "ancient resource" is available on CD? It's great!	Mu	
As a Reading Specialist, Guided Reading materials are used that are "leveled." Some of the leveled readers include topics such as wildlife and habitats, but we do not have enough non-fiction leveled readers. That would be a good idea for your project to consider.	O	
WDNR Tree Key	O	
construction class	O	
FOSS kits	O	
terrarium	O	
non-fiction books from my school and local public libraries	OP	
Scholastic News	OP	
Biology text	OP	
text book	OP	

Topic	Code
DNR material	DNR
Equipment/tools	Eq
Field trips/school forest	FT
Guest speaker	GS
Magazines	Ma
Music	Mu
Other	O
Other curriculum	Cu
Other publications	OP
Personal Information	PI
Project Wet or Learning Tree	Pr
Visuals/objects	V

Y. Example of Coded Responses Continued

Naturescope - Trees Are Terrific	OP	
DNR publications	OP	DNR
use own activities specific to our school forest	PI	FT
my own course background in field botany and ecology	PI	
my own sheets	PI	
Project wild	Pr	
Adapt Project Wild	Pr	
Project Wet	Pr	
Project WILD	Pr	
slide show on past and present cutting equipment - from axes to processors, logging camp simulation	V	
Visuals - materials from a lumber camp	V	

Z. Report to the LEAF Program

LEAF Digital Resources Needs Assessment 2006

Summary of Results Prepared for the LEAF Program

By Sunshine Buchholz
LEAF Forestry Education Specialist, 2001-2006
WCEE Environmental Education Specialist, 2006-present

Spring 2007

Executive Summary

Executive Summary

Introduction

This report summarizes a survey conducted for the LEAF Program by Sunshine Buchholz, Forestry Education Specialist, in 2006. LEAF is Wisconsin's K-12 Forestry Education Program, which provides educators with forestry education materials, including a Lesson Guide teachers receive by taking a workshop. The goal of this study was to provide LEAF with recommendations for the development of digital resources that enhance teacher's use of the Lesson Guide. A full description of the research and results can be found in *Recommendations on Digital Resources for the Wisconsin K-12 Forestry Education Program (LEAF)* - thesis by Sunshine R. Buchholz. The Literature Review provides background information on different types of digital resources and technology referenced in this report, the benefits of technology use in education, and the students of the digital age.

The following major points are detailed in this report:

- Educators will benefit from the creation of a LEAF Digital Resources Library that houses a variety of resources.
- The LEAF Program can increase its value to educators and stakeholders by serving as Wisconsin's Forestry Education Resource Clearinghouse.
- Digital resources would enhance use of the LEAF Guide for 61.3% of survey respondents and increase the amount of time they use the Guide for 49.1% of respondents.
- Eighty-nine percent of Guide users indicated that their comfort level in using digital resources for teaching students is moderate to very high, yet training is key in getting educators to incorporate digital resources into their forestry education lessons.

Survey of Teachers

In early 2006, a survey of educators who had taken a LEAF workshop was conducted to determine their digital resource needs. A questionnaire was used to gather feedback on what resources participants felt would enhance their use of the Guide. The survey population consisted of all teachers who took a LEAF workshop between July 2003 (first LEAF workshop) and September 2005, a total of 593 participants.

Teachers who live and teach outside of Wisconsin were not sent a survey (6 people). The total number of surveys mailed was 587. A total of 256 surveys were returned. Two surveys were duplicates and three surveys were determined to be unusable. Analysis was done on the 251 useable surveys. Response rate (useable surveys) was 42.8%.

Summary of Results

Guide Use

Of the 251 people that responded to the survey, 90.8% indicated that they intend to use the LEAF Guide, use the LEAF Guide but not every year, or use the LEAF Guide at least once per year. Over half of the respondents (55.8%) use the LEAF Guide at least once per year. (See pages 16-19)

Of the respondents who use the LEAF Guide at least once per year, 74.3% use it occasionally or often (between one and four lessons per year). Approximately a quarter (25.7%) of the respondents use the Guide for more than five lessons per year. (See pages 20-22)

Table 1 shows the number of respondents using each unit of the LEAF Guide. Respondents were asked to indicate all units of the LEAF Guide they use. Of the 215 respondents who indicated the unit they use, 58 (27.0%) use more than one unit of the LEAF Guide. (See page 92)

There were more users of the 7-8 unit than any other unit. Many of the 7-8 unit users teach grades 9-12 which may be a result of the way Guides were distributed early in their development (grade 9-12 teachers participating in a LEAF workshop prior to the completion of the 9-12 unit received a 7-8 unit).

Digital Resource Value

Of the 217 respondents who use or intend to use the LEAF Guide, 61.9% agreed or strongly agreed that their use of the Guide would be enhanced if they had access to new digital forestry education resources. Table 2 illustrates that there is some variation based on the unit used. Select comments about digital resources in this question include: “they help student understanding,” “they keep student attention,” “they make lesson preparation easier,” and “they give students independence.” (See pages 71-74)

Of the 218 respondents who use or intend to use the LEAF Guide, nearly half (49.1%) indicated that new digital forestry education resources would increase the amount of time they use of the Guide. Table 3 illustrates there is some variation based on the unit used. Select comments about digital resources in this question include: “it would be more user-friendly and I could be more effective with less time necessary to prep.” (See pages 75-79)

Of the 219 respondents who use or intend to use the LEAF Guide, 88.5% indicated that their comfort level in using digital resources for teaching students is moderate to very high. (See pages 79-82)

Technology Resource Availability

Overall the availability of technology resources (e.g., computers, printers) to survey respondents is high. Therefore, access to technology resources should not be seen as a barrier when planning for digital resource creation. Over 95% of the respondents who use or intend to use the LEAF Guide indicated that a computer in their classroom is sometimes or readily available to them for viewing or printing educational materials. Over 90% of those with computer access indicated that it had acceptable speed and memory. Nearly all of the respondents have access to the Internet (97.8%) and a black and white printer (98.6%).

The following numbers represent the percentage of respondents who indicated that the following are sometimes or readily available to them for viewing or printing educational materials:

- Internet for student use = 91.4%
- Computer lab = 91.0%
- DVD player = 85.2%
- LCD projector = 83.0%
- Color printer = 77.9%

Table 1

Unit used	Number of respondents using
K-1	38
2-3	37
4	45
5-6	50
7-8	73
9-12	55

Table 2

Unit used	Percent agreeing or strongly agreeing
K-1	55.6%
2-3	66.7%
4	65.0%
5-6	58.3%
7-8	64.3%
9-12	73.6%

Table 3

Unit used	Percent indicating increased use
K-1	55.6%
2-3	47.2%
4	37.2%
5-6	50.0%
7-8	54.4%
9-12	60.4%

- Computer(s) for student use in their classroom = 67.7%
(See pages 83-90)

Of 186 survey respondents who indicated the number of computers they have in their classroom for student access, 19.4% have no computer, 33.9% have one computer, 18.3% have two computers, and 5.4% have 20 or more computers. (See page 91)

Specific Resource Value

The following numbers represent the percent of respondents (who use or intend to use the Guide) that use specific materials in addition to the LEAF Lesson Guide to teach students about Wisconsin's forests: (See pages 23-29)

- Other lesson or activity guides = 53.0%
- Reference books = 47.8%
- Video tapes = 46.1%
- Posters = 45.7%
- Story books = 42.7%
- Web sites = 40.9%
- Project Learning Tree (PLT) = 40.1%
- Other materials = 20.7%
- DVDs = 17.7%
- CDs = 12.2%
- Only the LEAF Guide = 5.6%

Because only 5.6% of respondents (who use or intend to use the LEAF Guide) indicated they use the LEAF Guide exclusively to teach about Wisconsin's forests, 94.4% of respondents are assumed to use materials in addition to the LEAF Guide. Therefore, LEAF could enhance its ability to serve educators by becoming a clearinghouse that disseminates information about all types of forestry education resources. (See page 12)

The following numbers represent the percent of respondents (who use or intend to use the LEAF Guide) that indicated particular types of digital resources would be moderately or very useful to enhance their use of the Guide in teaching students about Wisconsin's forests: (See pages 30-74)

- Printable lessons/activities = 86.3%
- Educational game = 81.5%
- Images for printing = 77.4%
- Online tree identification key = 76.9%
- Printable background information = 76.4%
- Web site links = 75.0%
- Simulations and animations = 73.6%
- Virtual field trip = 72.4%
- Maps for printing = 72.2%
- Images for computer viewing = 70.8%
- Digital video = 69.5%
- Maps for computer viewing = 67.1%
- Posters for printing = 64.5%
- Printable resource lists = 64.5%
- Ask an expert web page = 64.2%
- Scientific data = 63.1%
- Audio material = 51.6%
- Posters for computer viewing = 51.4%

- Citizen science monitoring = 42.6%
- Chatroom or discussion board for teachers = 25.8%
- LEAF blog = 17.3%
- Chatroom or discussion board for students = 15.6%

The most effective manner in which the LEAF Program can distribute digital resources to educators is through a digital resources library. (*See page 12*)

Recommendations

Recommendations

The following table summarizes and prioritizes recommendations for creating digital forestry education resources based on the results of this study (a priority of level 1 is the most important).

Prioritized Recommendations for Digital Resource Creation		
Priority	Recommendation	Justification
1	Develop a plan that outlines how LEAF will serve as Wisconsin's Forestry Education Resource Clearinghouse.	Survey results – over 94% of survey respondents use forestry education materials in addition to the LEAF Guide. Research – teachers have limited time and need to be able to find resources efficiently.
1	Research existing forestry education materials to incorporate into the LEAF Clearinghouse.	Survey results – over 94% of survey respondents use forestry education materials in addition to the LEAF Guide. Research – there are many existing resources that can meet teachers' forestry education needs.
1	Develop a plan for the creation of the LEAF Digital Resources Library.	Survey results – digital resources will enhance and increase teachers' use of the LEAF Lesson Guide. Research – teachers have limited time and need to be able to find resources efficiently.
Incorporate the following into the LEAF Digital Resources Library:		
1	Digital images, maps, and posters	Survey results indicate these resources would enhance respondent's use of the LEAF Guide. Priority is based on the percentage of respondents indicating each resource would be moderately to very useful. (1=70% or greater, 2=50%-60%)
1	Educational games	
1	Expanded LEAF tree identification key	
1	Printable background information	
1	Printable lessons/activities	
1	Simulations and animations	
1	Videos	
1	Virtual field trips	
1	Web site links	
2	"Ask an expert" feature	
2	Audio material	
2	Printable resource lists	
2	Scientific data (or links to scientific data)	
2	GIS/GPS lessons	These two resources were added to the list based on respondents' comments (rather than to question response). Each of these resources was said to be useful by seven or more individuals.
2	WebQuests	
1	When creating resources for the digital library, incorporate respondent suggestions for materials that enhance specific lessons in specific units of the LEAF Guide.	Based on survey respondent suggestions for resources that enhance specific lessons. (Survey question 6)

Technology Resource Recommendations

Teachers' access to technology resources (e.g., computers, printers) should not limit the creation of digital resources. Whenever possible, alternatives for using particular technology resources should be suggested in the event that technical difficulties arise. Educators should be encouraged to print materials well in advance of using them, test Internet resources prior to use with students, and download materials from CD-ROMs or the Internet prior to class time. Detailed instructions should be provided for accessing technology resources (e.g., downloading, accessing a media player, printing, etc.). Troubleshooting suggestions should also accompany digital resources. LEAF may want to consider providing contact information for a staff person who can assist educators in accessing digital resources. Resources should be created in a manner that allows them to be used and disseminated in multiple ways to provide maximum access. Items created for student exploration should be formatted so that students can use them independently on a computer or in a group setting shown to the entire class using an LCD projector. Full-color resources should be developed for both printing and viewing on screen. For resources that require color printing, LEAF should suggest ways educators can accomplish this such as requesting materials from the LEAF Program (possibly for a fee).

Forestry Education Clearinghouse

Because only 5.6% of respondents (who use or intend to use the LEAF Guide) indicated they use the LEAF Guide exclusively, 94.4% of respondents are assumed to use materials in addition to the LEAF Guide to teach about Wisconsin's forests. Therefore, LEAF could enhance its ability to serve educators by becoming **Wisconsin's forestry education resource clearinghouse**.

A clearinghouse coordinates the collection and distribution of information. To become a forestry education clearinghouse, the LEAF Program would gather information about all the forestry education resources available to Wisconsin's teachers and provide instructions on how to access them in an organized manner. This includes all types of resources including print items such as activity guides and posters, digital resources such as those suggested in this study, human resources such as potential guest speakers, and physical resources such as field trip locations and equipment. The LEAF Program does not have to create all the materials to meet educators' needs. The goal of being a clearinghouse is to help people find the resources they want and make them aware of resources they did not know existed. Becoming a forestry education clearinghouse will ensure that the LEAF Program continues to serve teachers' resource needs long after they participate in a LEAF workshop.

Educators have limited time to prepare for teaching and acquire all the necessary resources that support their lessons. Many survey participants reference lack of preparation time as a barrier to using new resources. Because of their time constraints, educators are most likely to use resources that are well organized and easily accessible. Therefore, the fewer places from which teachers need to acquire resources for a particular topic, the more likely they are to teach the topic.

Digital Resource Library

All information provided by the LEAF Program as Wisconsin's forestry education resource clearinghouse can be organized and disseminated through a **digital resources library**. This will assist educators in accessing resources as efficiently as possible. A digital resource library is a coherent, organized collection of documents that have been compiled and produced in digital format. The goal of a digital library is to bring different types of resources together from many entities and place them into one convenient location for users to browse. A digital library is a tool that brings scattered resources together in an accessible framework. Educators can use digital libraries to create tailored experiences for their students that utilize the most current information and cover topics through a variety of methods.

The LEAF Digital Resource Library should be a web-based tool containing easily navigable sections organized in a consistent manner, such as by topic, resource type, or grade level. There should be information for classroom teachers, students, non-formal educators, and anyone else looking for forestry education materials. The library should have various resource categories such as background information, lessons and activities, digital images, and support materials (e.g., posters, CD-ROMs, DVDs, etc.). General forestry education materials and support materials that tie directly to the LEAF Lesson Guides should also be included.

- **Planning and Development**

The creation of the LEAF Digital Resource Library should be done with careful planning and input from educators. The library should be developed with the assistance of a professional web designer who can create a solid navigation structure, ensure the site has room for growth, and incorporate graphics that enhance users' experience. Once a template is created, LEAF staff can update and expand the library. The library should be maintained on a continual basis to avoid outdated information and broken links. New information must be added regularly encourage return visitation. The library should be advertised not only to LEAF teachers, but also to all educators in Wisconsin. People should receive reminders that the library exists and information about new resources that are added.

The forestry resource needs identified in this research should serve as a foundation to develop a digital resource library. The LEAF Program does not need to create every type of resource. Research should be conducted to determine what resources exist and information should be provided as to how to access these materials. To ensure the information is user-friendly, each resource should be described and the grade levels for which it is appropriate should be suggested. Teachers should be continually asked what their forestry education needs are. If LEAF does not have requested resources, the program should consider creating them or find out where they currently exist and provide information on how they can be obtained.

- **Existing LEAF Web Site**

The digital resources library should be a separate entity from the existing LEAF web site, which will allow it to have a look and feel of its own. It will also keep the LEAF web site clean and simple with information about the program that is easy to access. If the resource library is added to the existing LEAF web site the site may become too large and difficult to navigate. When linking to the digital library, users will have the feeling of leaving one site and entering a new, but related, site.

Both sites should share the LEAF logo and color scheme but can have an overall different appearance because they serve different purposes. To organize the two sites, educational resources should be removed from the existing LEAF web site and moved into the digital library. The existing LEAF site should be informational and answer people's questions about the LEAF Program. The digital library should be a place for people to find forestry education resources. For example, the wildland fire section of the existing LEAF web site would contain information about the wildland fire lesson guide supplement, conceptual document, rationale, and workshops. All wildland fire teaching resources would be part of the digital library.

People should be able to connect to one site independently of the other depending on the type of information they need. Each site should have a clearly identified link to the other site with an explanation of the type of information it contains. People may search the World Wide Web and find one site without realizing the other exists.

- **Training**

If the LEAF Program invests resources in the creation of digital resources for teachers, it should also invest resources in providing training opportunities on how to best use the resources. Information should be provided not only on how to access and use digital resources, but also on the benefits of using them to enhance students' learning experiences. Professional development is most effective when presented in a number of different formats such as training workshops, presentations at conferences, online courses, and self-directed learning.

To be successful, teachers need to see technology as a valuable resource. This may require a change in belief about teaching and learning. Teachers need to be open to change and take time to make changes if they have been relying on purely traditional methods. Research shows that the extent to which teachers receive professional development in using computers for learning plays a role in whether the technology has a positive impact on student achievement. Teachers need to know how to use the technology, as well as how to effectively incorporate it into their instruction.

Suggestions on various ways educators can incorporate digital resources into their forestry education lessons should be part of the digital resources library, providing educators with options to best meet the needs of their particular teaching situation. For a school forest educator, printing digital images of various plants may be their most effective use of digital resources. For a classroom teacher with access to a computer lab, an independent student WebQuest on the various forest types of Wisconsin may be their best option. Teachers need to see and understand what options are available to them.

- **Existing Digital Resource Libraries for Reference**

- The *National Science Digital Library* houses resources for K-12 teachers, librarians, university faculty, and the general public. The library was created by the National Science Foundation in an effort to assist educators, in efficiently locating quality resources. The library directs users to exemplary resources for science, technology, engineering, and mathematics education and research. Resources available are projects of the National Science Foundation or have been reviewed by their staff.
<http://nsdl.org/>
- The *Digital Library for Earth System Education* is a community effort involving educators, students, and scientists working together to improve the quality, quantity, and efficiency of teaching and learning about the Earth system at all levels. DLESE supports Earth system science education by providing access to high-quality collections of educational resources, Earth data sets and imagery, support services to help educators and learners effectively create, use, and share educational resources, and communication networks. DLESE resources include electronic materials for both teachers and learners, such as lesson plans, maps, images, data sets, visualizations, assessment activities, curriculum, online courses, and much more.
<http://www.dlese.org/about/index.html>
- *Cornell University Library Gateway – Digital Collections*:
http://campusgw.library.cornell.edu/about/digital_collections.html
- *EDSITEment*: <http://www.edsiteement.neh.gov/>

Survey Results

QUESTION 1

QUESTION 1: Please check the following statement that best describes your use of the LEAF Lesson Guide to teach students about Wisconsin's forests:

- I have never used the LEAF Lesson Guide to teach students about Wisconsin's forests and do not intend to. *Please continue to question 16.*
- I have not yet used the LEAF Lesson Guide to teach students about Wisconsin's forests but I intend to. *Please continue to question 3.*
- I have used the LEAF Lesson Guide to teach students about Wisconsin's forests but do not do so every school year. *Please continue to question 3.*
- I use the LEAF Lesson Guide to teach students about Wisconsin's forests at least once per school year. *Please continue to question 2.*

Question 1

Answer	Frequency	Percent
Not Applicable - question not answered	4	1.6
Never used Lesson Guide, do not intend to	19	7.6
Have not yet used Lesson Guide, do intend to	40	15.9
Have used Lesson Guide but not every year	48	19.1
Use Lesson Guide at least once per year	140	55.8
Total	251	100.0

Figure 1.1

Summary

Of the 251 people that responded to the survey, 90.8% indicated that they intend to use the LEAF Lesson Guide, use the LEAF Lesson Guide but not every year, or use the LEAF Lesson Guide at least once per year to teach students about Wisconsin's forests. Over half of the respondents (55.8%) use the LEAF Lesson Guide at least once per year.

Question 1
Frequency and percent of each answer.

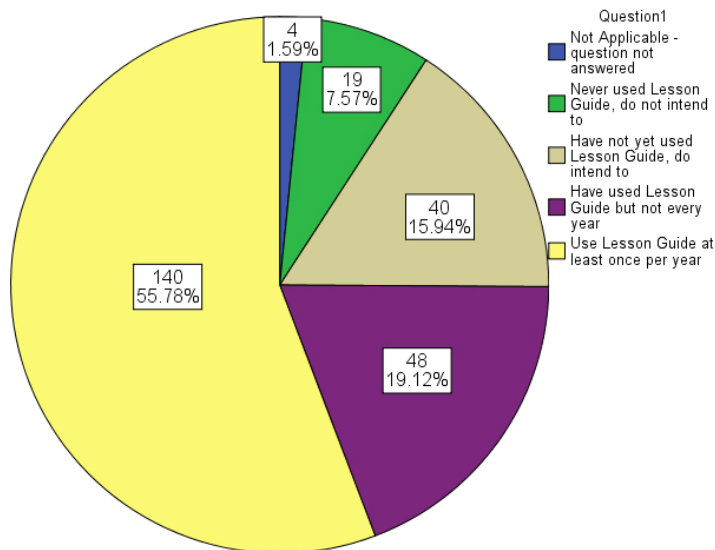


Figure 1.2

QUESTION 1

Summary of responses by unit used. Note: respondents were asked to indicate all the units they use. Therefore, the total number of respondents for each category below may appear to be higher than the totals in figure 1.1.

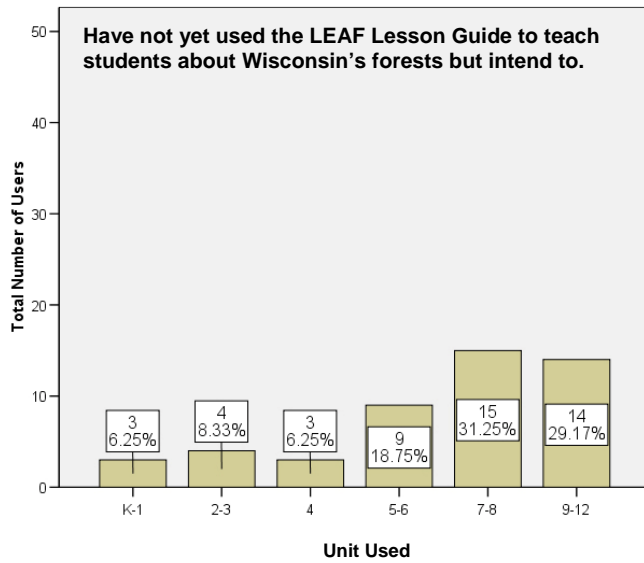


Figure 1.3a

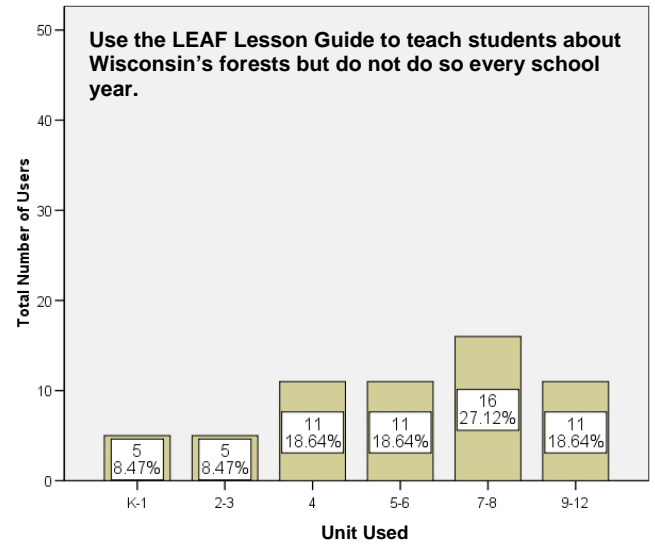


Figure 1.3b

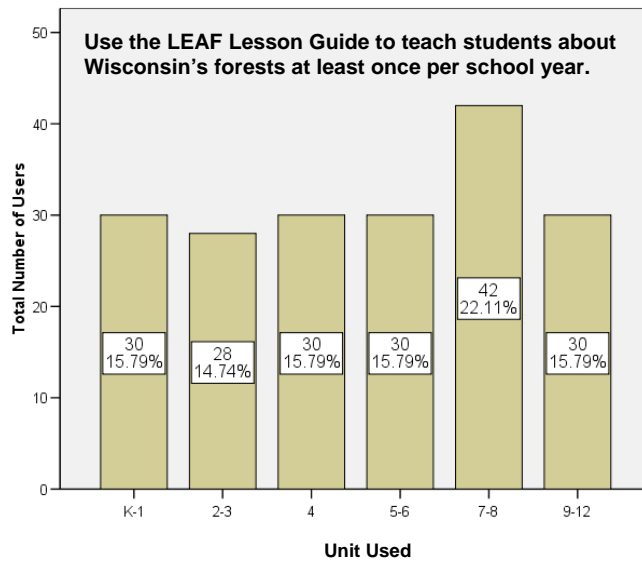


Figure 1.3c

Note: Percents reflect the portion of the total represented by each unit within each category.

QUESTION 1

Summary of responses by grade level taught. Note: respondents were asked to indicate all the grade levels they teach. Therefore, the total number of respondents for each category below may appear to be higher than the totals in figure 1.1.

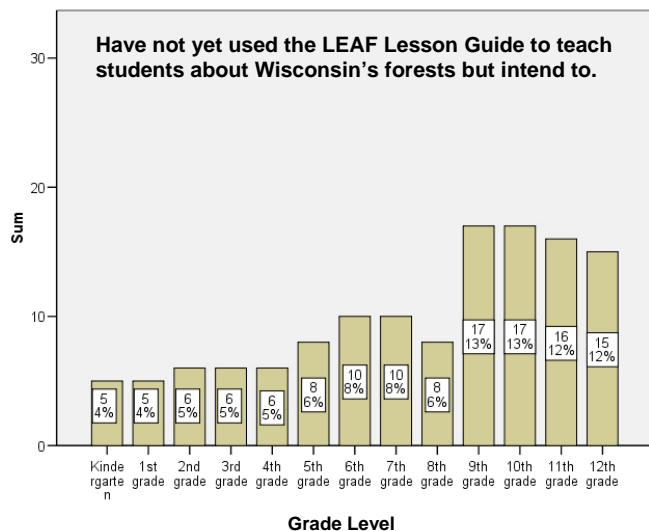


Figure 1.4a

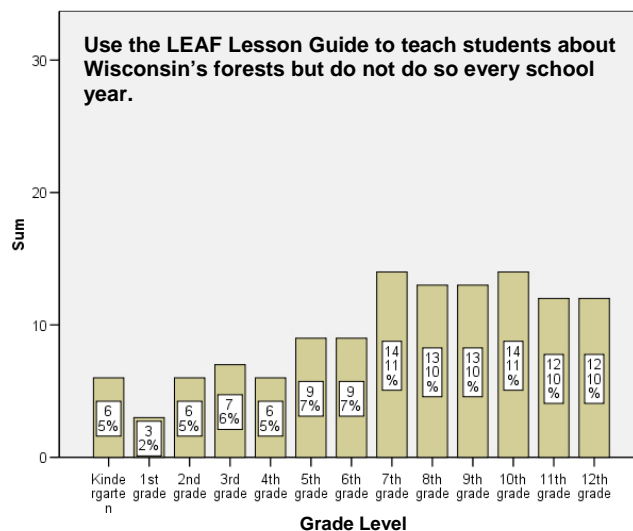


Figure 1.4b

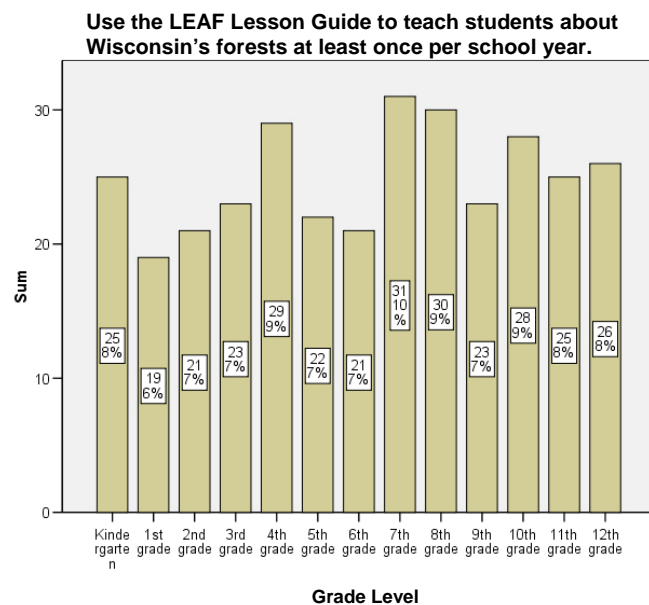


Figure 1.4c

Note: Percents reflect the portion of the total represented by each grade level within each category.

QUESTION 1

Of the 251 people that responded to the survey, 7.6% or 19 people indicated that they have never used the LEAF Lesson Guide and do not intend to. Comments written on the survey indicate that a portion of this group would not be expected to use the LEAF Lesson Guide. Although LEAF workshops are designed for classroom teachers, occasionally other individuals participate. These people include school administrative staff such as principals and resource specialists such as librarians. These individuals are invited to participate in the workshop to better understand the LEAF Program and share information about LEAF materials with teaching staff in their schools. Comments from respondents who do not use the LEAF Guide and do not intend to are provided below.

Comments from those who do not use the LEAF Guide and do not intend to.
I have enjoyed every class that I have taken through the LEAF program and find the information useful. I take a group of 6 th , 7 th , and 8 th grade students to Eagle River's Trees for Tomorrow each year. I believe that students in Wisconsin need to be educated about Wisconsin, its forests, management uses, resources, and energy concerns. The information that I have from these classes enhance our Trees experience. Thank you and keep up the good work.
I retired this past June and don't have access to the guide.
I am the principal, so I don't teach classes.
I do think that the activities presented in the guides are very well done. I am not a classroom teacher and so that's why I haven't used it.
I am no longer teaching science, so I do not use the curriculum at all.
Unable to incorporate into the low reading levels of my pull-out program! Good info for myself!
Due to budget cuts I don't know what I will be teaching next year and this year I got changed to literature and social studies. I really like the materials but not able to use them.
I am sorry; I have transferred schools and no longer teach lessons in elementary school since taking the LEAF course.
Unfortunately I teach math and am currently unable to use the LEAF materials.
I am an LMC director and took the class to support classroom instruction.
Teach elementary PE K-5 that's why! Sorry.
The training was wonderful! I don't teach the material because I am a building principal!
Can not seem to fit it into 5th grade curriculum.

Note: One must be cautious when extrapolating the data gathered from this survey to the entire population of LEAF teachers. Two opposing conclusions could be made about the number of teachers using the LEAF Lesson Guide. One could assume that if over 90% of teachers who responded to the survey indicated that they intend to use the LEAF Lesson Guide, use the LEAF Lesson Guide but not every year, or use the LEAF Lesson Guide at least once per year than over 90% of all the teachers who have taken a LEAF workshop or will take a LEAF workshop in the future will use the LEAF Lesson Guide. On the other hand, one could assume that the 42.8% of teachers who responded to the survey are the ones most likely to use or be using the LEAF Lesson Guide and therefore were most likely to respond to the survey. The 57.2% of teachers who did not respond to the survey may not use the LEAF Lesson Guide or ever intend to use the Guide and therefore did not respond to the survey.

QUESTION 2

QUESTION 2: I teach students about Wisconsin's forests using the LEAF Lesson Guide:
(please circle one)

- Occasionally (1-2 lessons in a school year)
- Often (3-4 lessons in a school year)
- Frequently (5-6 lessons in a school year)
- Very Frequently (more than 6 lessons in a school year)

*Data for the 140 people who indicated they use the LEAF Lesson Guide at least once per year in Question 1.

Question 2

Answer	Frequency	Percent
Occasionally (1-2 lessons/year)	53	37.9
Often (3-4 lessons/year)	51	36.4
Frequently (5-6 lessons/year)	21	15.0
Very Frequently (more than 6 lessons/year)	15	10.7
Total	140	100.0

Figure 2.1

Summary

Of the 251 survey respondents, 140 or 55.8% indicated that they use the LEAF Lesson Guide at least once per year. Of the respondents who use the LEAF Guide at least once per year, 74.3% use it occasionally or often, that is between one and four lessons per year. Approximately one fourth (25.7%) of the respondents use more than five lessons per year.

Question 2
Frequency and percent of each answer.

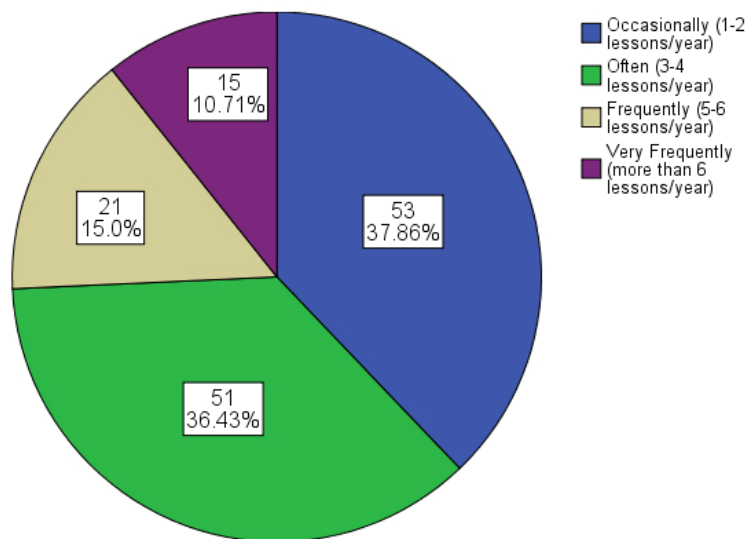


Figure 2.2

QUESTION 2

Summary of responses by unit used. Note: respondents were asked to indicate all the units they use. Therefore, the total number of respondents for each category below may appear to be higher than the totals in figure 2.1.

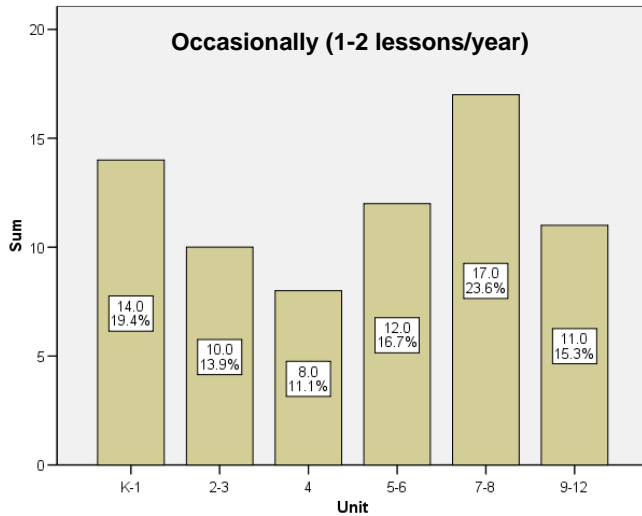


Figure 2.3a

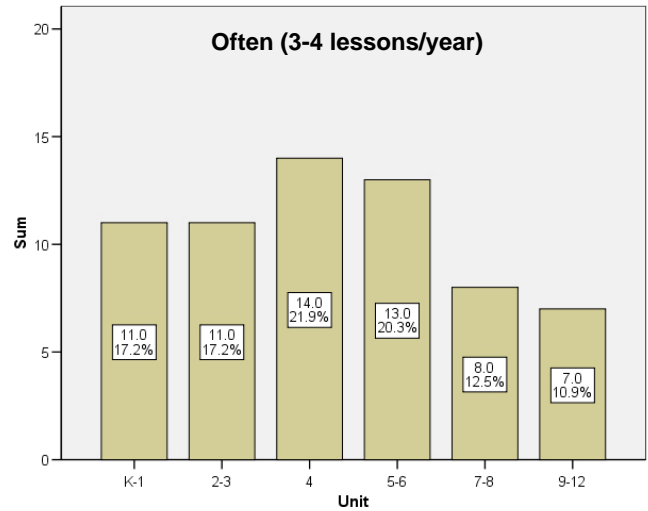


Figure 2.3b

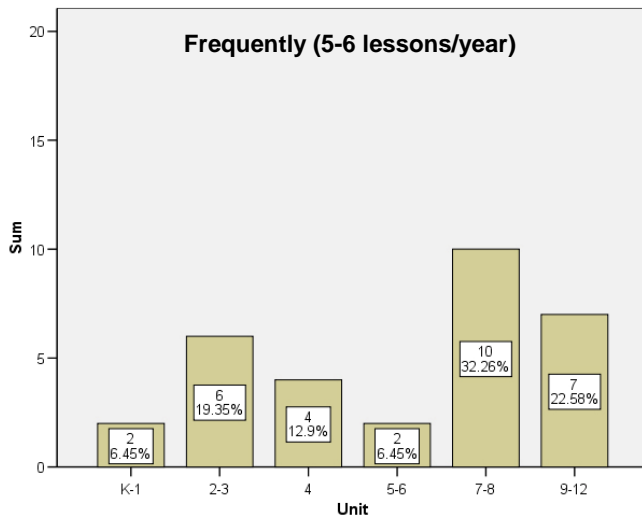


Figure 2.3c

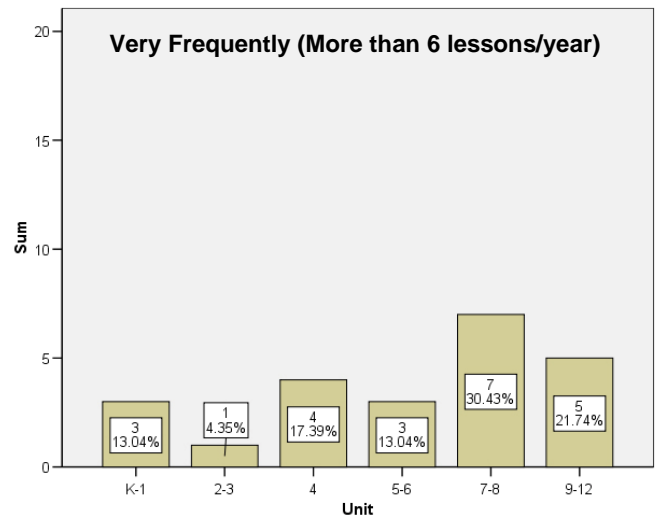


Figure 2.3d

Note: Percents reflect the portion of the total represented by each unit within each category (occasionally, often, frequently, very frequently).

QUESTION 2

Summary of responses by grade level taught. Note: respondents were asked to indicate all the grade levels they teach. Therefore, the total number of respondents for each category below may appear to be higher than the totals in figure 2.1.

Occasionally (1-2 lessons/year)

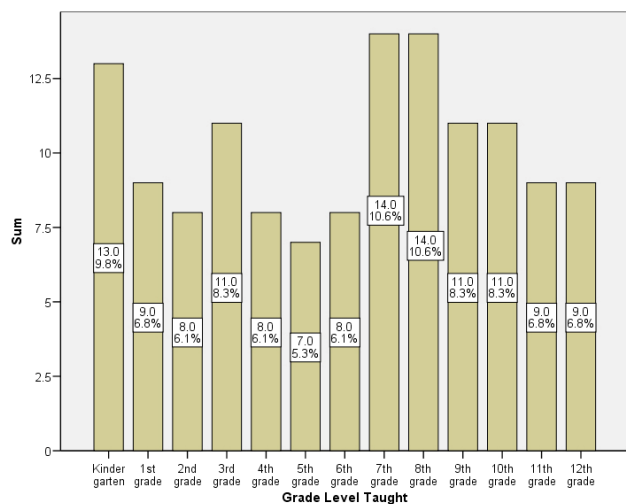


Figure 2.4a

Often (3-4 lessons/year)

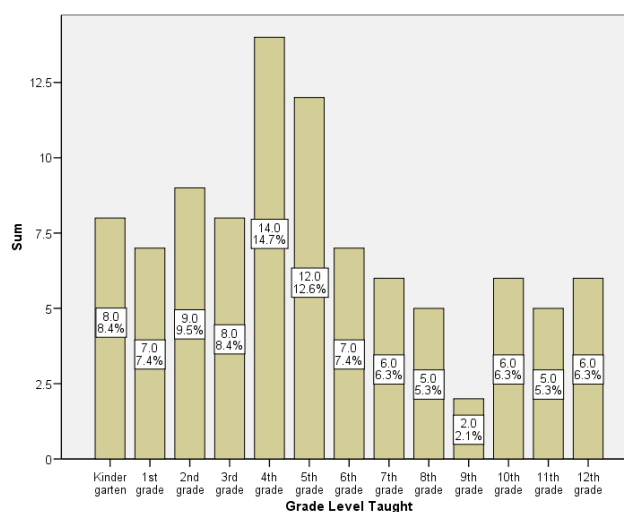


Figure 2.4b

Frequently (5-6 lessons/year)

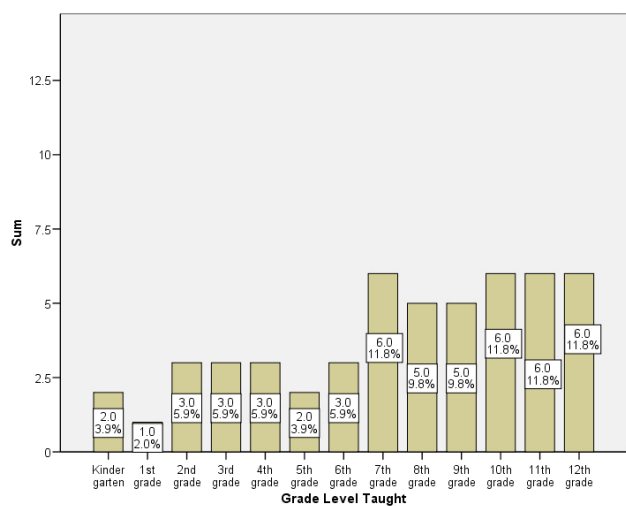


Figure 2.4c

Very Frequently (More than 6 lessons/year)

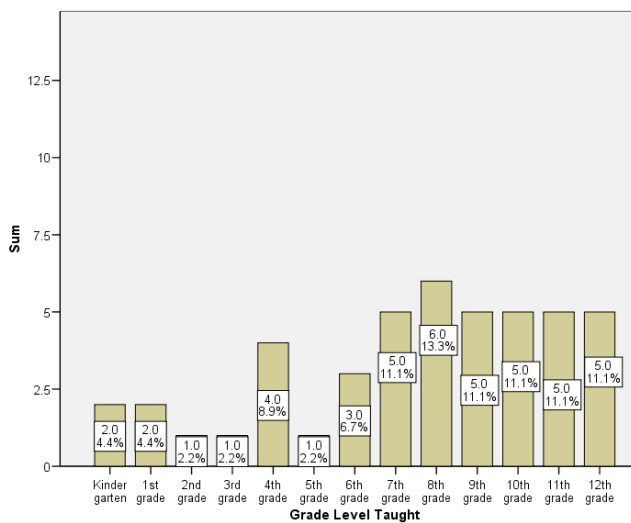


Figure 2.4d

Note: Percents reflect the portion of the total represented by each grade level within each category (occasionally, often, frequently, very frequently).

QUESTION 3

QUESTION 3: Other than the LEAF Lesson Guide and associated materials, I use the following resources to teach students about Wisconsin's forests: (check all that apply)

- | | |
|---------------------------------|---------------------------|
| a. None | h. Web sites |
| b. Project Learning Tree | i. CDs |
| c. Other lesson/activity guides | j. DVDs |
| d. Reference books | k. Other, please describe |
| e. Story books | _____ |
| f. Posters | _____ |
| g. Video tapes | |

Summary of Question 3 Frequencies and Percents			
Resource	Frequency	Total	Percent
None	13	232	5.6
Project Learning Tree	93	232	40.1
Other lesson/activity guides	123	232	53.0
Reference books	111	232	47.8
Story books	99	232	42.7
Posters	106	232	45.7
Video tapes	107	232	46.1
Web sites	95	232	40.9
CDs	28	232	12.1
DVDs	41	232	17.7
Other	48	232	20.7

Percentages are based upon the 232 respondents in question one who indicated they intend to use the LEAF Guide, use the LEAF Guide but not every year, or use the LEAF Guide at least once per year.

Figure 3.1

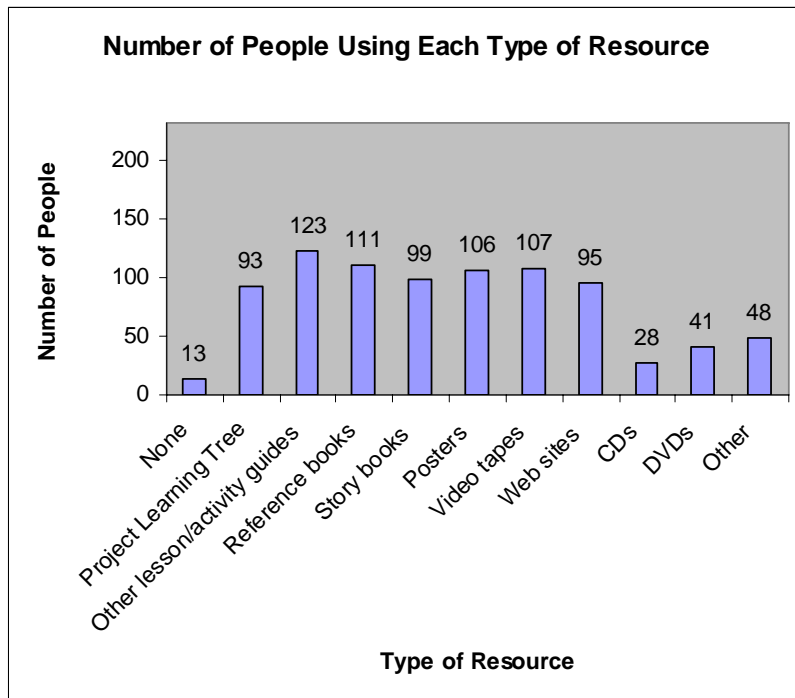


Figure 3.2

Note: The percentages given in Figure 3.1 are not an average of the percentages of users by unit in Figures 3.3a-3.3k on the following pages. The percentages given in Figures 3.3a-3.3k are based on the total number of respondents indicating use of each unit. Survey respondents were asked to indicate all units used. Therefore one person could indicate the use of more than one unit.

QUESTION 3

A) Of the 232 respondents who use the LEAF Guide or intend to use the LEAF Guide, 5.6% indicated that they use no materials other than the LEAF Guide to teach students about Wisconsin's forests. From this data, one can infer that the majority of respondents use resources in addition to the LEAF Guide to teach students about Wisconsin's forests. Based on the array of resource types people reported using, supporting materials in a variety of forms are valuable to teachers as forestry education resources. When broken down by unit, 9-12 unit users are the only group in which no one indicated "none" or they use no resources other than the LEAF Guide to teach students about Wisconsin's forests. (Figure 3.3a)

Recommendations:

- LEAF should continue to produce support materials of various types to assist teachers in incorporating forestry education into their curriculum.

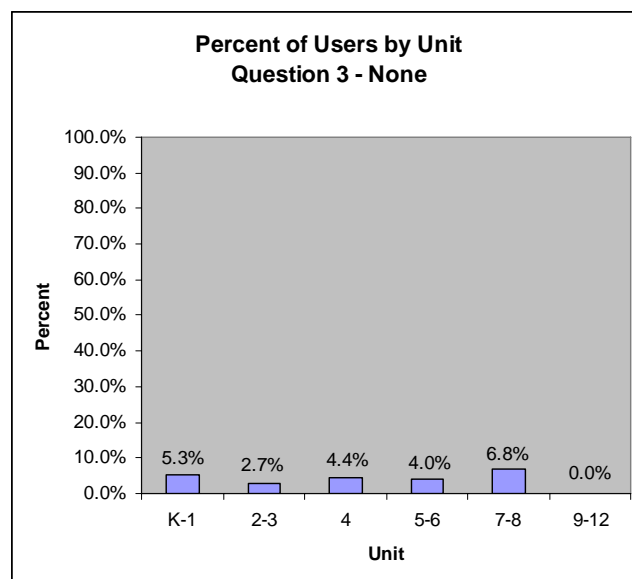


Figure 3.3a

B) Of the 232 respondents who use the LEAF Guide or intend to use the LEAF Guide, 40.1% also use Project Learning Tree (PLT). From this data, one can infer that collaboration between LEAF and Wisconsin Project Learning Tree would be beneficial to both programs. There may be people using either the LEAF Guide or Project Learning Tree that are not aware of the other program. Awareness of both programs may be increased through mutual promotion and collaborative efforts. When broken down by unit, there is an increasing trend of use of PLT from K-1 unit users to 9-12 unit users. Over one half (56.4%) of 9-12 unit users of the LEAF Guide also use PLT. (Figure 3.3b)

Recommendations:

- A joint LEAF and PLT workshop could be offered, possibly as part of a comprehensive forestry education resources workshop.
- LEAF could identify PLT lessons that support lessons in each unit of the LEAF Guide. PLT could do the same by correlating LEAF lessons to their materials. This effort would enhance teachers' incorporation of forestry education into their curriculum by raising their awareness of connections between multiple resources.

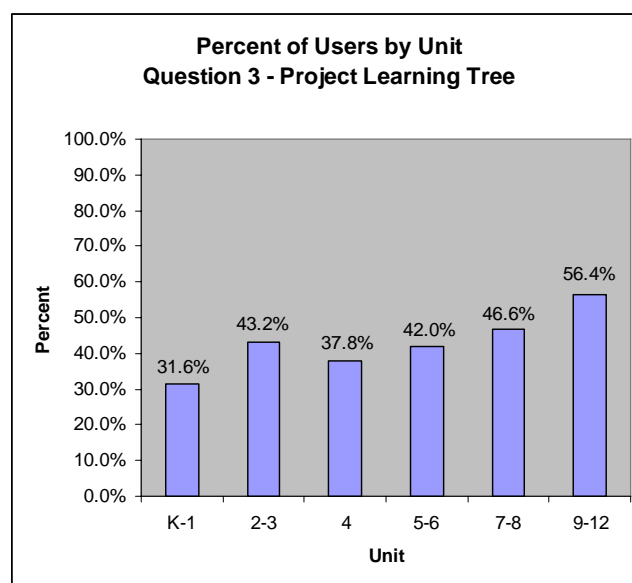


Figure 3.3b

QUESTION 3

C) Of the 232 respondents who use the LEAF Guide or intend to use the LEAF Guide, over half (53.0%) also use other lesson or activity guides to teach students about Wisconsin's forests. When broken down by unit, the trend is fairly consistent among users of all units, with a slight decrease in 2-3 unit users. (Figure 3.3c)

Recommendations:

- If the LEAF Program becomes a forestry education clearinghouse for Wisconsin, every effort should be made to inform teachers about and provide access to an array of forestry education lesson/activity guides. This ensures that teachers will continue to access the LEAF Program for all their forestry education needs. This also increases the visibility of the LEAF Program, while encouraging teachers to take LEAF workshops and use LEAF materials. If teachers access their forestry education resources through the clearinghouse, LEAF staff can monitor the quality of the materials and ensure they present appropriate information.
- Further research should be done with teachers to assess the specific types of lesson/activity guides they are using in addition to the LEAF Guide. This will assist LEAF staff in providing teachers access to a full array of resources. It would also be beneficial to determine the forestry-related subjects teachers are using in their units so materials can be developed to meet those needs. For example, if teachers are consistently using water-related lessons to enhance their forestry education units, LEAF could develop specific lessons and activities related to water and forests.

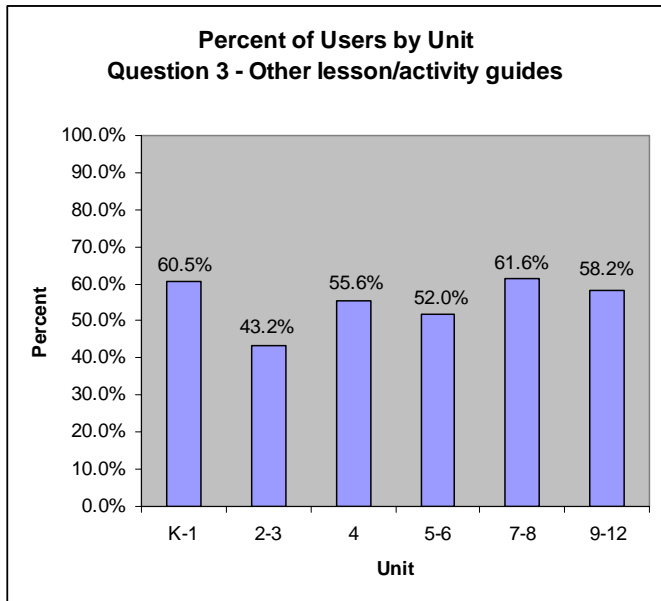


Figure 3.3c

D) Of the 232 respondents who use the LEAF Guide or intend to use the LEAF Guide, 47.8% use reference books in addition to the LEAF Guide to teach students about Wisconsin's forests. Reference books are assumed to include field guides, text books, scientific journals, etc. Such books can enhance a teacher's personal knowledge of Wisconsin forest information and thereby increase their comfort level in teaching about Wisconsin's forests. Reference books may also be accessed by students to deepen their learning experience. When broken down by unit, the trend is fairly consistent among users of all units with only 16.1 percentage points between the highest and lowest numbers. (Figure 3.3d)

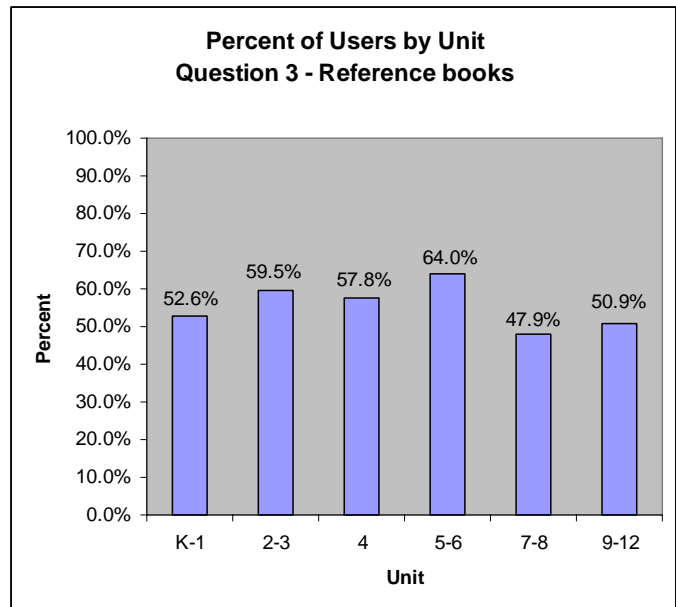


Figure 3.3d

QUESTION 3

Recommendations:

- Provide teachers with information about reference materials that relate to each LEAF lesson. This information is currently printed at the end of each lesson, but could be expanded in a digital format and added to a digital library of forestry. Each lesson of each unit of the LEAF Guide could have a list of references online with links to those that available in digital format.

E) Of the 232 respondents who use the LEAF Guide or intend to use the LEAF Guide, 42.7% use story books in addition to the LEAF Guide to teach students about Wisconsin's forests. When broken down by unit, there is a strong decreasing trend of use from K-1 unit users to 9-12 unit users. (Figure 3.3e)

Recommendations:

- Expand the list of books provided at the end of each LEAF lesson.
- Put the book list related to each LEAF lesson in a digital resource library.
- Have teachers submit book reviews for their favorite forestry-related story books. Place teachers' reviews and suggestions on how they use the books to enhance their forestry education units in a digital resource library.
- When opportunities to provide educators with free resources arise, consider story books as important items to include. Seek funding for the purchase of story books that can be provided to LEAF teachers at no cost.
- Use story books as incentives for teachers to participate in LEAF workshops, etc.

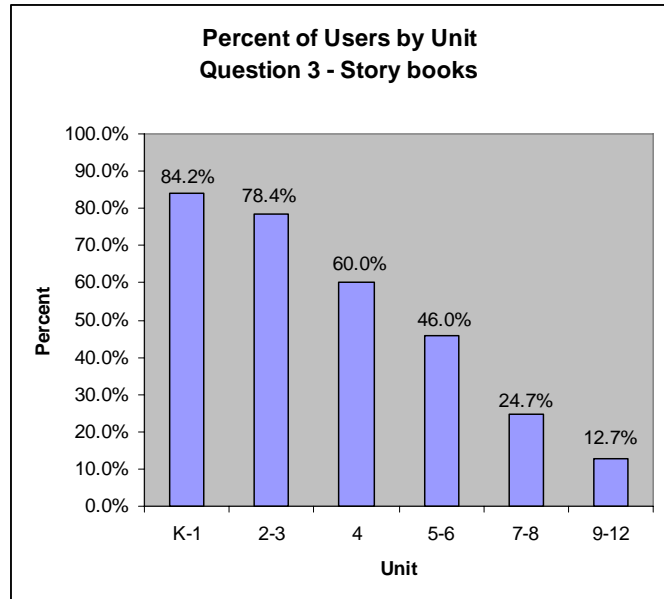


Figure 3.3e

F) Of the 232 respondents who use the LEAF Guide or intend to use the LEAF Guide, 45.7% use posters in addition to the LEAF Guide to teach students about Wisconsin's forests. When broken down by unit, the trend is fairly consistent among users of all units. (Figure 3.3f)

Recommendations:

- Continue to provide posters as resources to teachers. As new posters become available, provide a means for teachers to obtain them. The posters could be sent to teachers who request them either from the LEAF web site or from a mailing sent to teachers listing new resources.
- Research existing types of forestry-related posters. Describe the posters on the LEAF

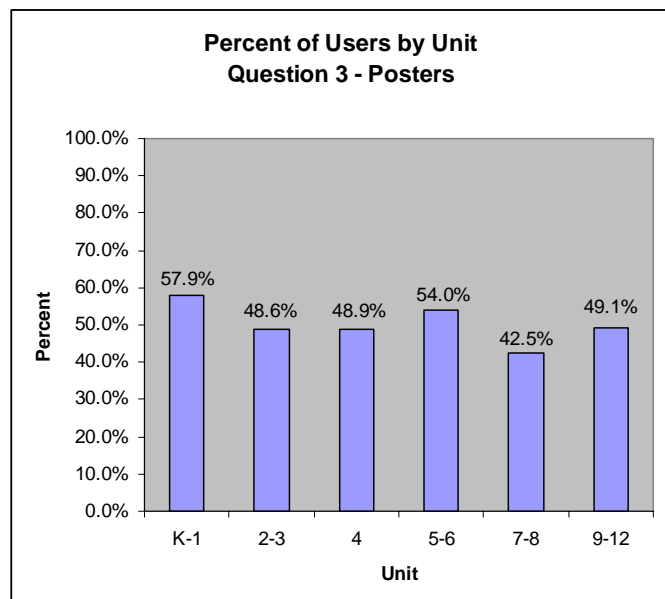


Figure 3.3f

QUESTION 3

web site, make connections between the posters and LEAF lessons, and provide information on how teachers can obtain the posters. This may include requesting them from LEAF or the DNR or purchasing them through identified distributors.

G) Of the 232 respondents who use the LEAF Guide or intend to use the LEAF Guide, 46.1% use video tapes in addition to the LEAF Guide to teach students about Wisconsin's forests. When broken down by unit, the trend is fairly consistent among K-1, 2-3, 5-6, and 7-8 unit users, with use between 40.0% and 48.6%. Over 61.8% of 4 and 9-12 unit users report using video tapes in addition to the LEAF Lesson Guide. (Figure 3.3g)

Recommendations:

- Research existing types of forestry-related videos. Describe the videos on the LEAF web site, make connections between the videos and LEAF lessons, and provide information on where teachers can obtain the videos.

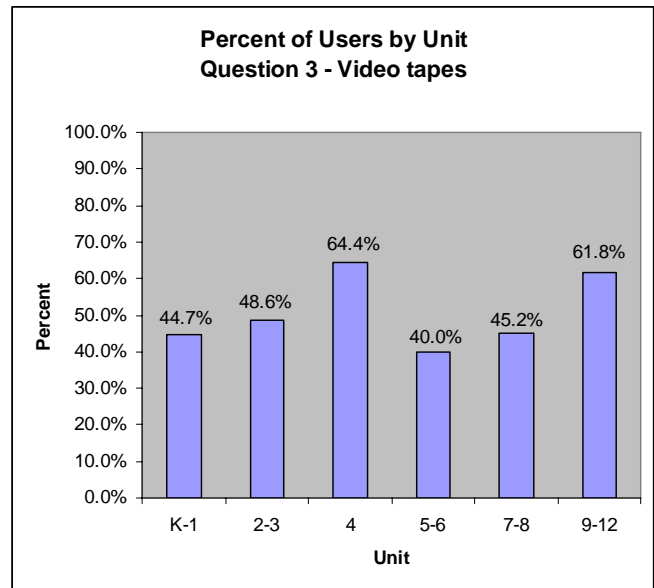


Figure 3.3g

H) Of the 232 respondents who use the LEAF Guide or intend to use the LEAF Guide, 40.9% use web sites in addition to the LEAF Guide to teach students about Wisconsin's forests. When broken down by unit, less than one quarter (23.7%) of K-1 unit users use web sites in addition to the LEAF Guide and nearly 60% (58.2%) of 9-12 unit users use web sites in addition to the LEAF Guide. All other unit users range between 39.7% and 50.0%. (Figure 3.3h)

Recommendations:

- Continue to research all types of forestry education web sites. Provide links to those sites from the LEAF web site. Suggest ways in which particular web sites can be used to enhance specific LEAF lessons.

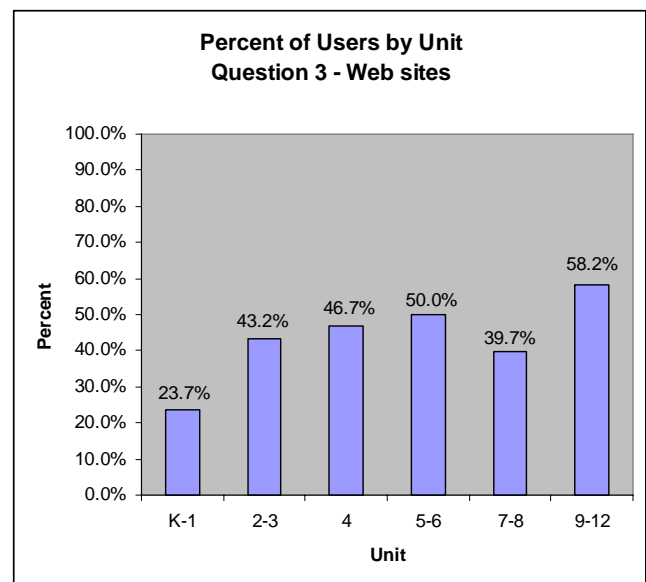


Figure 3.3h

QUESTION 3

I) Of the 232 respondents who use the LEAF Guide or intend to use the LEAF Guide, 12.2% use CDs in addition to the LEAF Guide to teach students about Wisconsin's forests. This is a relatively low percentage of users compared to other types of resources listed in this question. This may be because there are relatively few forestry education CDs available to teachers. It may also be because the CD format limits teachers' use of the material with their students. For example, if a particular resource can only be used when students are sitting at computers and the teacher has no computers for student use in their classroom, then regardless of the quality of the material on the CD, the teacher faces barriers in using it. When broken down by unit used, unit 4 users outweigh the users of all other units. (Figure 3.3i)

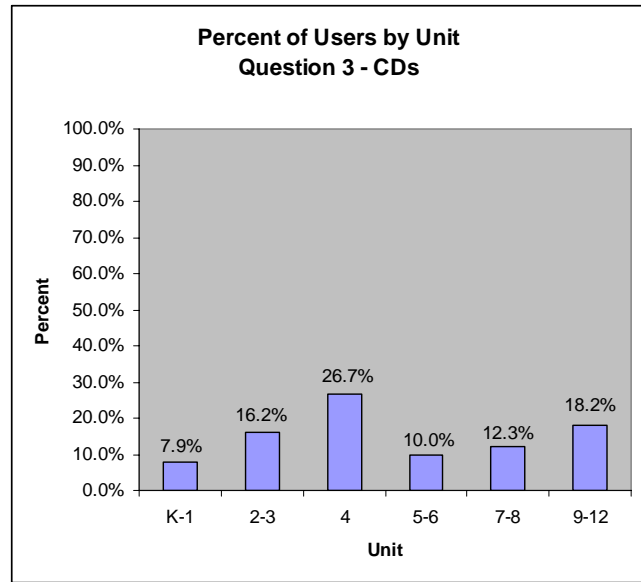


Figure 3.3i

Recommendations:

- Provide descriptions of, LEAF lesson connections to, and information about obtaining existing forestry education CD-ROMs on the LEAF web site.

J) Of the 232 respondents who use the LEAF Guide or intend to use the LEAF Guide, 17.7% use DVDs in addition to the LEAF Guide to teach students about Wisconsin's forests. This is a relatively low percentage of users compared to other types of resources listed in this question. This may be because there are relatively few forestry education DVDs available to teachers. It may also be because the DVD format limits teachers' use of the material with their students. For example, if a teacher does not have a DVD player available for classroom use or if a teacher does not have an LCD from which to project a DVD played from a computer, then regardless of the quality of the material on the DVD, the teacher faces barriers in using it.

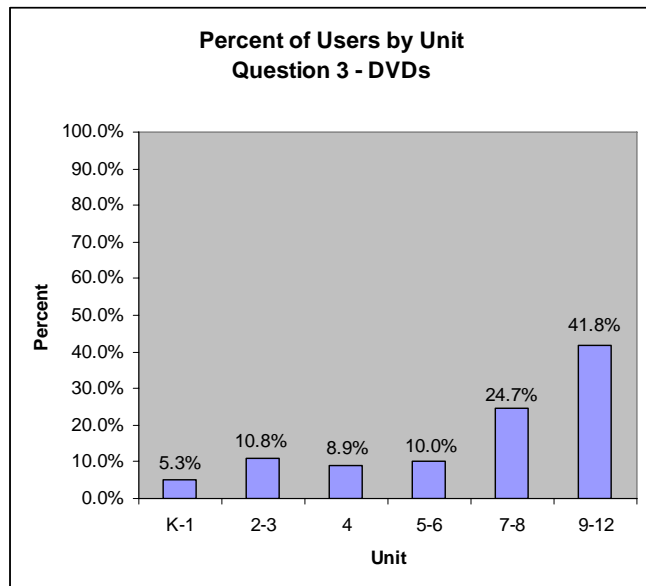


Figure 3.3j

Note: there are two types of DVDs. Those meant to be played from a DVD player, such as a movie viewed on a television, and those meant to be used on a computer; such as a simulation. When comparing video tape or VHS format materials and DVD format materials one must be aware of multiple factors. Because VHS format materials have been in use longer than DVD format materials, there may be more forestry education materials available in VHS format. Also, because VHS format materials have been in use longer than DVD format materials, more teachers may have access to VHS players for classroom use than DVD players. As time goes on, these factors may change. It is likely that more forestry education materials will be made available on DVD format and more DVD players may become available for classroom use.

QUESTION 3

When broken down by unit used, there is an increasing trend of use from K-1 unit users (5.3%) to 9-12 unit users (41.8%). (Figure 3.3j)

Recommendations:

- Research existing types of forestry-related DVDs. Provide descriptions of the DVDs on the LEAF web site, make connections between the DVD content and LEAF lessons, and provide information on where teachers can obtain the DVDs.

K) Of the 232 respondents who use the LEAF Guide or intend to use the LEAF Guide, 20.7% use other materials in addition to the LEAF Guide to teach students about Wisconsin's forests. A summary of those materials follows:

- Tactiles or artifacts e.g., materials from a lumber camp
- Field trips e.g., visits to a forest, outdoor experiences, field activities
- Guest speakers e.g., resource professionals
- Songs e.g., lumber camp songs
- Magazines e.g., DNR publications, Trees and Woodlots, Ranger Rick, Scholastic News, Naturescope
- DNR publications
- Project Wet/Wild
- Forestry tools e.g., clinometer, Biltmore stick
- Other e.g., Trees For Tomorrow information, Arbor Day kit, Human Influence on Wisconsin's Forests information, puzzles, terrarium, after school science/gardening club, leveled readers, slide show, construction class, personal background knowledge, FOSS kits

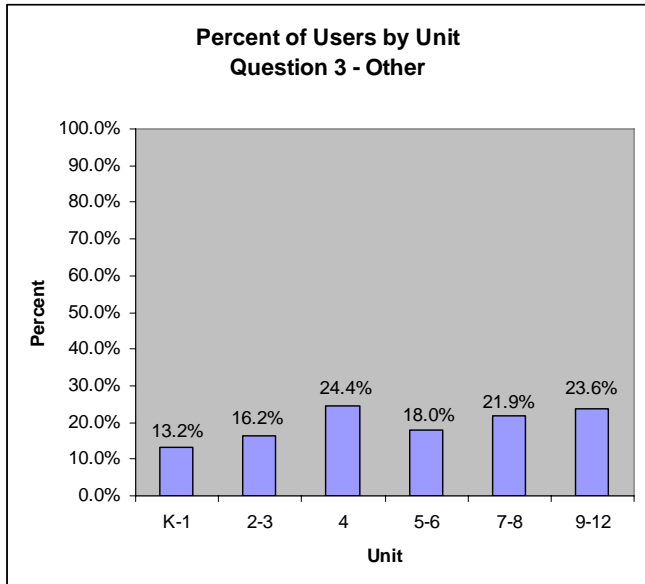


Figure 3.3k

When broken down by unit, the trend is fairly consistent among users of all units. (Figure 3.3k)

Recommendations:

- Have teachers suggest various types of resources they use in their forestry units. Post suggestions for use and information on how to obtain such resources on the LEAF web site.

QUESTION 4

QUESTION 4: To what degree would the following digital forestry education resources enhance your use of the LEAF Lesson Guide to teach students? Please indicate by checking the boxes below.

- 1 = Not at all
 2 = Slightly
 3 = Moderately
 4 = Very much
 ? = Not sure what the resource is

Computer-based Resource

- Images for computer viewing
- Images for printing
- Maps for computer viewing
- Maps for printing
- Posters for computer viewing
- Posters for printing
- Scientific data
- Printable background information
- Printable lessons/activities
- Printable resource lists
- Chatroom or discussion board for Teachers
- Chatroom or discussion board for Students
- LEAF blog
- Educational game
- Simulations or animations
- Digital video
- Audio material (interviews, music, etc.)
- Web site links
- Ask an expert web page
- Online tree identification key
- Virtual field trip
- Citizen science monitoring (students enter data)

Question 4 Summary

Images for computer viewing

Answer	Frequency	Percent
Not at all useful	19	8.8
Slightly useful	37	17.1
Moderately useful	80	37.0
Very useful	73	33.8
Not sure what the resource is	7	3.2
Total	216	100.0

Figure 4.1a

Question 4 – images for computer viewing refers to any type of digital image that people can access via the Internet or from a CD-ROM.

Of the 216 people who answered this portion of question four, 70.8% indicated that images for computer viewing would be moderately or very useful to enhance their use of the LEAF Lesson Guide.

Images for computer viewing

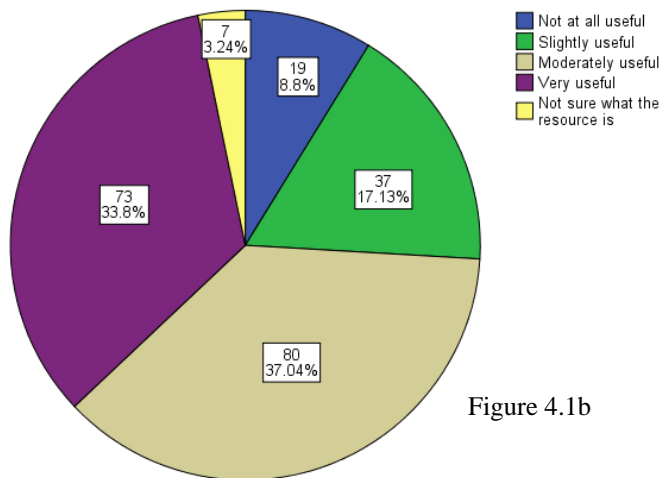


Figure 4.1b

QUESTION 4

Images for computer viewing by unit used

Images for computer viewing		K-1	2-3	4	5-6	7-8	9-12
Not at all useful	Count	6	1	3	1	6	1
	% of Total	2.8%	.5%	1.4%	.5%	2.8%	.5%
Slightly useful	Count	12	11	8	9	6	7
	% of Total	5.6%	5.1%	3.7%	4.2%	2.8%	3.2%
Moderately useful	Count	5	11	20	19	33	19
	% of Total	2.3%	5.1%	9.3%	8.8%	15.3%	8.8%
Very useful	Count	14	11	12	16	21	25
	% of Total	6.5%	5.1%	5.6%	7.4%	9.7%	11.6%
Not sure what the resource is	Count	0	0	0	3	4	2
	% of Total	.0%	.0%	.0%	1.4%	1.9%	.9%
Total	Count	37	34	43	48	70	54
	% of Total	17.1%	15.7%	19.9%	22.2%	32.4%	25.0%

Figure 4.1c

Note: The count for each category by unit does not equal the total for each category in figures 4.1a and 4.1b because survey respondents could indicate that they used more than one unit.

Percent of moderately useful and very useful by unit used

Unit	Total of moderately useful and very useful categories	Number of respondents using unit	Percent
K-1	19	37	51.4
2-3	22	34	64.7
4	32	43	74.4
5-6	35	48	72.9
7-8	54	70	77.1
9-12	44	54	81.5

Figure 4.1d

These numbers indicate that images for computer viewing have increasing usefulness from lower grade levels to upper. When creating digital image resources for teachers, LEAF should focus more effort on those applicable to the 7-8 and 9-12 units. That is not to say teachers using the K-6 units will not use images for computer viewing and these resources should not be made available to them, it only indicates that if only one resource of this type was to be created, it would be more likely to be used by teacher using a 7-8 or 9-12 unit.

Images for Printing

Answer	Frequency	Percent
Not at all useful	12	5.5
Slightly useful	33	15.2
Moderately useful	68	31.3
Very useful	100	46.1
Not sure what the resource is	4	1.8
Total	217	100.0

Figure 4.2a

Question 4 – images for printing refers to any type of digital image that people can access via the Internet or from a CD-ROM and is of high enough quality to print.

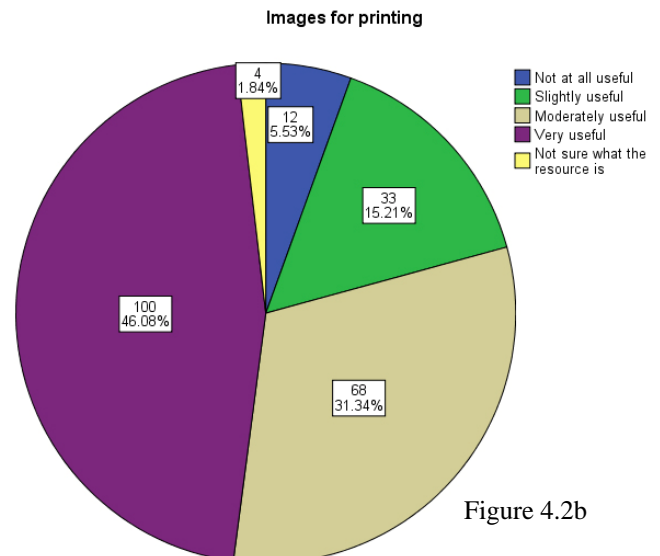


Figure 4.2b

QUESTION 4

Of the 217 people who answered this portion of question four, 77.4% indicated that images for printing would be moderately or very useful to enhance their use of the LEAF Lesson Guide.

Images for printing by unit used

Images for printing		K-1	2-3	4	5-6	7-8	9-12
Not at all useful	Count	1	0	4	2	3	1
	% of Total	.5%	.0%	1.8%	.9%	1.4%	.5%
Slightly useful	Count	6	6	10	5	7	7
	% of Total	2.8%	2.8%	4.6%	2.3%	3.2%	3.2%
Moderately useful	Count	9	12	13	19	17	19
	% of Total	4.1%	5.5%	6.0%	8.8%	7.8%	8.8%
Very useful	Count	20	16	16	21	24	25
	% of Total	9.2%	7.4%	7.4%	9.7%	11.1%	11.6%
Not sure what the resource is	Count	0	0	0	2	2	2
	% of Total	.0%	.0%	.0%	.9%	.9%	.9%
Total	Count	36	34	43	49	53	54
	% of Total	16.6%	15.7%	19.8%	22.6%	24.4%	25.0%

Figure 4.2c

Note: The count for each category by unit does not equal the total for each category in figures 4.2a and 4.2b because survey respondents could indicate that they used more than one unit.

Percent of moderately useful and very useful by unit used

Unit	Total of moderately useful and very useful categories	Number of respondents using unit	Percent
K-1	29	36	80.6
2-3	28	34	82.4
4	29	43	67.4
5-6	40	49	81.6
7-8	41	53	77.4
9-12	44	54	81.5

Figure 4.2d

These numbers indicate that images for printing are nearly equal in usefulness for teachers with the K-1, 2-3, 5-6, and 9-12 units. There was somewhat lower usefulness indicated by the 4 and 7-8 unit users. Overall, teachers indicated that images for printing are more useful than images for computer viewing.

Conclusion:

A digital image library should be created for teachers using the LEAF Lesson Guide. This could be one of the resources offered as part of a comprehensive statewide forestry education clearinghouse. Digital images should be made available through the LEAF Digital Resources Library.

Suggestions:

- Whenever images are obtained for the digital image library, the highest quality possible should be sought to allow for screen viewing and printing. A 4 inch by 6 inch image should have a resolution of 300 dots per inch (dpi) or higher. (General information: TIFF (.tif) files can be modified countless times without losing quality. JPEG (.jpg) files lose quality each time they are modified and resaved. JPEG files are smaller than TIFF files. JPEG files should be made available for printing in the digital image library as the smaller file size allows for faster downloading. However, keeping an original TIFF file is recommended as LEAF may use it for purposes beyond the digital image library.)

QUESTION 4

- All images posted to the digital image library should be made available in two formats. One should be a 72 dpi image file for computer viewing. This is the maximum image resolution needed for on screen images and digital projections and keeps page load time as low as possible. The second image should be high enough quality for printing and made available through a link near the first image. The printable image should be a JPEG file of 300 dpi and at least 4 inches by 6 inches. This maximizes the usefulness of every image in the digital library, while satisfying teachers' needs for displaying and printing the graphics.

Maps for computer viewing

Answer	Frequency	Percent
Not at all useful	21	9.9
Slightly useful	44	20.7
Moderately useful	68	31.9
Very useful	75	35.2
Not sure what the resource is	5	2.3
Total	213	100.0

Figure 4.3a

Question 4 – maps for computer viewing refer to any type of digital map that people can access via the Internet or from a CD-ROM. The maps could be static images or could be made to respond to user input. Interactive maps currently exist on the World Wide Web and use GIS software that gives users particular layers from which to choose with the map image being updated accordingly.

Of the 213 people who answered this portion of question four, 67.1% indicated that maps for computer viewing would be moderately or very useful to enhance their use of the LEAF Lesson Guide.

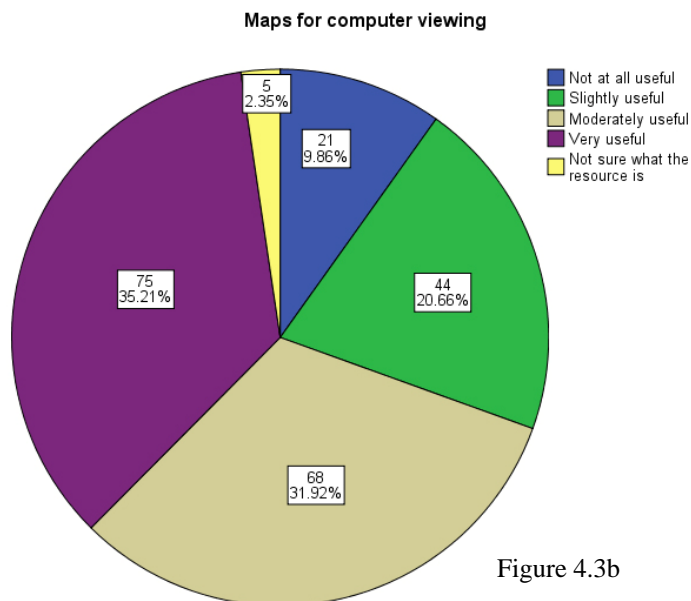


Figure 4.3b

QUESTION 4

Maps for computer viewing by unit used

Maps for computer viewing		K-1	2-3	4	5-6	7-8	9-12
Not at all useful	Count	9	3	2	0	4	1
	% of Total	4.2%	1.4%	.9%	.0%	1.9%	.5%
Slightly useful	Count	12	13	12	10	11	9
	% of Total	5.6%	6.1%	5.6%	4.7%	5.2%	4.2%
Moderately useful	Count	6	10	12	18	31	16
	% of Total	2.8%	4.7%	5.6%	8.5%	14.6%	7.5%
Very useful	Count	7	8	16	19	22	28
	% of Total	3.3%	3.8%	7.5%	8.9%	10.3%	13.1%
Not sure what the resource is	Count	1	0	0	1	1	1
	% of Total	.5%	.0%	.0%	.5%	.5%	.5%
Total	Count	35	34	42	48	69	55
	% of Total	16.4%	16.0%	19.7%	22.5%	32.4%	25.8%

Figure 4.3c

Note: The count for each category by unit does not equal the total for each category in figures 4.3a and 4.3b because survey respondents could indicate that they used more than one unit.

Percent of moderately useful and very useful by unit used

Unit	Total of moderately useful and very useful categories	Number of respondents using unit	Percent
K-1	13	35	37.1
2-3	18	34	52.9
4	28	42	66.7
5-6	37	48	77.1
7-8	53	69	76.8
9-12	44	55	80.0

Figure 4.3d

These numbers indicate that maps for computer viewing have increasing usefulness from lower grade levels to upper. Thus, when creating digital map resources for teachers, LEAF should focus more effort on those applicable to the 5-6, 7-8 and 9-12 units. That is not to say teachers using the K-4 units will not use maps for computer viewing and these resources should not be made available to them, it only indicates that if only one resource of this type was to be created, it would be more likely to be used by teacher using a 5-6, 7-8 or 9-12 unit.

QUESTION 4

Maps for Printing

Answer	Frequency	Percent
Not at all useful	17	8.0
Slightly useful	36	17.0
Moderately useful	61	28.8
Very useful	93	43.9
Not sure what the resource is	5	2.4
Total	212	100.0

Figure 4.4a

Question 4 – maps for printing refers to any type of digital map that people can access via the Internet or from a CD-ROM and is of high enough quality to print.

Of the 212 people who answered this portion of question four, 72.2% indicated that maps for printing would be moderately or very useful to enhance their use of the LEAF Lesson Guide.

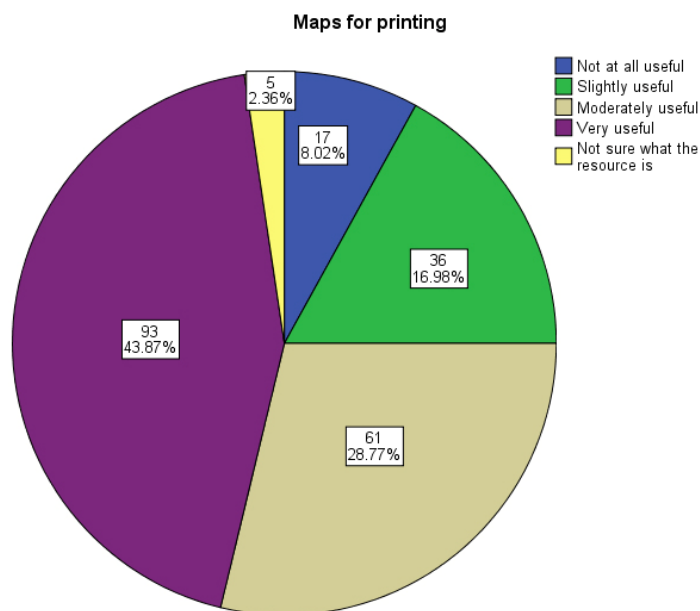


Figure 4.4b

Maps for printing by Unit Used

Maps for printing		K-1	2-3	4	5-6	7-8	9-12
Not at all useful	Count	5	1	3	2	3	3
	% of Total	2.4%	.5%	1.4%	.9%	1.4%	1.4%
Slightly useful	Count	9	10	9	7	9	6
	% of Total	4.2%	4.7%	4.2%	3.3%	4.2%	2.8%
Moderately useful	Count	8	9	11	14	26	17
	% of Total	3.8%	4.2%	5.2%	6.6%	12.3%	8.0%
Very useful	Count	12	15	19	23	29	24
	% of Total	5.7%	7.1%	9.0%	10.8%	13.7%	11.3%
Not sure what the resource is	Count	1	0	0	1	0	2
	% of Total	.5%	.0%	.0%	.5%	.0%	.9%
Total	Count	35	35	42	47	67	52
	% of Total	16.5%	16.5%	19.8%	22.2%	31.6%	24.5%

Figure 4.4c

Note: The count for each category by unit does not equal the total for each category in figures 4.4a and 4.4b because survey respondents could indicate that they used more than one unit.

QUESTION 4

Percent of moderately useful and very useful by unit used

Unit	Total of moderately useful and very useful categories	Number of respondents using unit	Percent
K-1	20	35	57.1
2-3	24	35	68.6
4	30	42	71.4
5-6	37	47	78.7
7-8	55	67	82.1
9-12	41	52	78.8

Figure 4.4d

These numbers indicate that maps for printing have increasing usefulness from lower grade levels to upper. These numbers also indicate that the teachers using the K-8 units are more likely to use printed maps than those viewed from a computer. This is especially true for K-1 unit users, 37.1% who indicated maps for computer viewing were moderately to very useful versus 57.1% who indicated maps for printing were moderately to very useful. Overall, teachers indicated that maps for printing are more useful than maps for computer viewing (72.7% for printing and 67.1% for computer viewing).

Conclusion:

A library of digital maps should be created for teachers using the LEAF Guide. This could be one of the resources offered as part of a comprehensive statewide forestry education clearinghouse. Maps should be made available through the LEAF Digital Resources Library.

Suggestions:

- The same suggestions hold true for digital maps as for digital images. Digital maps are essentially a specific type of digital image. Exceptions to this are interactive maps that can be manipulated by the user. Such maps require sophisticated programs to function. Links to interactive maps that currently exist on the World Wide Web could be listed in the same section of the digital image library as the standard maps.

Posters for computer viewing

Answer	Frequency	Percent
Not at all useful	37	17.6
Slightly useful	60	28.6
Moderately useful	70	33.3
Very useful	38	18.1
Not sure what the resource is	5	2.4
Total	210	100.0

Figure 4.5a

Question 4 – posters for computer viewing refers to any type of poster that people can access via the Internet or from a CD-ROM. These differ from digital images and maps in that they feature a specific topic and contain images and textual information. The posters

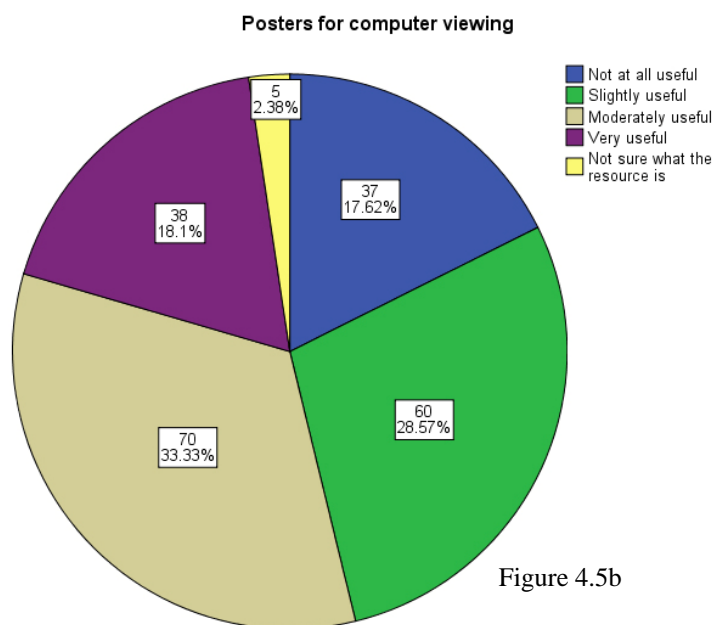


Figure 4.5b

QUESTION 4

would be like those typically found in classrooms featuring any subject that a teacher would want to illustrate. Digital format posters could contain more than static information. They could be created to react to user commands with hotspot area users could click on. Hotspot areas could link to images, further information, or other web sites. A specific example is a poster featuring Wisconsin trees. When users click on a specific tree additional images and information about that tree would be displayed.

Of the 210 people who answered this portion of question four, 51.4% indicated that posters for computer viewing would be moderately or very useful to enhance their use of the LEAF Lesson Guide.

Posters for computer viewing by unit used

Posters for computer viewing		K-1	2-3	4	5-6	7-8	9-12
Not at all useful	Count	10	5	6	4	11	3
	% of Total	4.8%	2.4%	2.9%	1.9%	5.2%	1.4%
Slightly useful	Count	11	13	9	10	20	12
	% of Total	5.2%	6.2%	4.3%	4.8%	9.5%	5.7%
Moderately useful	Count	7	8	19	23	23	20
	% of Total	3.3%	3.8%	9.0%	11.0%	11.0%	9.5%
Very useful	Count	6	6	7	8	13	15
	% of Total	2.9%	2.9%	3.3%	3.8%	6.2%	7.1%
Not sure what the resource is	Count	0	0	0	2	2	2
	% of Total	.0%	.0%	.0%	1.0%	1.0%	1.0%
Total	Count	34	32	41	47	69	52
	% of Total	16.2%	15.2%	19.5%	22.4%	32.9%	24.8%

Figure 4.5c

Note: The count for each category by unit does not equal the total for each category in figures 4.5a and 4.5b because survey respondents could indicate that they used more than one unit.

Percent of moderately useful and very useful by unit used

Unit	Total of moderately useful and very useful categories	Number of respondents using unit	Percent
K-1	13	34	38.2
2-3	14	32	43.8
4	26	41	63.4
5-6	31	47	66.0
7-8	36	69	52.2
9-12	35	52	67.3

Figure 4.5d

These numbers indicate that posters for computer viewing have increasing usefulness for users of lower units to upper. Thus, when creating digital poster resources for teachers, LEAF should focus more effort on those applicable to the 4, 5-6, 7-8, and 9-12 units. More teachers using the K-1 and 2-3 units indicated that posters for computer viewing were not at all useful to slightly useful than indicated that they were moderately to very useful.

QUESTION 4

Posters for Printing

Answer	Frequency	Percent
Not at all useful	25	11.7
Slightly useful	45	21.0
Moderately useful	71	33.2
Very useful	67	31.3
Not sure what the resource is	6	2.8
Total	214	100.0

Figure 4.6a

Question 4 – posters for printing refers to any type of digital posters that people can access via the Internet or from a CD-ROM and are of high enough quality to print.

Of the 214 people who answered this portion of question four, 64.5% indicated that posters for printing would be moderately or very useful to enhance their use of the LEAF Lesson Guide.

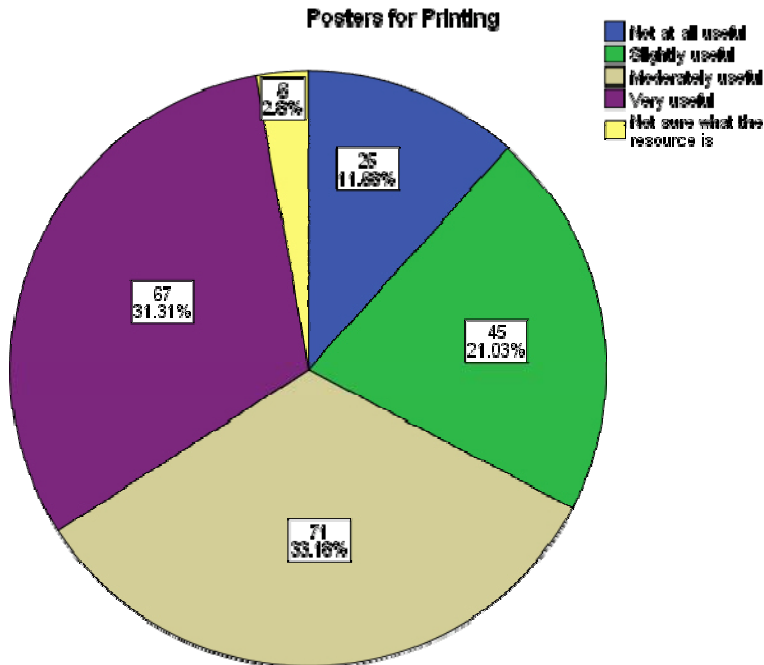


Figure 4.6b

Posters for printing by unit used

Posters for printing		K-1	2-3	4	5-6	7-8	9-12
Not at all useful	Count	3	2	4	2	9	4
	% of Total	1.4%	.9%	1.9%	.9%	4.2%	1.9%
Slightly useful	Count	8	8	9	5	18	12
	% of Total	3.7%	3.7%	4.2%	2.3%	8.4%	5.6%
Moderately useful	Count	10	10	16	19	19	19
	% of Total	4.7%	4.7%	7.5%	8.8%	8.9%	8.9%
Very useful	Count	15	12	18	21	23	16
	% of Total	7.0%	5.6%	8.4%	9.7%	10.7%	7.5%
Not sure what the resource is	Count	0	1	2	2	1	3
	% of Total	.0%	.5%	.9%	.9%	.5%	1.4%
Total	Count	36	33	49	49	70	54
	% of Total	16.8%	15.4%	22.9%	22.6%	32.7%	25.2%

Figure 4.6c

Note: The count for each category by unit does not equal the total for each category in figures 4.6a and 4.6b because survey respondents could indicate that they used more than one unit.

QUESTION 4

Percent of moderately useful and very useful by unit used

Unit	Total of moderately useful and very useful categories	Number of respondents using unit	Percent
K-1	25	36	69.4
2-3	22	33	66.7
4	34	49	69.4
5-6	40	49	81.6
7-8	42	70	60.0
9-12	35	54	64.8

Figure 4.6d

These numbers indicate that posters for printing have nearly equal usefulness for all unit users. The users of the 5-6 unit indicated the highest level of moderate to very useful for posters for printing (81.6%). Overall, teachers indicated that posters for printing are more useful than posters for computer viewing.

Conclusion:

Digital posters should be made available to teachers using the LEAF Lesson Guide. This could be one of the resources offered as a part of a comprehensive statewide forestry education clearinghouse. Posters should be made available through the LEAF Digital Resources Library. This study found that teachers will use digital images and maps slightly more than posters. Thus, focus should be on creating image and map resources first and posters second.

Suggestions:

- Posters should be designed for printed on a standard size printer (one using 8.5 inch by 11 inch paper). The same poster can also be created in a larger size if there are instructions on how to print it – for example, on 11 inch by 17 inch paper or on multiple pieces of 8.5 inch by 11 inch paper taped together.
- An example of an interactive poster can be found on the DNR's EEK! web site at: <http://www.dnr.state.wi.us/org/caer/ce/EEK/nature/habitat/forest1.htm>. It is a digital version of a poster distributed by the DNR. The poster contains drawings of forest animals. When a user clicks on an animal, a window opens with a picture of that animal and information about it.

Scientific Data

Answer	Frequency	Percent
Not at all useful	24	11.2
Slightly useful	49	22.9
Moderately useful	70	32.7
Very useful	65	30.4
Not sure what the resource is	6	2.8
Total	214	100.0

Figure 4.7a

Question 4 – scientific data refers to any type of data or statistical information that people can access via the Internet or from a CD-ROM. This could include research reports on specific topics or real time data. Examples include statistics on type and amount of forest cover in Wisconsin, data on recreational forest use types, or data related to the benefits of urban tree planting.

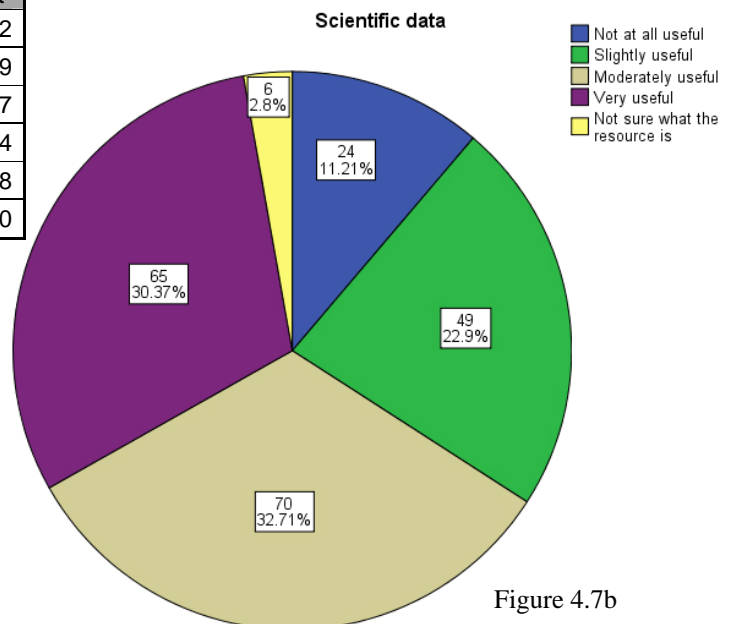


Figure 4.7b

QUESTION 4

Of the 214 people who answered this portion of question four, 63.1% indicated that scientific data would be moderately or very useful to enhance their use of the LEAF Lesson Guide.

Scientific data by unit used

Scientific data		K-1	2-3	4	5-6	7-8	9-12
Not at all useful	Count	9	6	5	1	3	3
	% of Total	4.2%	2.8%	2.3%	.5%	1.4%	1.4%
Slightly useful	Count	17	9	10	7	10	8
	% of Total	7.9%	4.2%	4.7%	3.3%	4.7%	3.7%
Moderately useful	Count	5	12	14	18	30	21
	% of Total	2.3%	5.6%	6.5%	8.4%	14.0%	9.8%
Very useful	Count	4	6	12	21	27	20
	% of Total	1.9%	2.8%	5.6%	9.8%	12.6%	9.3%
Not sure what the resource is	Count	0	0	1	1	1	3
	% of Total	.0%	.0%	.5%	.5%	.5%	1.4%
Total	Count	35	33	42	48	71	55
	% of Total	16.4%	15.4%	19.6%	22.4%	33.2%	25.7%

Figure 4.7c

Note: The count for each category by unit does not equal the total for each category in figures 4.7a and 4.7b because survey respondents could indicate that they used more than one unit.

Percent of moderately useful and very useful by unit used

Unit	Total of moderately useful and very useful categories	Number of respondents using unit	Percent
K-1	9	35	25.7
2-3	18	33	54.5
4	26	42	61.9
5-6	39	48	81.3
7-8	57	71	80.3
9-12	41	55	74.5

Figure 4.7d

These numbers indicate that scientific data has strong trend of increasing usefulness for users of lower grade level units to upper grade level units. Teachers using the 5-6, 7-8, and 9-12 units are more likely to use scientific data than teachers using the K-1, 2-3, or 4 units.

Conclusion:

Scientific data should be part of a comprehensive digital resource library created for teachers using the LEAF Lesson Guide. This could be one of the resources offered by LEAF in an effort to be the comprehensive statewide forestry education clearinghouse.

Suggestions:

- The focus of scientific data in the digital resource library should be on information that enhances the 5-12 units of the LEAF Lesson Guide.
- Highly technical, scientific data should include interpretation for the average reader, or at minimum an explanation of how it relates to specific activities in the LEAF Lesson Guide.

QUESTION 4

Printable Background Information

Answer	Frequency	Percent
Not at all useful	12	5.7
Slightly useful	33	15.6
Moderately useful	77	36.3
Very useful	85	40.1
Not sure what the resource is	5	2.4
Total	212	100.0

Figure 4.8a

Question 4 – printable background information refers to any type of forestry-related information that would enhance understanding of the ecologic, economic, and/or social aspects of Wisconsin's forests that people can access via the Internet or from a CD-ROM. Examples include information on topics such as forest fragmentation, invasive species, or timber harvesting techniques. The information could be used by teachers to expand their forestry knowledge and also for students when gathering information on a particular topic or when the teacher feels they need deeper understanding of a subject.

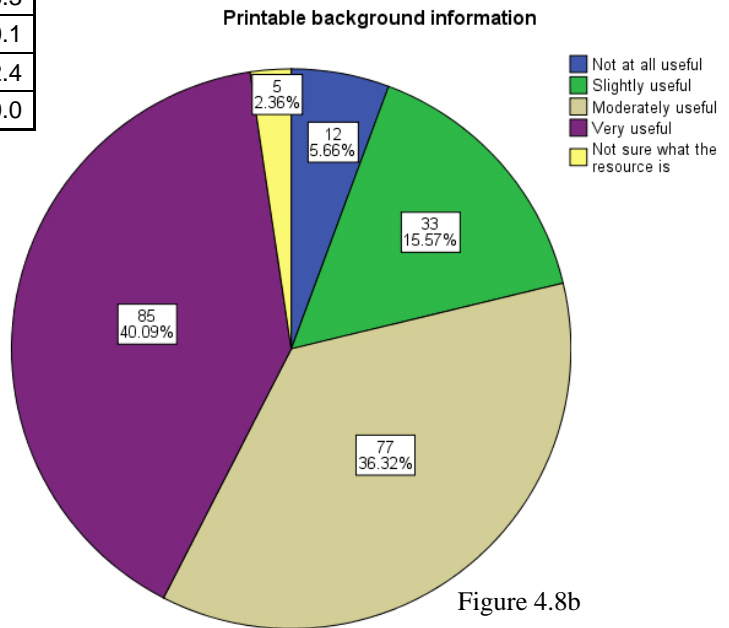


Figure 4.8b

Of the 212 people who answered this portion of question four, 76.4% indicated that printable background information would be moderately or very useful to enhance their use of the LEAF Lesson Guide.

Printable Background Information by unit used

Printable background information		K-1	2-3	4	5-6	7-8	9-12
Not at all useful	Count	2	0	3	0	4	2
	% of Total	.9%	.0%	1.4%	.0%	1.9%	.9%
Slightly useful	Count	10	4	5	6	9	5
	% of Total	4.7%	1.9%	2.4%	2.8%	4.2%	2.4%
Moderately useful	Count	12	15	21	16	25	18
	% of Total	5.7%	7.1%	9.9%	7.5%	11.8%	8.5%
Very useful	Count	10	14	15	25	29	26
	% of Total	4.7%	6.6%	7.1%	11.8%	13.7%	12.3%
Not sure what the resource is	Count	0	0	0	1	1	2
	% of Total	.0%	.0%	.0%	.5%	.5%	.9%
Total	Count	34	33	44	48	68	53
	% of Total	16.0%	15.6%	20.8%	22.6%	32.1%	25.0%

Figure 4.8c

Note: The count for each category by unit does not equal the total for each category in figures 4.8a and 4.8b because survey respondents could indicate that they used more than one unit.

QUESTION 4

Percent of moderately useful and very useful by unit used

Unit	Total of moderately useful and very useful categories	Number of respondents using unit	Percent
K-1	22	34	64.7
2-3	29	33	87.9
4	36	44	81.8
5-6	41	48	85.4
7-8	54	68	79.4
9-12	44	53	83.0

Nearly equal percentages of respondents using each unit indicated that printable background information is moderately to very useful except for K-1 unit users.

Figure 4.8d

Conclusion:

Printable background information should be part of a comprehensive digital resource library created for teachers using the LEAF Lesson Guide. This could be one of the resources offered as part of a comprehensive statewide forestry education clearinghouse.

Suggestions:

- The information should be on forestry-related topics addressed in the LEAF Lesson Guide as well as topics of timely importance.
- The information should be written in language that the average reader can understand, generally a sixth grade level would be appropriate for most middle and high school student and adult users.
- The information should be in Adobe Acrobat Portable Document Format (PDF) format, with consistent layout and formatting from one topic to the next, at a length of approximately one page per topic.
- The information could be gathered from existing sources, written by LEAF staff, or solicited from LEAF stakeholders.
- Another potential source for information is the LEAF online course, as it addresses all subconcepts identified in the *LEAF Conceptual Guide to Wisconsin K-12 Forestry Education*. Various sections of the online course could be referenced and linked from the digital resource library. The online course should be designed so that each topic can be read on screen as well as printed in PDF format. This will allow greater flexibility in use.

Printable Lessons/activities

Answer	Frequency	Percent
Not at all useful	7	3.2
Slightly useful	18	8.2
Moderately useful	49	22.4
Very useful	140	63.9
Not sure what the resource is	5	2.3
Total	219	100.0

Figure 4.9a

Question 4 – printable lessons/activities refers to any type of lesson or activity that people can access via the Internet or from a CD-ROM. This includes the lessons in the LEAF Lesson Guide as well as forestry-related lessons from other print and digital sources.

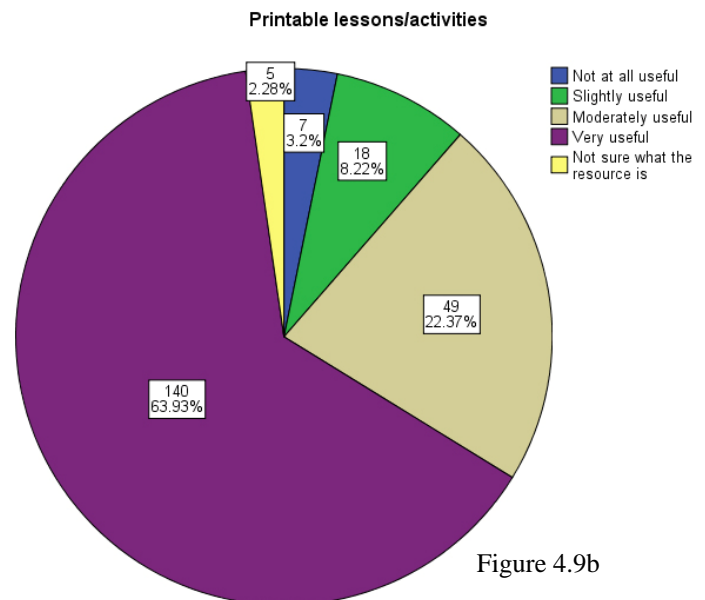


Figure 4.9b

QUESTION 4

Of the 219 people who answered this portion of question four, 86.3% indicated that printable lessons/activities would be moderately or very useful to enhance their use of the LEAF Lesson Guide.

Printable Lessons/activities by unit used

Printable lessons/activities		K-1	2-3	4	5-6	7-8	9-12
Not at all useful	Count	0	1	3	0	2	1
	% of Total	.0%	.5%	1.4%	.0%	.9%	.5%
Slightly useful	Count	5	2	3	4	10	4
	% of Total	2.3%	.9%	1.4%	1.8%	4.6%	1.8%
Moderately useful	Count	6	9	10	5	14	19
	% of Total	2.7%	4.1%	4.6%	2.3%	6.4%	8.7%
Very useful	Count	27	23	27	40	43	28
	% of Total	12.3%	10.5%	12.3%	18.3%	19.6%	12.8%
Not sure what the resource is	Count	0	1	1	1	0	2
	% of Total	.0%	.5%	.5%	.5%	.0%	.9%
Total	Count	38	36	44	50	69	54
	% of Total	17.4%	16.4%	20.1%	22.8%	31.5%	24.7%

Figure 4.9c

Note: The count for each category by unit does not equal the total for each category in figures 4.9a and 4.9b because survey respondents could indicate that they used more than one unit.

Percent of moderately useful and very useful by unit used

Unit	Total of moderately useful and very useful categories	Number of respondents using unit	Percent
K-1	33	38	86.8
2-3	32	36	88.9
4	37	44	84.1
5-6	45	50	90.0
7-8	57	69	82.6
9-12	47	54	87.0

Figure 4.9d

Nearly equal percentages of respondents using each unit indicated that printable lessons/activities are moderately to very useful.

Conclusion:

Printable lessons/activities should be made available to educators as part of a digital resources library. This could be one of the resources offered as part of a comprehensive statewide forestry education clearinghouse.

Suggestions:

- Continue to expand upon the non-LEAF forestry-education lessons/activities currently available on the LEAF web site.
- Make some of the LEAF lessons or portions of lessons from each unit available online as examples of what is in the units and to entice people to take a workshop to obtain an entire unit of the Lesson Guide.

To encourage return visitation, continue to create short activities and post them online. The activities can include simple instructions in a one page format and can be relevant to a particular grade level, topic, season, or subject area. Various LEAF staff can take turns creating them on a monthly basis. In addition to the LEAF digital resources library, they can also be

QUESTION 4

included in the LEAFlet electronic newsletter. Activities could also be solicited from teachers who develop extensions to the LEAF lessons.

- Consider making the entire LEAF Lesson Guide available online. This could increase the use of LEAF materials and visibility of the program. Users could be required to enter contact information before accessing the lessons so statistics could be generated on user numbers. Each lesson is written with complete background information, providing educators with sufficient information to teach the lessons. LEAF workshops could focus on enhancing teachers' abilities to incorporate forestry education topics into their existing curriculum rather than the current structure which focuses on introducing teachers to lessons.

Printable Resource Lists

Answer	Frequency	Percent
Not at all useful	15	7.2
Slightly useful	53	25.4
Moderately useful	63	30.1
Very useful	72	34.4
Not sure what the resource is	6	2.9
Total	209	100.0

Figure 4.10a

Question 4 – printable resource lists include any type of forestry-related resource lists that people can access via the Internet or from a CD-ROM. Examples include lists of state foresters, lists of publications, lists of forestry field experience providers, lists of educators using the LEAF Lesson Guide, etc.

Of the 209 people who answered this portion of question four, 64.5% indicated printable resource lists would be moderately or very useful to enhance their use of the LEAF Lesson Guide.

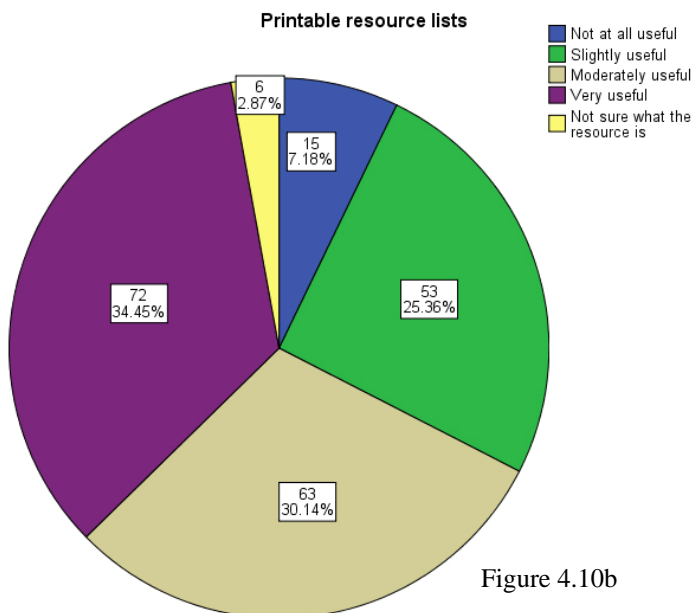


Figure 4.10b

QUESTION 4

Printable Resource Lists by unit used

Printable resource lists		K-1	2-3	4	5-6	7-8	9-12
Not at all useful	Count	1	1	5	3	5	3
	% of Total	.5%	.5%	2.4%	1.4%	2.4%	1.4%
Slightly useful	Count	13	8	6	10	20	13
	% of Total	6.2%	3.8%	2.9%	4.8%	9.6%	6.2%
Moderately useful	Count	9	8	8	13	18	19
	% of Total	4.3%	3.8%	3.8%	6.2%	8.6%	9.1%
Very useful	Count	11	15	21	19	24	16
	% of Total	5.3%	7.2%	10.0%	9.1%	11.5%	7.7%
Not sure what the resource is	Count	0	2	2	1	0	2
	% of Total	.0%	1.0%	1.0%	.5%	.0%	1.0%
Total	Count	34	34	42	46	67	53
	% of Total	16.3%	16.3%	20.1%	22.0%	32.1%	25.4%

Figure 4.10c

Note: The count for each category by unit does not equal the total for each category in figures 4.10a and 4.10b because survey respondents could indicate that they used more than one unit.

Percent of moderately useful and very useful by unit used

Unit	Total of moderately useful and very useful categories	Number of respondents using unit	Percent
K-1	20	34	58.8
2-3	23	34	67.6
4	29	42	69.0
5-6	32	46	69.6
7-8	42	67	62.7
9-12	35	53	66.0

Figure 4.10d

Nearly equal percentages of respondents using each unit of the Lesson Guide indicated that printable resource lists would be moderately to very useful.

Conclusion:

Include printable resource lists as part of the LEAF digital resources library. This could be one of the resources offered as part of a comprehensive statewide forestry education clearinghouse.

Suggestions:

- Solicit ideas from users of the LEAF Lesson Guide as to the types of resource lists that would be most helpful to them. These lists may include resource professionals willing to speak in classrooms, places to obtain forestry-related field equipment, potential field trip sites, etc.
- Make the resource lists user-friendly by categorizing them (e.g., by topic, by grade level, by region of the state, etc.).
- Ensure the resource lists are kept up-to-date.

QUESTION 4

Chatroom or Discussion Board for Teachers

Answer	Frequency	Percent
Not at all useful	79	37.1
Slightly useful	77	36.2
Moderately useful	41	19.2
Very useful	14	6.6
Not sure what the resource is	2	.9
Total	213	100.0

Figure 4.11a

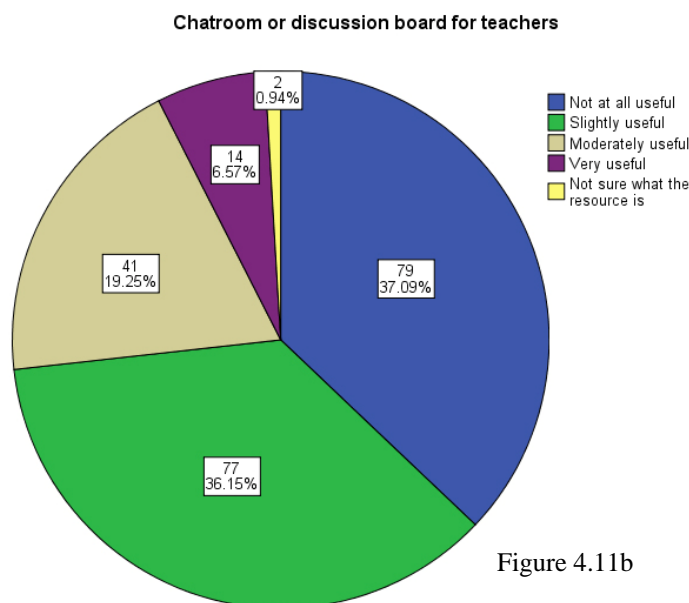


Figure 4.11b

Question 4 – a chatroom or discussion board for teachers would be a place on the World Wide Web where people could post comments and questions related to various topics. An example would be a discussion board for K-1 teachers who use the LEAF Lesson Guide to share ideas on how to incorporate forestry education into their classroom or a discussion board for teachers who want suggestions on where to locate various types of forestry education resources.

Of the 213 people who answered this portion of question four, 25.8% indicated that a chatroom or discussion board for teachers would be moderately or very useful to enhance their use of the LEAF Lesson Guide.

Chatroom or Discussion Board for Teachers by unit used

Chatroom or discussion board for teachers		K-1	2-3	4	5-6	7-8	9-12
Not at all useful	Count	12	14	10	13	28	19
	% of Total	5.6%	6.6%	4.7%	6.1%	13.1%	8.9%
Slightly useful	Count	10	8	17	22	18	20
	% of Total	4.7%	3.8%	8.0%	10.3%	8.5%	9.4%
Moderately useful	Count	12	9	15	8	14	10
	% of Total	5.6%	4.2%	7.0%	3.8%	6.6%	4.7%
Very useful	Count	1	4	1	4	8	5
	% of Total	.5%	1.9%	.5%	1.9%	3.8%	2.3%
Not sure what the resource is	Count	0	0	0	1	0	0
	% of Total	.0%	.0%	.0%	.5%	.0%	.0%
Total	Count	35	35	43	48	68	54
	% of Total	16.4%	16.4%	20.2%	22.5%	31.9%	25.4%

Figure 4.11c

Note: The count for each category by unit does not equal the total for each category in figures 4.11a and 4.11b because survey respondents could indicate that they used more than one unit.

QUESTION 4

Percent of moderately useful and very useful by unit used

Unit	Total of moderately useful and very useful categories	Number of respondents using unit	Percent
K-1	13	35	37.1
2-3	13	35	37.1
4	16	43	37.2
5-6	12	48	25.0
7-8	22	68	32.4
9-12	15	54	27.8

Figure 4.11d

The percent of respondents indicating that a chatroom or discussion board for teachers would be moderately to very useful was nearly equivalent (within 12.2 percentage points) for users of all units.

Conclusion:

Due to the low number of respondents indicating that a chatroom or discussion board for teachers would be moderately to very useful, it is not recommended that LEAF create these types of resources for teachers.

Chatroom or Discussion Board for Students

Answer	Frequency	Percent
Not at all useful	108	51.2
Slightly useful	68	32.2
Moderately useful	26	12.3
Very useful	7	3.3
Not sure what the resource is	2	.9
Total	211	100.0

Figure 4.12a

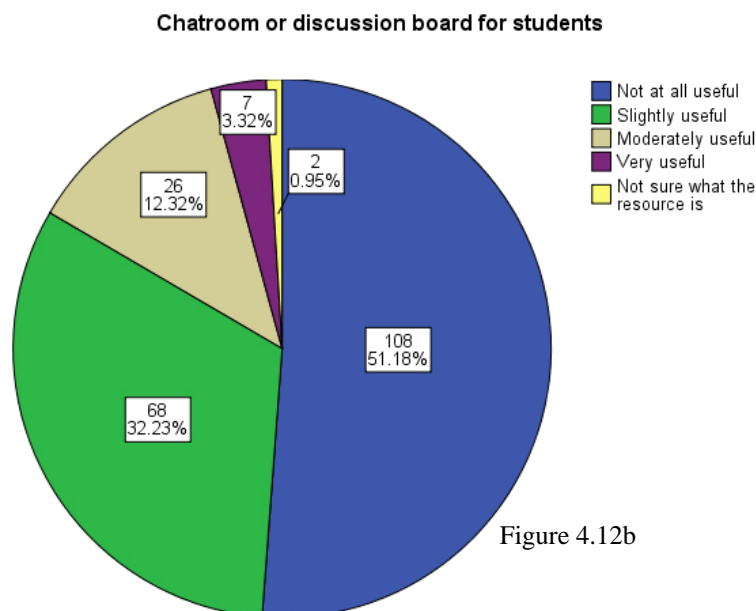


Figure 4.12b

Question 4 – a chatroom or discussion board for students would be a place on the World Wide Web where students could post comments and questions related to various topics. A chatroom might be a place for general forestry discussion that a teacher sends students to as part of a lesson or it might be related to a specific topic or lesson where students can connect with students in other schools studying the same topic. An example would be a discussion board for 7th-8th grade students studying invasive species. Students could explain where they are in the state and which species affect their area. Other students could read this information, ask questions, and explain the species affecting their area.

Of the 211 people who answered this portion of question four, 15.6% indicated that a chatroom or discussion board for students would be moderately or very useful to enhance their use of the LEAF Lesson Guide.

QUESTION 4

Chatroom or Discussion Board for Students by unit used

Chatroom or discussion board for students		K-1	2-3	4	5-6	7-8	9-12
Not at all useful	Count	21	18	18	19	30	24
	% of Total	10.0%	8.5%	8.5%	9.0%	14.2%	11.4%
Slightly useful	Count	11	13	15	18	17	18
	% of Total	5.2%	6.2%	7.1%	8.5%	8.1%	8.5%
Moderately useful	Count	2	2	8	8	15	9
	% of Total	.9%	.9%	3.8%	3.8%	7.1%	4.3%
Very useful	Count	1	1	0	1	6	3
	% of Total	.5%	.5%	.0%	.5%	2.8%	1.4%
Not sure what the resource is	Count	0	0	0	1	0	0
	% of Total	.0%	.0%	.0%	.5%	.0%	.0%
Total	Count	35	34	41	47	68	54
	% of Total	16.6%	16.1%	19.4%	22.3%	32.2%	25.6%

Figure 4.12c

Note: The count for each category by unit does not equal the total for each category in figures 4.12a and 4.12b because survey respondents could indicate that they used more than one unit.

Percent of moderately useful and very useful by unit used

Unit	Total of moderately useful and very useful categories	Number of respondents using unit	Percent
K-1	3	35	8.6
2-3	3	34	8.8
4	8	41	19.5
5-6	9	47	19.1
7-8	21	68	30.9
9-12	12	54	22.2

Figure 4.12d

The percent of respondents indicating that a chatroom or discussion board for students would be moderately to very useful was highest for those using the 7-8 unit and lowest for those using the K-1 or 2-3 unit.

Conclusion:

Due to the low number of respondents indicating that a chatroom or discussion board for students would be moderately to very useful, it is not recommended that LEAF create these types of resources for students.

QUESTION 4

LEAF Blog

Answer	Frequency	Percent
Not at all useful	75	35.9
Slightly useful	65	31.1
Moderately useful	30	14.4
Very useful	6	2.9
Not sure what the resource is	33	15.8
Total	209	100.0

Figure 4.13a

Question 4 – a LEAF blog would be a place on the World Wide Web where LEAF staff post information on various topics such as the LEAF Program, forestry education, or general forestry information on a regular basis. Others could read the information and respond.

Of the 209 people who answered this portion of question four, 17.3% indicated that a LEAF blog would be moderately or very useful to enhance their use of the LEAF Lesson Guide.

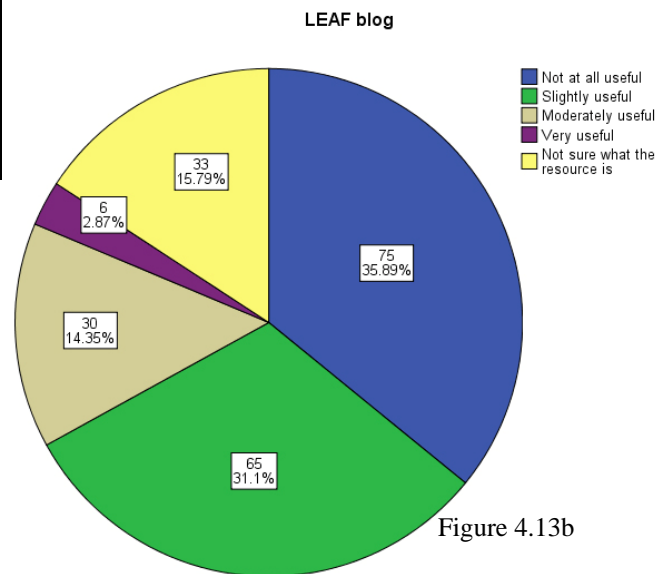


Figure 4.13b

LEAF Blog by unit used

LEAF blog		K-1	2-3	4	5-6	7-8	9-12
Not at all useful	Count	13	13	12	13	18	18
	% of Total	6.2%	6.2%	5.7%	6.2%	8.6%	8.6%
Slightly useful	Count	10	6	14	21	29	20
	% of Total	4.8%	2.9%	6.7%	10.0%	13.9%	9.6%
Moderately useful	Count	5	5	7	9	11	7
	% of Total	2.4%	2.4%	3.3%	4.3%	5.3%	3.3%
Very useful	Count	0	1	0	0	4	2
	% of Total	.0%	.5%	.0%	.0%	1.9%	1.0%
Not sure what the resource is	Count	6	9	9	5	6	5
	% of Total	2.9%	4.3%	4.3%	2.4%	2.9%	2.4%
Total	Count	34	34	42	48	68	52
	% of Total	16.3%	16.3%	20.1%	23.0%	32.5%	24.9%

Figure 4.13c

Note: The count for each category by unit does not equal the total for each category in figures 4.13a and 4.13b because survey respondents could indicate that they used more than one unit.

Percent of moderately useful and very useful by unit used

Unit	Total of moderately useful and very useful categories	Number of respondents using unit	Percent
K-1	5	34	14.7
2-3	6	34	17.6
4	7	42	16.7
5-6	9	48	18.8
7-8	15	68	22.1
9-12	9	52	17.3

Figure 4.13d

QUESTION 4

The percent of respondents indicating that a LEAF blog would be moderately to very useful was consistent (within 7.4 percentage points) among users of all units.

Conclusion:

Due to the low number of respondents indicating that a LEAF blog would be moderately to very useful, it is not recommended that LEAF create this type of resource.

Educational Game

Answer	Frequency	Percent
Not at all useful	9	4.1
Slightly useful	26	11.7
Moderately useful	84	37.8
Very useful	97	43.7
Not sure what the resource is	6	2.7
Total	222	100.0

Figure 4.14a

Question 4 – educational game refers to any type of interactive game that can be used to teach students forestry education concepts and that can be accessed via the Internet or from a CD-ROM.

Of the 222 people who answered this portion of question four, 81.5% indicated that an educational game would be moderately or very useful to enhance their use of the LEAF Lesson Guide.

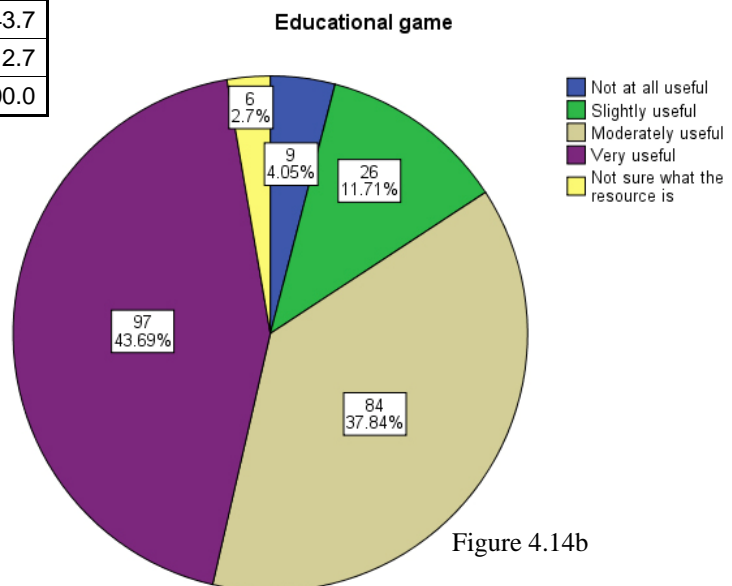


Figure 4.14b

Educational Game by unit used

Educational game		K-1	2-3	4	5-6	7-8	9-12
Not at all useful	Count	2	0	3	1	2	2
	% of Total	.9%	.0%	1.4%	.5%	.9%	.9%
Slightly useful	Count	3	5	2	4	10	8
	% of Total	1.4%	2.3%	.9%	1.8%	4.5%	3.6%
Moderately useful	Count	12	12	19	19	28	24
	% of Total	5.4%	5.4%	8.6%	8.6%	12.6%	10.8%
Very useful	Count	21	18	19	24	30	19
	% of Total	9.5%	8.1%	8.6%	10.8%	13.5%	8.6%
Not sure what the resource is	Count	0	1	1	2	2	2
	% of Total	.0%	.5%	.5%	.9%	.9%	.9%
Total	Count	38	36	44	50	72	55
	% of Total	17.1%	16.2%	19.8%	22.5%	32.4%	24.8%

Note: The count for each category by unit does not equal the total for each category in figures 4.14a and 4.14b because survey respondents could indicate that they used more than one unit.

Figure 4.14c

QUESTION 4

Percent of moderately useful and very useful by unit used

Unit	Total of moderately useful and very useful categories	Number of respondents using unit	Percent
K-1	33	38	86.8
2-3	30	36	83.3
4	38	44	86.4
5-6	43	50	86.0
7-8	58	72	80.6
9-12	43	55	78.2

Figure 4.14d

The percent of respondents indicating that an educational game would be moderately to very useful was consistent (within 8.6 percentage points) among users of all units.

Conclusion:

LEAF should provide educators access to forestry-related educational games. This could be one of the resources offered as part of a comprehensive statewide forestry education clearinghouse.

Suggestions:

- Take advantage of opportunities to create or obtain forestry-related educational games and place them in the LEAF digital resources library.
- Provide educational games for various age groups on differing topics. Survey LEAF teachers to find out which topics they would find most helpful if provided for students in game format.
- Ensure that educational games do not require uncommon software to operate. The games should utilize technology that is available in most schools. Download time should be kept to a minimum. Keep the technical complexity of games minimal because schools do not always have the fastest computers or most up-to-date equipment.

Simulations and Animations

Answer	Frequency	Percent
Not at all useful	17	7.9
Slightly useful	30	13.9
Moderately useful	64	29.6
Very useful	95	44.0
Not sure what the resource is	10	4.6
Total	216	100.0

Figure 4.15a

Question 4 – simulations and animations include any type of computer-based simulations or animations that teach students forestry education concepts and that can be accessed via the Internet or from a CD-ROM. Examples of simulations include computer-based graphics that illustrate forest harvesting techniques or concepts such as forest succession

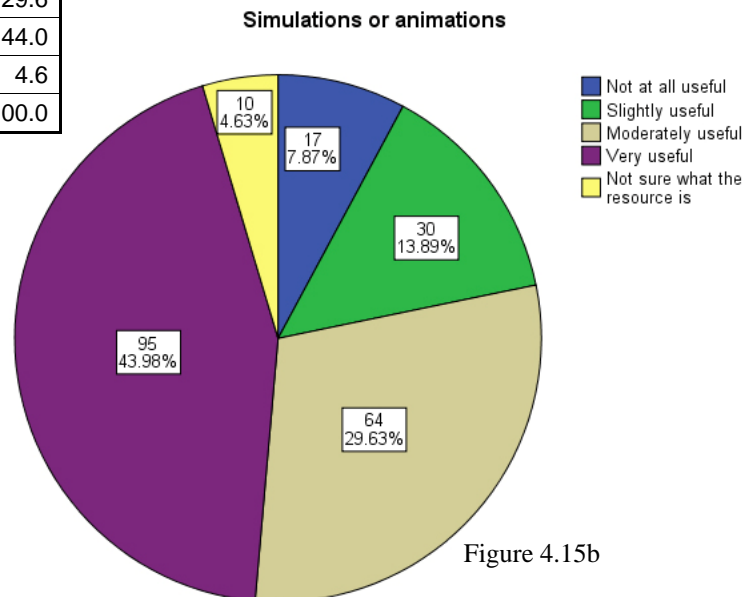


Figure 4.15b

QUESTION 4

in which students can manipulate the outcome by choosing different options. Examples of animations include a series of computer-based graphics that illustrate the process of photosynthesis or the basic needs of a tree and its growth process.

Of the 216 people who answered this portion of question four, 73.6% indicated that simulations and animations would be moderately or very useful to enhance their use of the LEAF Lesson Guide.

Simulations and Animations by unit used

Simulations and animations		K-1	2-3	4	5-6	7-8	9-12
Not at all useful	Count	6	3	2	1	3	1
	% of Total	2.8%	1.4%	.9%	.5%	1.4%	.5%
Slightly useful	Count	8	9	8	4	8	5
	% of Total	3.7%	4.2%	3.7%	1.9%	3.7%	2.3%
Moderately useful	Count	6	7	10	19	27	22
	% of Total	2.8%	3.2%	4.6%	8.8%	12.5%	10.2%
Very useful	Count	14	15	22	23	28	25
	% of Total	6.5%	6.9%	10.2%	10.6%	13.0%	11.6%
Not sure what the resource is	Count	0	1	2	2	4	2
	% of Total	.0%	.5%	.9%	.9%	1.9%	.9%
Total	Count	34	35	44	49	70	55
	% of Total	15.7%	16.2%	20.4%	22.7%	32.4%	25.5%

Figure 4.15c

Note: The count for each category by unit does not equal the total for each category in figures 4.15a and 4.15b because survey respondents could indicate that they used more than one unit.

Percent of moderately useful and very useful by unit used

Unit	Total of moderately useful and very useful categories	Number of respondents using unit	Percent
K-1	20	34	58.8
2-3	22	35	62.9
4	32	44	72.7
5-6	42	49	85.7
7-8	55	70	78.6
9-12	47	55	85.5

Figure 4.15d

The percent of respondents indicating that an educational game would be moderately to very useful shows an increasing trend from users of the K-1 unit to users of the 9-12 unit.

Conclusion:

Take advantage of opportunities to create or obtain forestry-related simulations and animations and place them in the LEAF digital resources library.

Suggestions:

- Focus the development of simulations/animations on concepts in the 4, 5-6, 7-8, and 9-12 units.
- Ensure that simulations and animations do not require uncommon software to operate. The simulations and animations should utilize technology that is available in most schools. Download time should be kept to a minimum. Keep the technical complexity of these resources minimal because schools do not always have the fastest computers or most up-to-date technology resources.

QUESTION 4

Digital Video

Answer	Frequency	Percent
Not at all useful	23	10.8
Slightly useful	32	15.0
Moderately useful	66	31.0
Very useful	82	38.5
Not sure what the resource is	10	4.7
Total	213	100.0

Figure 4.16a

Question 4 – digital video includes any type of video that can be accessed via the Internet or from a CD-ROM.

Of the 213 people who answered this portion of question four, 69.5% indicated that digital video would be moderately or very useful to enhance their use of the LEAF Lesson Guide.

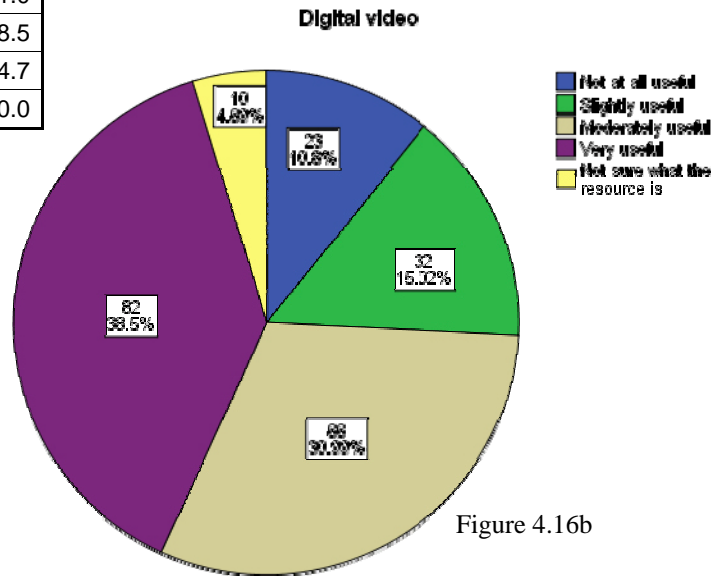


Figure 4.16b

Digital Video by unit used

Digital video		K-1	2-3	4	5-6	7-8	9-12
Not at all useful	Count	6	4	4	2	5	2
	% of Total	2.8%	1.9%	1.9%	.9%	2.3%	.9%
Slightly useful	Count	4	10	9	5	11	4
	% of Total	1.9%	4.7%	4.2%	2.3%	5.2%	1.9%
Moderately useful	Count	8	6	11	22	23	20
	% of Total	3.8%	2.8%	5.2%	10.3%	10.8%	9.4%
Very useful	Count	16	13	19	16	25	24
	% of Total	7.5%	6.1%	8.9%	7.5%	11.7%	11.3%
Not sure what the resource is	Count	1	2	1	2	3	3
	% of Total	.5%	.9%	.5%	.9%	1.4%	1.4%
Total	Count	35	35	44	47	67	53
	% of Total	16.4%	16.4%	20.7%	22.1%	31.5%	24.9%

Figure 4.16c

Note: The count for each category by unit does not equal the total for each category in figures 4.16a and 4.16b because survey respondents could indicate that they used more than one unit.

Percent of moderately useful and very useful by unit used

Unit	Total of moderately useful and very useful categories	Number of respondents using unit	Percent
K-1	24	35	68.6
2-3	19	35	54.3
4	30	44	68.2
5-6	38	47	80.9
7-8	48	67	71.6
9-12	44	53	83.0

Figure 4.16d

QUESTION 4

The percent of respondents indicating that digital video would be moderately to very useful varied from users of different units. The range is between 54.3% for 2-3 unit users to 83.0% for 9-12 users. There appears to be no distinct trend among users of different units.

Conclusion:

Take advantage of opportunities to create or obtain forestry-related videos and place information on how to obtain them in the LEAF digital resources library.

Suggestions:

- Research existing forestry education videos. Provide information on how to obtain videos. Review the videos to ensure the content and quality is appropriate for use in Wisconsin classrooms.
- Have teachers recommend videos they use and describe how they enhance their ability to teach forestry education. Make this information available to other educators.
- When possible make forestry education video clips available to teachers via the Internet. Provide links to downloadable clips teachers can play from their computers using readily accessible software such as Windows Media Player or Real Player. This can include the already existing video that supports LEAF lessons in the 7-8 and 9-12 units. The information is likely to be useful to many educators, not only those using specific units of the LEAF Guide.

Audio Material

Answer	Frequency	Percent
Not at all useful	33	15.5
Slightly useful	65	30.5
Moderately useful	58	27.2
Very useful	52	24.4
Not sure what the resource is	5	2.3
Total	213	100.0

Figure 4.17a

Audio material

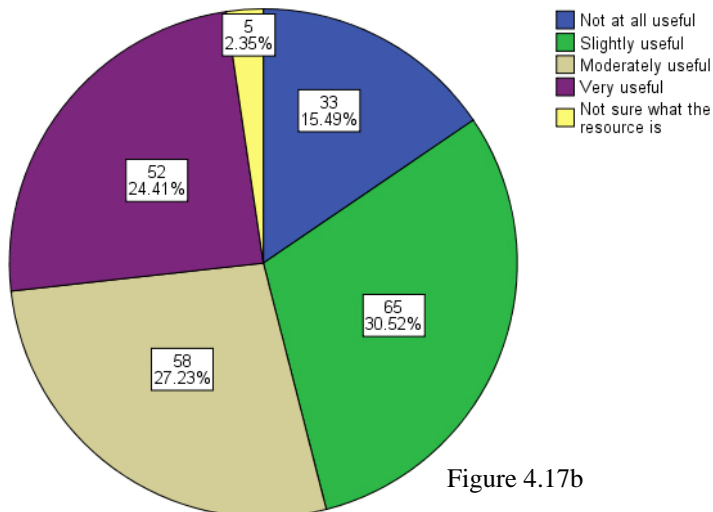


Figure 4.17b

Question 4 – audio material includes any type of sound files that can be accessed via the Internet or from a CD-ROM. Examples include interviews, music, presentations/lectures/speeches, animal vocalizations, etc.

Of the 213 people who answered this portion of question four, 51.6% indicated that audio material would be moderately or very useful to enhance their use of the LEAF Lesson Guide.

QUESTION 4

Audio Material by unit used

Audio material		K-1	2-3	4	5-6	7-8	9-12
Not at all useful	Count	6	4	5	3	10	8
	% of Total	2.8%	1.9%	2.3%	1.4%	4.7%	3.8%
Slightly useful	Count	7	9	13	15	23	18
	% of Total	3.3%	4.2%	6.1%	7.0%	10.8%	8.5%
Moderately useful	Count	7	7	13	21	21	16
	% of Total	3.3%	3.3%	6.1%	9.9%	9.9%	7.5%
Very useful	Count	15	13	11	7	13	11
	% of Total	7.0%	6.1%	5.2%	3.3%	6.1%	5.2%
Not sure what the resource is	Count	0	1	1	1	2	0
	% of Total	.0%	.5%	.5%	.5%	.9%	.0%
Total	Count	35	34	43	47	69	53
	% of Total	16.4%	16.0%	20.2%	22.1%	32.4%	24.9%

Figure 4.17c

Note: The count for each category by unit does not equal the total for each category in figures 4.17a and 4.17b because survey respondents could indicate that they used more than one unit.

Percent of moderately useful and very useful by unit used

Unit	Total of moderately useful and very useful categories	Number of respondents using unit	Percent
K-1	22	35	62.9
2-3	20	34	58.8
4	24	43	55.8
5-6	28	47	59.6
7-8	34	69	49.3
9-12	27	53	50.9

Figure 4.17d

The percent of respondents indicating that audio material would be moderately to very useful was shows a slight trend of more use for users of lower grade level units (K-6) than upper (7-12).

Conclusion:

Take advantage of opportunities to create or obtain forestry-related audio material and place it in the LEAF digital resources library.

Suggestions:

- Initial efforts should focus on providing audio material for users of the K-1, 2-3, 4, and 5-6 units.
- Take advantage of opportunities to provide educators with forestry-related audio material. However, since audio material was not indicated as moderately to very useful to as many respondents as other materials, focus more heavily on the development of other types of resources before creating audio resources.

QUESTION 4

Web Site Links

Answer	Frequency	Percent
Not at all useful	12	5.6
Slightly useful	39	18.1
Moderately useful	93	43.1
Very useful	69	31.9
Not sure what the resource is	3	1.4
Total	216	100.0

Figure 4.18a

Question 4 – web site links are references to existing resources on the World Wide Web. The web sites linked to may contain material on an array of topics and be of various types (static information, audio, video, games, etc.)

Of the 216 people who answered this portion of question four, 75.0% indicated that web site links would be moderately or very useful to enhance their use of the LEAF Lesson Guide.

Web site links

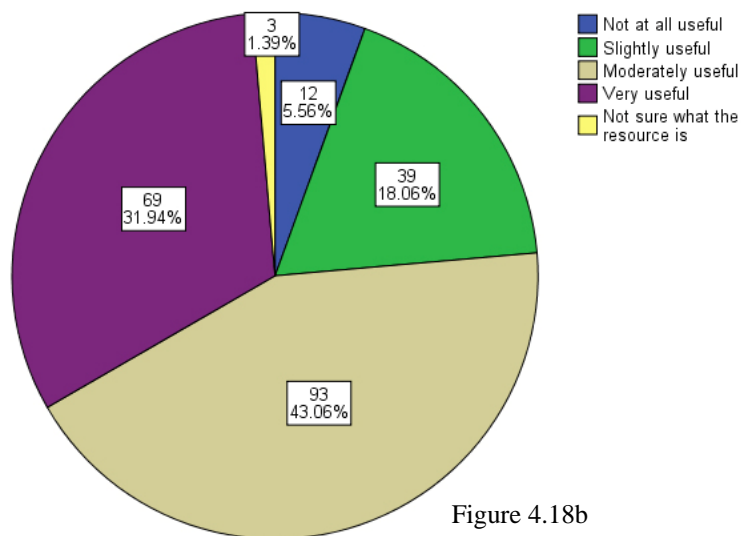


Figure 4.18b

Web Site Links by unit used

Web site links		K-1	2-3	4	5-6	7-8	9-12
Not at all useful	Count	2	2	4	3	2	3
	% of Total	.9%	.9%	1.9%	1.4%	.9%	1.4%
Slightly useful	Count	8	7	6	6	12	3
	% of Total	3.7%	3.2%	2.8%	2.8%	5.6%	1.4%
Moderately useful	Count	18	15	19	20	28	25
	% of Total	8.3%	6.9%	8.8%	9.3%	13.0%	11.6%
Very useful	Count	8	11	15	17	26	23
	% of Total	3.7%	5.1%	6.9%	7.9%	12.0%	10.6%
Not sure what the resource is	Count	0	0	0	1	1	0
	% of Total	.0%	.0%	.0%	.5%	.5%	.0%
Total	Count	36	35	44	47	69	54
	% of Total	16.7%	16.2%	20.4%	21.8%	31.9%	25.0%

Figure 4.18c

Note: The count for each category by unit does not equal the total for each category in figures 4.18a and 4.18b because survey respondents could indicate that they used more than one unit.

QUESTION 4

Percent of moderately useful and very useful by unit used

Unit	Total of moderately useful and very useful categories	Number of respondents using unit	Percent
K-1	26	36	72.2
2-3	26	35	74.3
4	34	44	77.3
5-6	37	47	78.7
7-8	54	69	78.3
9-12	48	54	88.9

Figure 4.18d

The percent of respondents indicating that web site links would be moderately to very useful was shows a upward trend from users of the K-1 unit to users of the 9-12 unit.

Conclusion:

Provide web site links as part of the digital resources library.

Suggestions:

- Continue to expand the list of links currently on the LEAF web site by including more topics and more links within each topic. Move the link list to the LEAF digital resources library.
- Cross categorize links to make them easy to use. Group them in multiple ways including by topic, type of resource, and grade level appropriateness.
- Provide separate link sections for students and teachers.
- Always include a description of the linked web site so users can quickly evaluate usefulness.
- Create a place in the digital resources library for resources organized by unit and include the links listed in the additional resources sections of each unit of the LEAF Lesson Guide.
- Periodically check for broken links and update them regularly. Users are frustrated by links pages leading to web sites that no longer exist or have changed their address.

“Ask an Expert” Web Page

Answer	Frequency	Percent
Not at all useful	30	14.2
Slightly useful	43	20.3
Moderately useful	83	39.2
Very useful	53	25.0
Not sure what the resource is	3	1.4
Total	212	100.0

Figure 4.19a

Question 4 – an “ask an expert” web page is a place on the LEAF web site where people could submit questions to forestry experts on various topics. Replies to questions would be posted on the web page for anyone to read. Various forestry professionals would be contacted to serve as experts and be forwarded questions by LEAF staff as web site users submitted them. LEAF staff would then post the responses to the web page.

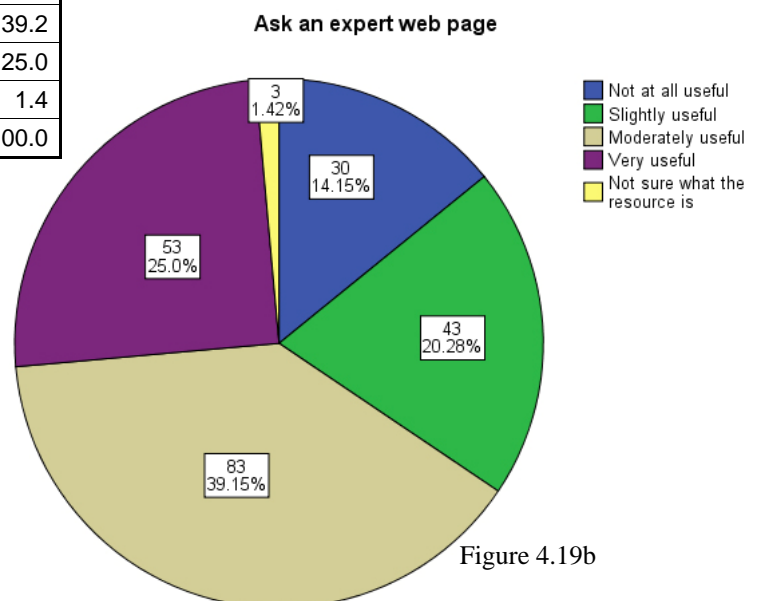


Figure 4.19b

QUESTION 4

Of the 212 people who answered this portion of question four, 64.2% indicated that an “ask an expert” web page would be moderately or very useful to enhance their use of the LEAF Lesson Guide.

“Ask an expert” web page by unit used

“Ask an expert” web page		K-1	2-3	4	5-6	7-8	9-12
Not at all useful	Count	8	4	6	2	8	4
	% of Total	3.8%	1.9%	2.8%	.9%	3.8%	1.9%
Slightly useful	Count	4	6	8	11	12	13
	% of Total	1.9%	2.8%	3.8%	5.2%	5.7%	6.1%
Moderately useful	Count	16	14	18	19	30	26
	% of Total	7.5%	6.6%	8.5%	9.0%	14.2%	12.3%
Very useful	Count	8	9	11	14	19	10
	% of Total	3.8%	4.2%	5.2%	6.6%	9.0%	4.7%
Not sure what the resource is	Count	0	0	0	1	1	0
	% of Total	.0%	.0%	.0%	.5%	.5%	.0%
Total	Count	36	33	43	47	70	53
	% of Total	17.0%	15.6%	20.3%	22.2%	33.0%	25.0%

Figure 4.19c

Note: The count for each category by unit does not equal the total for each category in figures 4.19a and 4.19b because survey respondents could indicate that they used more than one unit.

Percent of moderately useful and very useful by unit used

Unit	Total of moderately useful and very useful categories	Number of respondents using unit	Percent
K-1	24	36	66.7
2-3	23	33	69.7
4	29	43	67.4
5-6	33	47	79.2
7-8	49	70	70.0
9-12	36	53	67.9

Figure 4.19d

The percent of respondents indicating that an “ask an expert” web page would be moderately to very useful is consistent among users of all units (within 3.3 percent) except for users of the 5-6 unit, who indicated a higher percentage than all the other units.

Conclusion:

Include an “ask an expert” feature as part of a digital resources library.

Suggestions:

- An “ask an expert” feature would be a resource that provides incentive for people to revisit the LEAF web site. It would also be a way for LEAF to connect with forestry stakeholders who would offer their expertise to answer questions.
- Research existing “ask an expert” web pages and speak with the web site owners to determine how to make the resource effective and useful.
- Continually solicit questions from students and teachers to keep the feature active and current.
- Invite a variety of resource professionals to serve as experts so answers come from different sources. Provide profiles of the experts so students can learn more about forestry professionals.

QUESTION 4

Online Tree Identification Key

Answer	Frequency	Percent
Not at all useful	19	8.8
Slightly useful	23	10.6
Moderately useful	58	26.7
Very useful	109	50.2
Not sure what the resource is	8	3.7
Total	217	100.0

Figure 4.20a

Question 4 – an online tree identification key is a series of web pages that utilize images and text to guide users through an exercise that allows them to identify Wisconsin tree species. Such a key currently exists on the LEAF web site.

Of the 217 people who answered this portion of question four, 76.9% indicated that an online tree identification key would be moderately or very useful to enhance their use of the LEAF Lesson Guide.

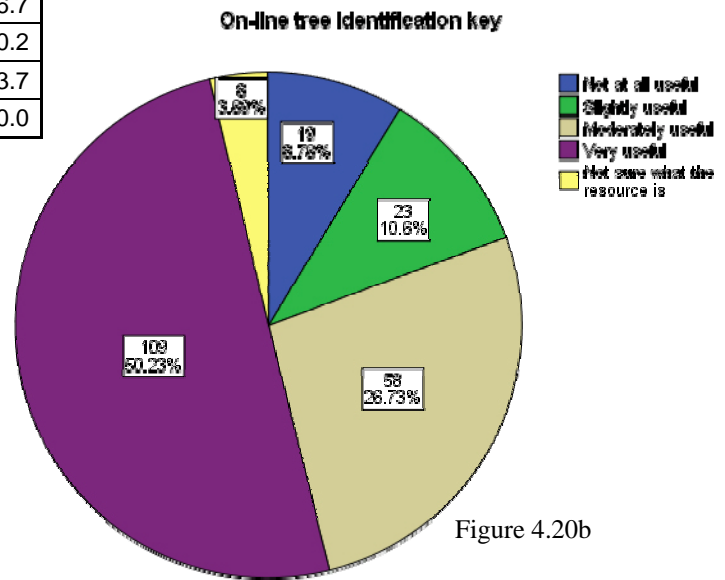


Figure 4.20b

Online tree identification key by unit used

Online tree identification key		K-1	2-3	4	5-6	7-8	9-12
Not at all useful	Count	5	2	4	2	4	1
	% of Total	2.3%	.9%	1.8%	.9%	1.8%	.5%
Slightly useful	Count	7	5	6	3	6	5
	% of Total	3.2%	2.3%	2.8%	1.4%	2.8%	2.3%
Moderately useful	Count	4	8	13	16	17	13
	% of Total	1.8%	3.7%	6.0%	7.4%	7.8%	6.0%
Very useful	Count	18	18	19	25	41	35
	% of Total	8.3%	8.3%	8.8%	11.5%	18.9%	16.1%
Not sure what the resource is	Count	2	2	2	2	2	0
	% of Total	.9%	.9%	.9%	.9%	.9%	.0%
Total	Count	36	35	44	48	70	54
	% of Total	16.6%	16.1%	20.3%	22.1%	32.3%	25.0%

Figure 4.20c

Note: The count for each category by unit does not equal the total for each category in figures 4.20a and 4.20b because survey respondents could indicate that they used more than one unit.

QUESTION 4

Percent of moderately useful and very useful by unit used

Unit	Total of moderately useful and very useful categories	Number of respondents using unit	Percent
K-1	22	36	61.1
2-3	26	35	74.3
4	32	44	72.7
5-6	41	48	85.4
7-8	58	70	82.9
9-12	48	54	88.9

Figure 4.20d

The percent of respondents indicating that an online tree identification key would be moderately to very useful increases from the K-1 unit to the 9-12 unit.

Conclusion:

Include the LEAF tree identification key and associated resources as part of the digital resources library.

Suggestions:

- Expand the tree identification key that currently exists to include more Wisconsin tree species, especially those on the printed tree identification key in the 7-8 unit.
- Market the tree identification key to workshop participants and the general forestry education audience, encouraging them to visit the LEAF web site.
- Consider expanding the key or adding a second one that features common forest shrubs.
- Give users the ability to click on images in the key and view or print higher resolution versions.

Virtual Field Trip

Answer	Frequency	Percent
Not at all useful	25	11.7
Slightly useful	27	12.6
Moderately useful	61	28.5
Very useful	94	43.9
Not sure what the resource is	7	3.3
Total	214	100.0

Figure 4.21a

Question 4 – a virtual field trip is a computer-based activity that helps users explore a given place. The field trip may include images, written information, sound, video clips, and links to other web sites for further investigation. Examples of forestry-related virtual field trips include paper mills, saw mills, different forest types, timber harvests, etc.

Of the 214 people who answered this portion of question four, 72.4% indicated that a virtual field trip would be moderately or very useful to enhance their use of the LEAF Lesson Guide.

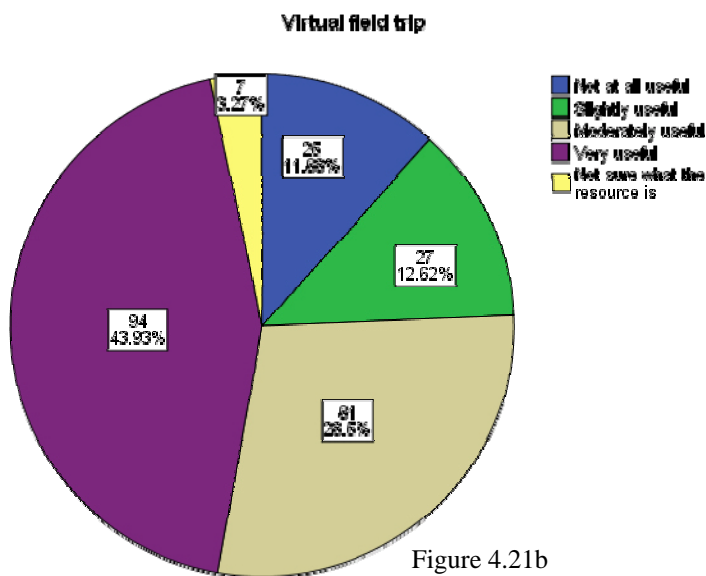


Figure 4.21b

QUESTION 4

Virtual field trip by unit used

Virtual Field Trip		K-1	2-3	4	5-6	7-8	9-12
Not at all useful	Count	4	4	6	5	8	5
	% of Total	1.9%	1.9%	2.8%	2.3%	3.7%	2.3%
Slightly useful	Count	4	3	4	2	10	10
	% of Total	1.9%	1.4%	1.9%	.9%	4.7%	4.7%
Moderately useful	Count	12	9	12	20	22	16
	% of Total	5.6%	4.2%	5.6%	9.3%	10.3%	7.5%
Very useful	Count	16	18	20	20	25	21
	% of Total	7.5%	8.4%	9.3%	9.3%	11.7%	9.8%
Not sure what the resource is	Count	0	1	1	1	2	2
	% of Total	.0%	.5%	.5%	.5%	.9%	.9%
Total	Count	36	35	43	48	67	54
	% of Total	16.8%	16.4%	20.1%	22.4%	31.3%	25.2%

Figure 4.21c

Note: The count for each category by unit does not equal the total for each category in figures 4.21a and 4.21b because survey respondents could indicate that they used more than one unit.

Percent of moderately useful and very useful by unit used

Unit	Total of moderately useful and very useful categories	Number of respondents using unit	Percent
K-1	28	36	77.8
2-3	27	35	77.1
4	32	43	74.4
5-6	40	48	83.3
7-8	47	67	70.1
9-12	37	54	68.5

Figure 4.21d

The percent of respondents indicating that an virtual field trip would be moderately to very useful shows a general decrease from users of the K-1 unit to users of the 9-12 unit. An exception to the trend is for users of the 5-6 unit who indicated the highest level of usefulness compared to the other units.

Conclusion:

Create virtual field trips and include them in the LEAF digital resources library.

Suggestions:

- Begin with topics that appeal to an array of grade levels and become more specific to particular grade level needs as time allows. For example, a virtual field trip to various forest communities would benefit students of all grade levels. Whereas a virtual field trip to a sawmill would be more suitable for middle and high school students.
- Focus grade level appropriateness to K-6 students unless specific needs of 7-12 students are being targeted.
- Poll LEAF Lesson Guide users as to the type of virtual field trips they would find most useful.

QUESTION 4

Citizen Science Monitoring

Answer	Frequency	Percent
Not at all useful	54	25.0
Slightly useful	56	25.9
Moderately useful	52	24.1
Very useful	40	18.5
Not sure what the resource is	14	6.5
Total	216	100.0

Figure 4.22a

Question 4 – citizen science monitoring is a computer-based activity in which students gather field data and enter it into a computerized database of information gathered by other citizen scientists. Data gathered may include bird sightings, invasive species monitoring, phenology observations, etc.

Of the 216 people who answered this portion of question four, 42.6% indicated that citizen science monitoring would be moderately or very useful to enhance their use of the LEAF Lesson Guide.

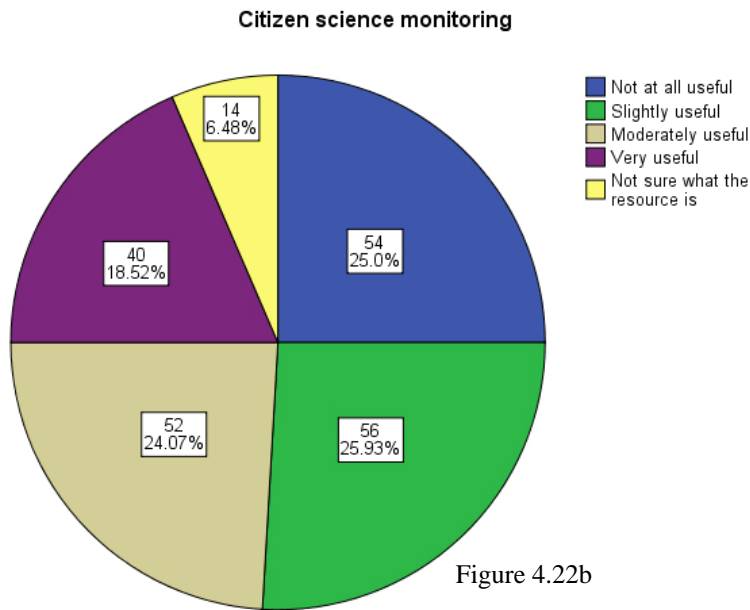


Figure 4.22b

Citizen science monitoring by unit used

Citizen science monitoring		K-1	2-3	4	5-6	7-8	9-12
Not at all useful	Count	17	14	9	7	10	4
	% of Total	7.9%	6.5%	4.2%	3.2%	4.6%	1.9%
Slightly useful	Count	10	8	12	14	17	15
	% of Total	4.6%	3.7%	5.6%	6.5%	7.9%	6.9%
Moderately useful	Count	5	5	9	15	22	16
	% of Total	2.3%	2.3%	4.2%	6.9%	10.2%	7.4%
Very useful	Count	2	5	7	9	19	18
	% of Total	.9%	2.3%	3.2%	4.2%	8.8%	8.3%
Not sure what the resource is	Count	1	2	6	4	2	1
	% of Total	.5%	.9%	2.8%	1.9%	.9%	.5%
Total	Count	35	34	43	49	70	54
	% of Total	16.2%	15.7%	19.9%	22.7%	32.4%	25.0%

Figure 4.22c

Note: The count for each category by unit does not equal the total for each category in figures 4.22a and 4.22b because survey respondents could indicate that they used more than one unit.

QUESTION 4

Percent of moderately useful and very useful by unit used

Unit	Total of moderately useful and very useful categories	Number of respondents using unit	Percent
K-1	7	35	20.0
2-3	10	34	29.4
4	16	43	37.2
5-6	24	49	49.0
7-8	41	70	58.6
9-12	34	54	63.0

Figure 4.22d

The percent of respondents indicating that citizen science monitoring would be moderately to very useful shows a steady increase from users of the K-1 unit to users of the 9-12 unit. This is the most distinct upward trend in usefulness from users of the lower grade level units to the upper grade level units of any question 4 resource.

Conclusion:

Do not focus efforts on creating citizen science monitoring programs as part of LEAF due to low respondent interest. Promote existing programs in the state. Provide information on what citizen science monitoring is, why it is important, and how teachers and students can become involved.

Suggestions:

- Any citizen science monitoring activities created should focus on users of upper grade level units, namely 7-8 and 9-12.
- Include links to existing citizen science monitoring projects in the LEAF digital resources library.

QUESTION 5

QUESTION 5: Please describe digital forestry-related resources that would enhance your use of the LEAF Lesson Guide. This includes materials that would enhance your students' understanding of forestry concepts. Be as specific as possible and list as many ideas as you can think of. Add additional pages if needed.

Summary of respondent comments: (in order of most comments to least)

- **Video**, 29 respondent comments: They included users of all units. Specific requests include:
 - Forest types (including urban, state, national) and trees in Wisconsin (K-1, 2-3, 7-8)
 - Forestry careers of all types (2-3, 4, 5-6, 7-8, 9-12)
 - Succession (7-8, 9-12)
 - Forest biomes (7-8, 9-12)
 - Trees through the seasons (7-8, 9-12)
 - Plants and animals of forest ecosystems (7-8, 9-12)
 - Living history (reenactments) related to Wisconsin forest history (4, 7-8)
 - Logging and sawmill operations (9-12)
 - Step-by-step papemaking (2-3, 4, 5-6)
 - Forestry terms and tools (9-12)
 - Forest management types (7-8)
 - Video of some kind for every unit
 - Theme videos
 - Comparison of forestry practices between Wisconsin and other states and other countries.
 - Lessons or quizzes to accompany the videos. (7-8)
 - Wildfire related information – forests before and after, interviews with firefighters, DNR, citizens, animals affected (2-3)
- **Online tree identification key**, 18 respondent comments: They spanned all units K-12. All comments favored having an online tree identification key. Specific comments ranged from those noting they use the existing LEAF online tree identification key to those who think the idea is “great” and may not know the current key exists. Suggestions include having online identification for various species such as grasses, small shrubs, and winter trees; tree identification quizzes; an interactive tree identification activity; a printable dichotomous key that can be modified to be site specific; and a tree identification key for lower elementary students (K-2).
- **Digital images**, 16 respondent comments: They included users of all units. All favored having digital images available for printing. Specific types of images suggested include:
 - Forest connections to other ecosystems (4, 7-8)
 - Series of images showing a forest from cutover to regrown (5-6)
 - Aerial and ground level photos of silviculture techniques before and after (7-8, 9-12)
 - Successional stages (7-8, 9-12)
 - Affects of parcelization (7-8, 9-12)
 - Trees and forests from around Wisconsin (2-3, 7-8)
 - Clip art for game pieces, etc. (K-1)
 - Trees, leaves, animals that are enlarged (K-1)
 - Careers in forestry (unknown)
 - Forest management over time (7-8)
- **Maps**, 14 respondent comments: All favored having maps available. They include users of all units. Specific suggestions include:
 - State forest regions (multiple requests)
 - Wisconsin forests over time (intervals)
 - Biomes
 - Glaciation
 - Topographic

QUESTION 5

- **Simulations**, 11 respondent comments: They are users of all the units. All favored having simulations. Specific topic suggestions include:
 - A forest management simulation (tree counting, DBH, board feet, etc.) (7-8, 9-12)
 - Business simulation to explain supply and demand – something fun to get students attention about a dry subject (9-12)
 - A simulation that would help urban students experience something outside the city environment (K-1)
 - Harvesting simulation where students can make decisions about the type and number of trees cut and see forest response over time. The idea is for students to immediately see that their actions have long-term impacts. (7-8)
 - A simulation where students could create and manage a forest environment (7-8)
 - Simulation showing forest succession (9-12)
- **PowerPoint-based resources**, 10 respondent comments: They are users of the K-1, 7-8, and 9-12 units. All favored having PowerPoint presentations that can be used to illustrate forestry concepts. Specific topic suggestions include images of various forest types, succession, lumberjacks, and invasive species and their controls.

*These comments are noteworthy because they were not suggested in question 4 and were purely based off respondent ideas.
- **Educational games**, 8 respondent comments: They spanned all units K-12. All comments favored having computer-based educational games. One specific comment regarding games was, “They (students) are always interested in materials if presented in a game-like fashion.”
- **Virtual field trips**, 8 respondent comments: They included users of all units except 5-6. All favored having virtual field trips with specific topic suggestions of Wisconsin forest types, plants and animals in bogs, providing background prior to a field trip, logging, sawmill, paper mill. Two respondents commented that virtual field trips are helpful resources because field trip budgets are limited.
- **Any type of digital resource** would be beneficial, 7 respondent comments: They included users of the K-1, 4, 5-6, 7-8, and 9-12 units. Specific resource ideas mentioned include things to do in a computer lab, having all resources available online to build projects around, and interactive web materials. A K-1 unit user mentioned that computer-based resources can be used in conjunction with a SmartBoard.
- **GIS or GPS**, 7 respondent comments: They included users of the 5-6, 7-8, and 9-12 units. All comments favored lessons that utilize GIS or GPS technology. Specific suggestions include how to use a GPS unit, how GIS/GPS technology is used in industry, an online simulation using GPS, GIS resources that include forest stand comparison from ground and aerial level, and a geocache type activity.

*These comments are noteworthy because they were not suggested in question 4 and were purely based off respondent ideas.
- **Printable lesson materials**, 7 respondent comments: The majority were K-1, 2-3, and 4 unit users. All favored having printable lesson materials. One 9-12 unit user commented that any activity pages should be made so that teachers can modify them to meet specific needs.

*One noteworthy comment was that “It would be helpful to have any of the handouts needed for each lesson on the computer to print off.” All teachers should have a CD-ROM of the LEAF Lesson Guide. This comment leads one to believe there may be people that did not receive a CD or do not realize what is on the CD.
- **WebQuests**, 7 respondent comments: They included users of all units. Suggestions from a 4 unit user on topics include lumber camp, log drives, or saw mills (historical forestry information).

*These comments are noteworthy because they were not suggested in question 4 and were purely based off respondent ideas.
- **Audio material**, 6 respondent comments: One was a K-1 unit user, two were 2-3 unit users, two were 4 unit users, and one uses all units. All comments favored having music. Specific requests include the inclusion of printed music, folk songs, music to play with songs (the researcher assumes this means for the songs in the K-1 unit), and lumberjack songs.

QUESTION 5

- **Field activities**, 5 respondent comments: One is a 7-8 unit user, three are 9-12 unit users, and one uses both the 5-6 and 7-8 units. Specific comments include the desire for field lessons using simple inexpensive equipment, field lessons for 9-12 students (3 comments), GIS/GPS field activities, and fun and educational games that can be played in a forest setting.
- **Literature**, 5 respondent comments: They included users of the K-1 through 4 unit. All favored having more forestry-related literature. Specific comments included lists of books, reproducible booklets or one-page stories that include comprehension questions, and copies of books. Noteworthy quotes include, "...lists of beginning books or copies of readers, videos or enhancements would be useful. This would be very useful if it was digital because of a limited budget." "Learning about the forests that surround them is a very real concept that they can identify with very well. Their prior knowledge through living in and near forests makes this type of informative reading very real to the students."
 *These comments are noteworthy because they were not suggested in question 4 and were purely based off respondent ideas.
- **Ideas listed in question 4**, 5 respondent comments: Some to all of the items in question 4 would be good enhancements. They are users of the K-1, 2-3, 7-8, and 9-12 units.
- **Independent research**, 5 respondent comments: Information that students could use in independent research. They include users of the K-1, 5-6, 7-8, and 9-12 units. A 7-8 unit user requested information that could be used to support positions in a mock trial and investigate real-life issues. A K-1 unit user requested questions and information that first grade students could find online at an appropriate reading level. A 5-6 and 7-8 unit user suggested information about conservation.
- **"Ask an expert" web page**, 4 respondent comments: Three were users of the K-1 unit, one of them also uses the 2-3 unit. For one respondent the unit of use is unknown. All four comments favored having an "ask an expert" web page for students and teachers. Specific reasons for having an "ask an expert" web page included "to submit questions," "to get a personalized response," "for information gathering," and for students to submit questions to professionals in various forestry careers.
- **Animations**, 3 respondent comments: They include a 2-3 unit user, a 4 unit user, and a 5-6 unit user. All favored animation resources to illustrate forestry concepts. A specific suggestion is to create animated maps that show a harvested area returning to forest land. One respondent commented that "students love watching animated shows" and "they must be entertaining and hip."
- **No need for digital resources**, 3 respondent comments: Statements that they are strictly outdoor educators. They include a 5-6 unit user, a K-1 and 2-3 unit user, and a user of unknown units.
 *These comments are noteworthy to the researcher because there are digital resources that could enhance outdoor teaching. If outdoor educators are not aware of such resources but use LEAF materials, they will be a group that will need targeted marketing when digital resources are created. They would also benefit from workshops designed to demonstrate how digital resources can be incorporated into outdoor education.
- **Citizen science monitoring**, 2 respondent comments: One is a 7-8 unit user and one is a 9-12 unit user. Both comments favored citizen science monitoring projects.
- **Scavenger hunts**, 2 respondent comments: They are users of the K-1, 2-3, and 4 unit. All favored having some type of scavenger hunt activity.
- **Teacher pages** online, 2 respondent comments: One is a user of the 5-6 through 9-12 units and the other is a 9-12 unit user. Specific requests include a place for teachers to post resources or best practices and a place for teachers to discuss how they used a particular lesson, changes they made, results they found, etc.
- **Wisconsin Forest Tales** reader, 2 respondent comments: Both were users of the 4 unit. One suggested having the book on tape or CD for use at a learning center and the other suggested having the stories in the book acted out and placed on a DVD.

QUESTION 5

- **Web site links** to forestry-related information, 5 respondent comments: They included users of all units. Specific suggestions for links include printable activities, pre- and post-activities for school forest visits, local forest area resources, and kid-friendly sites.
- **Forestry individual**, 1 respondent comment: A user of the 7-8 unit suggested a person “to speak and take classes through school forests” would be helpful.

FORMAT SUGGESTIONS

- Twelve respondent comments: Three K-1 unit users suggested that computer-based activities for their age group should be visual (posters, maps, videos), easily navigable by students when alone, and navigable with images (versus text). Suggestions from users of all units included having both activities that can be done by all students in the class at the same time as well as activities that students can do individually based on interest. If the resources are for all students to use at the same time, concern over having multiple copies of a disk-based resource was voiced. There were both comments expressing that Internet-based resources are better for all-class access and comments expressing Internet connection may be limited so disk-based resources would be better. One respondent suggested a program with a table of contents and a search feature would be helpful. One respondent stated, “The online resources are useful but if other schools are similar, the printing budget is tight.”

SUBJECT REQUESTS

- **Career information**, 9 respondent comments: They are users of the 2-3, 4, 5-6, 7-8, and 9-12 units. Specific comments include images of forestry professionals with a description of work responsibilities (and a place for students to ask questions – see “ask an expert” section), videos about forestry careers including interviews, how math/science/social studies tie to forestry careers, and forestry career information with education paths.
- **Wider variety of subject areas**, 7 respondent comments: Stated a need for forestry material that ties to more subject areas. Specific subjects mentioned include physical education and health, language arts/reading, and math.
- **County level forestry information** specific to Wisconsin, 3 respondent comments: They were users of the 5-6, 7-8, and 9-12 units.
- **Topics** referenced for resource creation:
 - Forest change (4, 7-8, 9-12)
 - Regions of the state (9-12)
 - Land management issues (9-12)
 - Forest history (4, 7-8, 9-12)
 - Forest ecosystems (7-8, 9-12)
 - Processor/harvesting/logging (7-8, 9-12)
 - Sawmill (9-12)
 - Papermaking (2-3, 4, 5-6, 9-12)
 - Forest management (7-8, 9-12)
 - Urban forest (K-1, 2-3, 9-12)
 - Scientific data (9-12)
 - Forest types (7-8, 9-12)
 - Succession (5-6, 9-12)
 - Vegetative history (7-8, 9-12)
 - Human impacts on forests (renewable energy, pollution) (K-1, 7-8, 9-12)

ACTIVITY SUGGESTIONS

- Two respondents suggested that having activities that can be used to review information would be helpful. Specific examples include worksheets with answer keys and a game to reinforce concepts. Both favored having the material online in a format students could access and work through themselves.
- Lesson for students to learn about Smokey Bear with web links and worksheets. (7-8 unit user)

QUESTION 5

- A math activity that ties to the WDNR seedling order form. (4 and 5-6 unit user)
- Plotting with legal descriptions. (7-8 unit user)
- Photosynthesis and making of sugars. (9-12 unit user)

OTHER USEFUL INFORMATION

Forty four respondents made comments in question 5 and did not offer suggestions for digital resources but provided other information.

- Two respondents made comments about how the LEAF materials have helped them to expand their forestry education in the classroom. One uses the 5-6, 7-8, and 9-12 unit and the other uses the 9-12 unit. Specific comments include, "Because of the LEAF materials so far I have been able to extend my forestry class from one semester to two," and "This is the first year I have used LEAF. I am currently into our 6th week of my new Forestry Science class. I have used the LEAF book exclusively so far. It's working out well."
- Several respondents explained why they are not using the LEAF Lesson Guide. These comments may be helpful to the LEAF Program when studying overall use of the Guide.
 - "I am not the current science teacher. I only use this unit for a few lessons to do with Earth Day." (2-3 unit user)
 - "I am not teaching this unit anymore. I loved teaching the LEAF lessons in 4th grade. Our social studies curriculum in 2nd grade is based more on Appleton history." (4 unit user)
 - "I work with special needs students so I go off the regular ed. teachers units to work with and adapt." (4 unit user)
 - "I am currently encountering much resistance from my team members and administrators re: implementing any of this. We are to focus on increasing WKCE scores, mostly reading and math. Everything is to be dropped." (5-6 unit user)
 - "I teach preschool. I don't use any of this very often." (K-1 unit user)
 - "I have since moved up to fifth grade. I gave my 4th grade guide to the new teacher. The science teacher uses the LEAF guide with my kids. I no longer use it." (4 unit user)
 - "I am currently a reading and English teacher at the middle school. My original job was at third grade and I used LEAF quite a bit. However, every year I teach summer school kindergarten." (K-1 unit user)
 - "No time this semester to work lessons in." (5-6, 7-8, 9-12 unit user)
 - "I don't teach environmental science every year so I really haven't spent much time with the LEAF material other than the 1 1/2 day seminar." (9-12 unit user)
- Several respondents made general comments related to the LEAF Lesson Guide.
 - "A unit plan that is complete needs visuals to keep students interested." (7-8 unit user)
 - "Have actual kids perform some of the lessons in a forest or at a research station, so those students who don't have access can further connect." (4 and 5-6 unit user)
 - "At the kindergarten level we teach children about tree identification, types of wood, and what wood is used for. I really haven't had much time to teach anything about real forestry." (K-1 unit user)
 - "I try to take a trip to our school forest when the budget allows and any materials that would fit into a woodworking curriculum is welcome. I attempt to supplement the materials that are taught in Biology but I can't afford the time that it takes to get really "in depth"." (7-8 unit user)
 - "Additional resources: examples of study guides, quizzes, current handouts are OK, could be more." (9-12 unit user)
- Several respondents made suggestions for forestry education resources that are not digital.
 - "Summer programs - field trip - like activities similar to what teachers are offered through LEAF (summer Academies)." (K-1, 2-3, and 4 unit user)
 - "Leaf molds - classroom set to use. Hands-on tree parts to assemble." (7-8 unit user)
 - "Make a difference poster: simple things an individual can do. Value of connected forests poster." (7-8 unit user)

QUESTION 6

QUESTION 6: Are there any specific activities in the LEAF Lesson Guide that could be enhanced with digital materials?

Summary of Specific Requests

K-1 Unit

Lesson 1: Activity 1-2: Videos: tree parts, a tree in different seasons, a time-lapsed tree growing. (3 requests)

Lesson 1: Activity 3: CD of the songs or sing along video. (2 requests)

Lesson 2: Activity 1: Colored images on the memory cards. (1 request)

Lesson 3: CD of forest animal sounds. (1 request) Video or PowerPoint of products we get from trees, fun we can have in forests, forest-related jobs, etc. (1 request)

Lesson 5: Music to sing songs to. (1 request)

Career Profiles: Place to meet career people online and ask questions of them. (1 request)
Videos or voices of career profiles. (3 requests)

Whole Unit: Printable color images of all the student pages with pictures. (1 request)

2-3 Unit

Lesson 1: Introduction: Create an online quiz to test students' knowledge of tree parts. (1 request)

Lesson 1: Activity 3: Real images of a tree lifecycle. (1 request)

Lesson 2: Activity 1: Printable images of trees and shrubs. (1 request)

Lesson 2: Conclusion: Images and maps of different types of forests in Wisconsin. (1 request)

Lesson 3: Activity 2: Images of producers, consumers, and decomposers and their interactions. (1 request)

Lesson 5: Activity 2: Photos and descriptions of people involved in forest management. (1 request)

Field Enhancement 1: Images and maps of different types of forests in Wisconsin. (1 request)

4 Unit

Lesson 1: Activity 1: Journal entries on CD for the students to listen to multiple times. (1 request)

Lesson 2: Put all the overheads online or on a DVD. (1 request)

Lesson 3: Images to match the job descriptions. (2 requests) Video of life in a logging camp. (1 request) CD of lumberjack music (by David Drake). (1 request)

Lesson 4: Audio of the letters being read in vernacular. (1 request)

5-6 Unit

Lesson 1: Activity 1: Make the matching tree parts to human parts activity an online game so it has a higher interest level. (1 request)

Lesson 1: Activity 2: Interactive activity that shows what happens when trees basic needs are not met. (1 request)

Lesson 2: Activity 2: Make the forest layers diagram clearer/less confusing, perhaps interactive. (2 requests)

Lesson 3: Activity 1: Activity for students to choose the next step in succession to reinforce concepts. (1 request)

Lesson 3: Activity 2: Visuals that show forest regeneration at different intervals over time. (1 request)

Lesson 4: Provide an animated film to illustrate photosynthesis and energy flow. (1 request)

Lesson 5: Interactive activity where students categorize forest products. (1 request)

Lesson 6: Video about forest management. (1 request) Maps that show changes in Wisconsin's forests over time. (1 request)

Lesson 7: Put the maps online so they are more interactive. (1 request)

QUESTION 6

Field Enhancement 1: Video to explain DBH and how to use a Biltmore stick. (1 request)

7-8 Unit

Lesson 1: Images of the different forest types. (3 requests) All the maps in digital format with images to support what the maps are showing. (3 requests) A way to work with the data digitally.

(1 request) Provide the rubric in digital format so it can be modified. (1 request)

Lesson 3: Computer simulated management. (1 request)

Lesson 5: Enhance the discussion with stakeholders on forest issues. Create an interactive forum/debate dealing with values people place on forests and different outcomes that can occur.

(1 request) PowerPoint presentation about different forest products and how they are made.

(1 request)

Lesson 7: Up-to-date facts about the trends on page 145 that students could access via computer. (1 request)

Careers: Interview with forestry professionals on video and/or a web site where students could ask questions. (1 request)

Field Enhancement 2: Simulated forest plots where students could do data collection. (1 request) Air photos of forest types with legal descriptions. (1 request) A way for students to put the maps they create on the computer. (1 request)

9-12 Unit

Lesson 1: Activity 1: A PowerPoint that enhances the “Odyssey of Atom X.” (1 request)

Lesson 1: Activity 3: Information to help students visualize the ecosystems (oak savanna, forested wetland, northern hardwood forest). Suggestions include maps of ecosystem locations in Wisconsin, images of the ecosystems, video of the ecosystems, video of the ecosystems with natural sounds and no animation. (4 requests)

Lesson 2: Activities 1-4: Pictures of forests in various stages of succession – virtual tour or PowerPoint. (3 requests)

Lesson 3: Introduction: Examples and a quiz to reinforce the different types of diversity. (1 request)

Lesson 3: Activity 1: Put the landscape, climate, and natural divisions maps online. Provide images of the different types of plants in different areas. (2 requests)

Lesson 3: Activities 1-4: Provide images or a PowerPoint of forest diversity, forest layers, and tree profiles. (3 requests)

Lesson 4: Economics simulation and/or PowerPoint on concepts. (2 requests)

Lesson 5: Web page to describe lifecycle analysis and a real-life example. (1 request) Images of the technology, perhaps a DVD. (2 requests) GIS maps and scientific data. (1 request)

PowerPoint jeopardy to review the vocabulary and statistics. (1 request)

General Comments:

- PowerPoints for any of the lessons would be nice. They are faster, more visually appealing, and more easily accessed than overheads.
- Field experiences for the 9-12 unit (GIS mapping, inventory and sampling procedures)

General Requests:

- Video or PowerPoint of stewardship statements by young people of different ethnic backgrounds.
- CD of all songs in all units.
- Images of geologic features in Wisconsin.
- Images and maps to enhance any of the topics covered.

QUESTION 7

QUESTION 7: Overall, my use of the LEAF Lesson Guide would be enhanced if I had access to new digital forestry education resources that support activities in the LEAF Lesson Guide.

Strongly Disagree
Disagree
Neutral
Agree
Strongly Agree

Comments:

Question 7 Summary

Of the 232 respondents who use the LEAF Guide or intend to use the LEAF Guide, 215 answered question 7 (92.7%). Of those who responded to question 7, 61.9% agreed or strongly agreed that their use of the LEAF Lesson Guide would be enhanced if they had access to new digital forestry education resources that support activities in the LEAF Lesson Guide. Of those who responded to question 7, 4.7% disagreed or strongly disagreed that their use of the LEAF Lesson Guide would be enhanced if they had access to new digital forestry education resources that support activities in the LEAF Lesson Guide. Note: the respondent who strongly disagreed did not indicate a unit used and is therefore not represented in the unit breakdowns.

Answer	Frequency	Percent
Strongly disagree	1	.47
Disagree	9	4.19
Neutral	72	33.49
Agree	108	50.23
Strongly agree	25	11.63
Total	217	100.0

Figure 7.1

Breakdown by Unit Used

K-1

Of all the K-1 unit users who answered this question, 55.6% agree or strongly agree that their use of the LEAF Lesson Guide would be enhanced if they had access to new digital forestry education resources that support activities in the LEAF Lesson Guide.

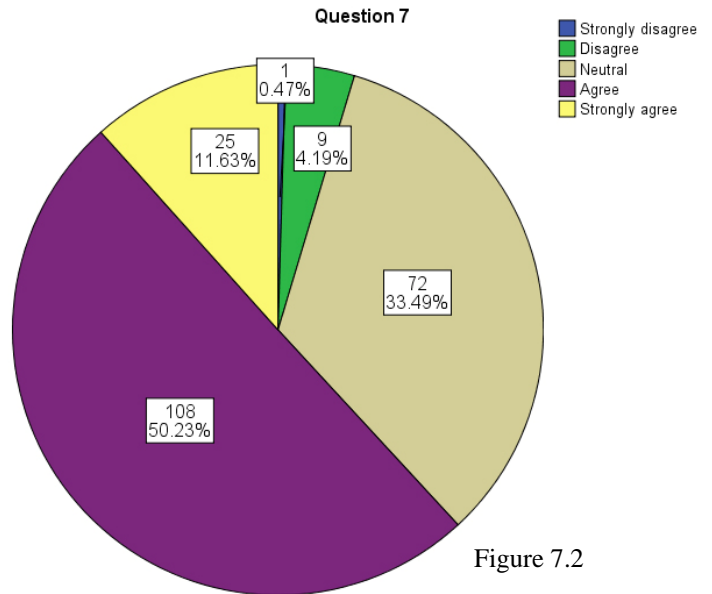


Figure 7.2

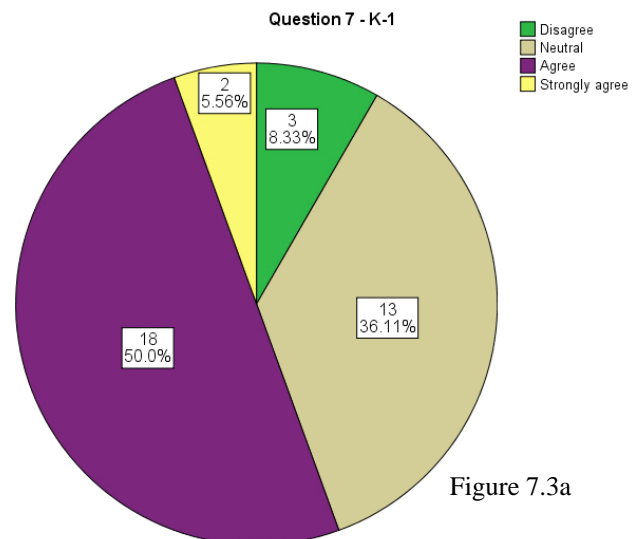
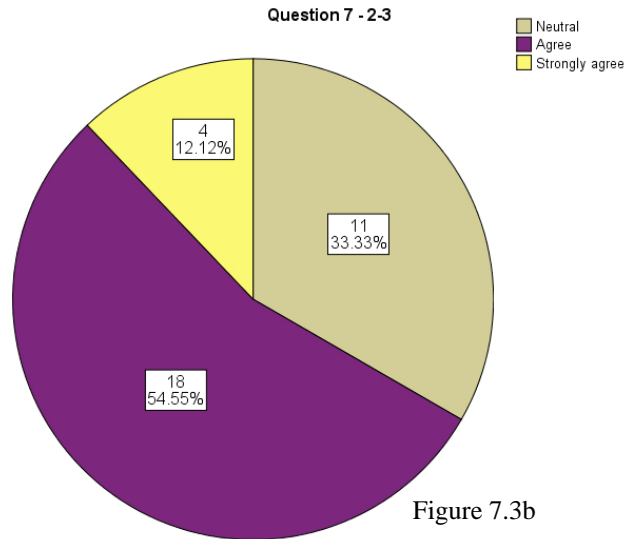


Figure 7.3a

QUESTION 7

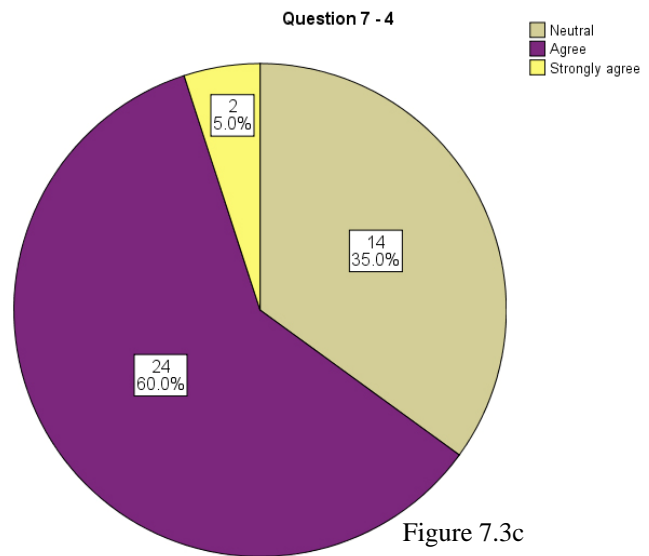
2-3

Of all the 2-3 unit users who answered this question, 66.7% agree or strongly agree that their use of the LEAF Lesson Guide would be enhanced if they had access to new digital forestry education resources that support activities in the LEAF Lesson Guide.



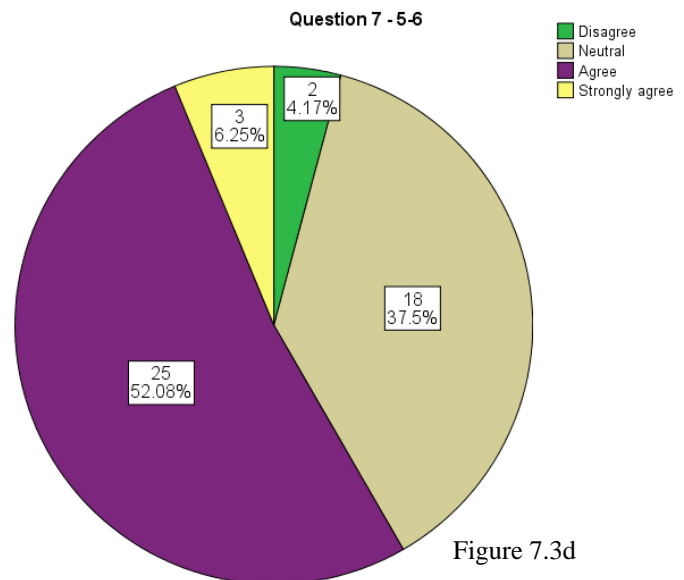
4

Of all the 4 unit users who answered this question, 65.0% agree or strongly agree that their use of the LEAF Lesson Guide would be enhanced if they had access to new digital forestry education resources that support activities in the LEAF Lesson Guide.



5-6

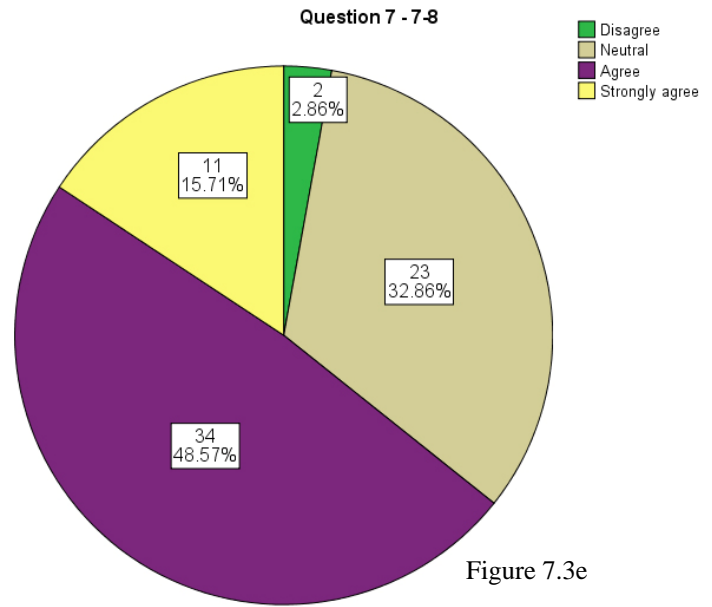
Of all the 5-6 unit users who answered this question, 58.3% agree or strongly agree that their use of the LEAF Lesson Guide would be enhanced if they had access to new digital forestry education resources that support activities in the LEAF Lesson Guide.



QUESTION 7

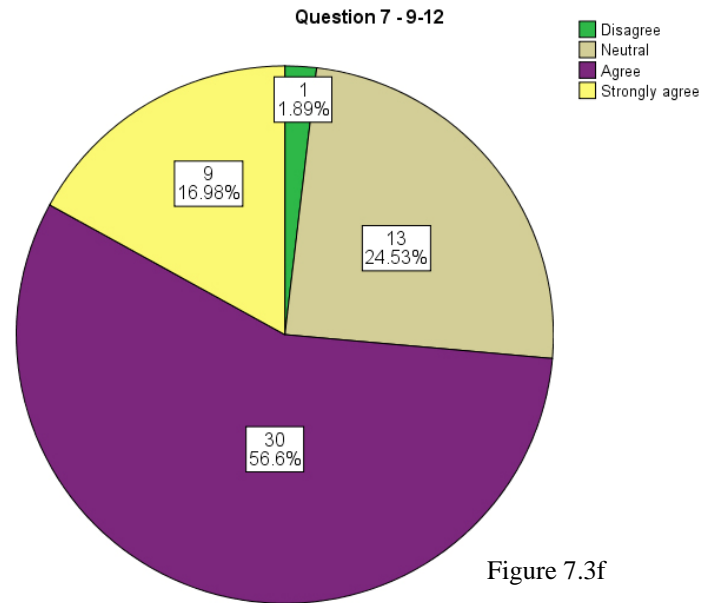
7-8

Of all the 7-8 unit users who answered this question, 64.3% agree or strongly agree that their use of the LEAF Lesson Guide would be enhanced if they had access to new digital forestry education resources that support activities in the LEAF Lesson Guide.



9-12

Of all the 9-12 unit users who answered this question, 73.6% agree or strongly agree that their use of the LEAF Lesson Guide would be enhanced if they had access to new digital forestry education resources that support activities in the LEAF Lesson Guide.



QUESTION 7

Summary of Question 7 Comments

Support Digital Resources:

- New materials always helpful (4 comments)
- Students like digital resources (2 comments)
- Help student understanding (1 comment)
- Keep student attention (1 comment)
- Make lesson preparation easier (1 comment)
- Give students independence (1 comment)
- Use in place of field trips (1 comment)

Use Regardless:

- Five respondents indicated that they are supportive of digital resources but will use the materials regardless

Concerns:

- Lack of hardware and unreliable computers (5 comments)
- Limited time to incorporate new materials (2 comments)
- Prefer to take students outdoors (2 comments)

Select Quotes:

- "I find that digital resources help keep student attention and motivate them to try things they may not otherwise try."
- "It helps to [have] a variety of resources available."
- "Any new up to date resources, especially color prints would keep the use of the lessons fresh."
- "It could make some classes easier for students to understand."
- "I find that digital resources help keep student attention and motivate them to try things they may not otherwise try."
- "Online activities are always great!"
- "Any resources that make preparation of the lesson easier are great."
- "I would like to use this with independent study students as well as enhance a classroom environment."
- "New updated resources are always terrific."
- "With fewer opportunities available to take students out to a real forest, online tours and guides would be incredibly helpful!"
- "Yes, it would be cool, and a little more technology-integration friendly."
- "At early childhood education levels anything that provides pictures (concrete ideas) help."
- "Kids like digital activities and would be motivated."
- "I am pretty resourceful and supplement my guide already, so it would be nice to have Wisconsin tailored resources, but I will still use the guide. We are in the digital age. Kids love this stuff."
- "I think the resources that are presently available are good, but I understand that keeping today's students interested requires stepping up to their technology level!"
- "The lessons are already great but enhancement can only improve our delivery as well."
- "Agree - the materials are an excellent start - and definitely can stand alone - but could be enhanced with extras."

QUESTION 8

QUESTION 8: If new digital forestry education resources were available to me, my use of the LEAF Lesson Guide to teach students about Wisconsin's forests would:

Decrease
Remain the same
Increase
Not sure

Comments:

Question 8 Summary

Of the 232 respondents who use the LEAF Guide or intend to use the LEAF Guide, 218 answered question 8 (94.0%). Of those who responded to question 8, 49.1% indicated that their use of the LEAF Lesson Guide would increase if new digital forestry education resources were available to them.

Answer	Frequency	Percent
Remain the same	80	36.70
Increase	107	49.08
Not sure	31	14.22
Total	218	100.0

Figure 8.1

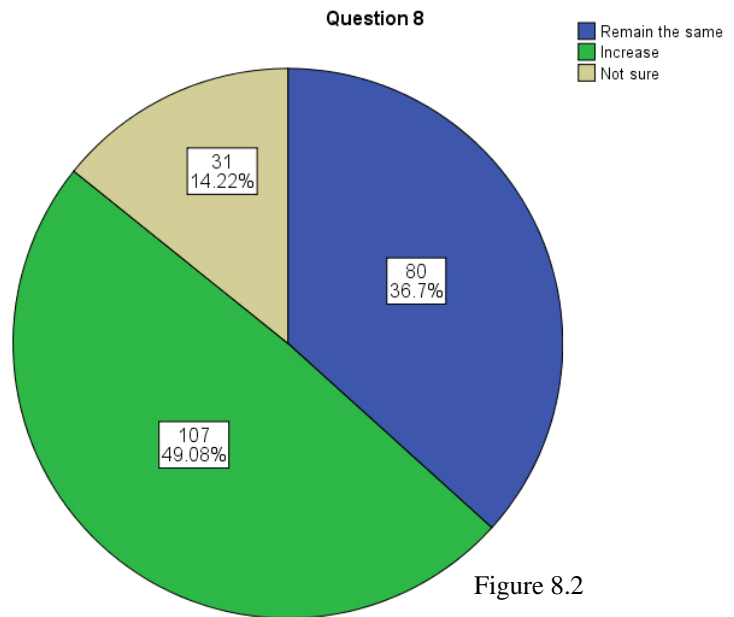


Figure 8.2

Breakdown by Unit Used

K-1

Of all the K-1 unit users who answered this question, 55.6% indicated that their use of the LEAF Lesson Guide would increase if new digital forestry education resources were made available to them. 30.6% indicated that their use of the LEAF Lesson Guide would remain the same if new digital forestry education resources were made available to them.

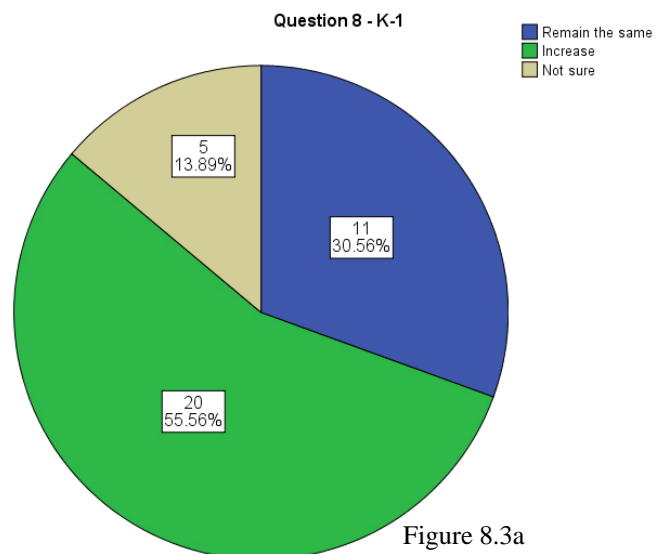
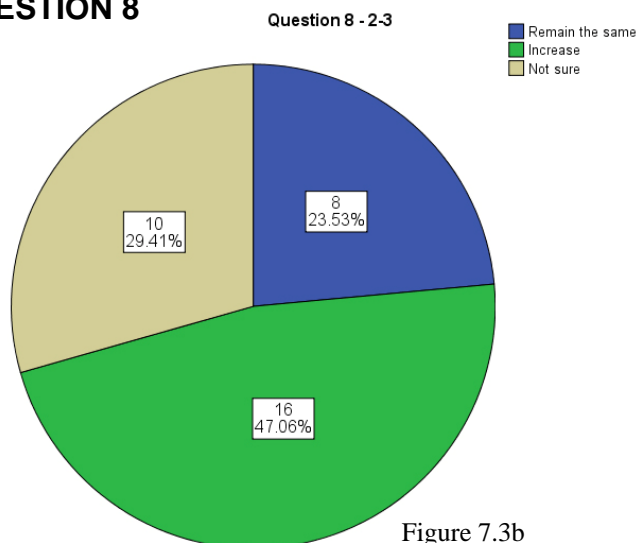


Figure 8.3a

QUESTION 8

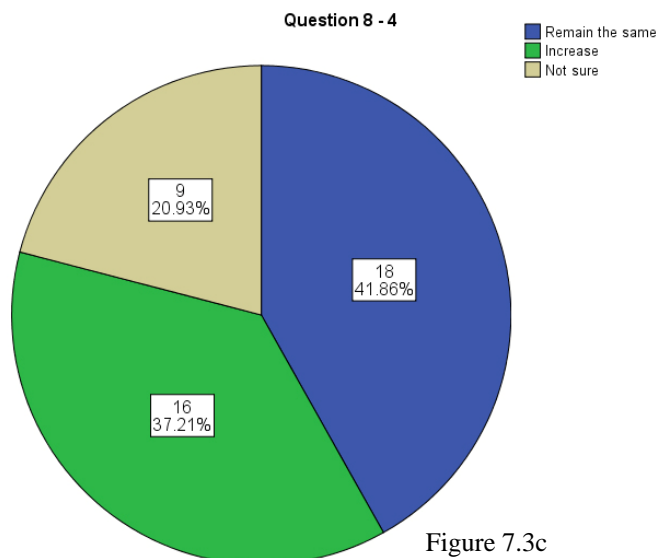
2-3

Of all the 2-3 unit users who answered this question, 47.1% indicated that their use of the LEAF Lesson Guide would increase if new digital forestry education resources were made available to them. 23.5% indicated that their use of the LEAF Lesson Guide would remain the same if new digital forestry education resources were made available to them.



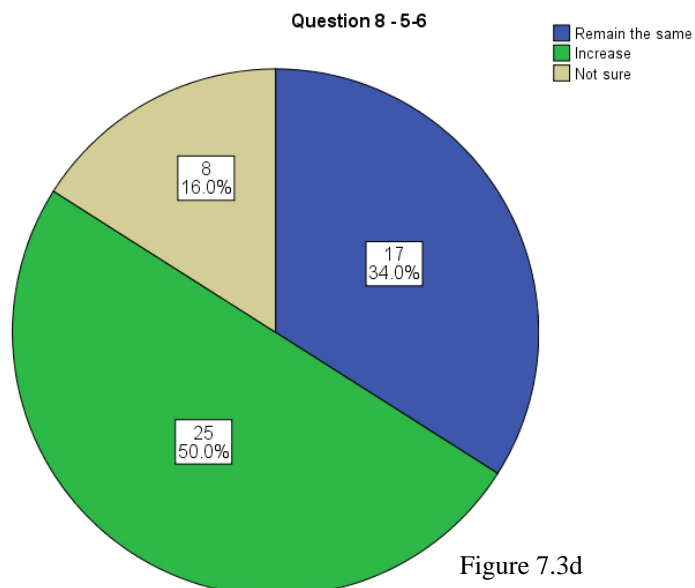
4

Of all the 4 unit users who answered this question, 37.2% indicated that their use of the LEAF Lesson Guide would increase if new digital forestry education resources were made available to them. 41.9% indicated that their use of the LEAF Lesson Guide would remain the same if new digital forestry education resources were made available to them.



5-6

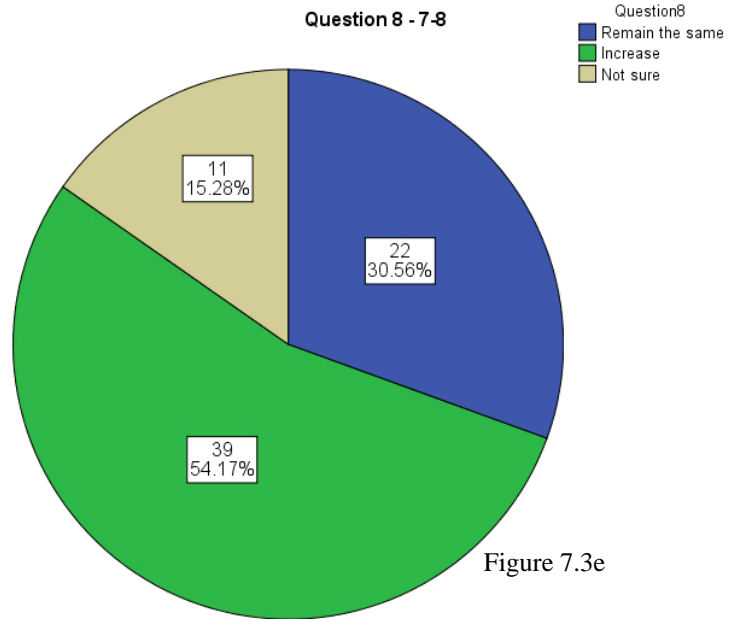
Of all the 5-6 unit users who answered this question, 50.0% indicated that their use of the LEAF Lesson Guide would increase if new digital forestry education resources were made available to them. 34.0% indicated that their use of the LEAF Lesson Guide would remain the same if new digital forestry education resources were made available to them.



QUESTION 8

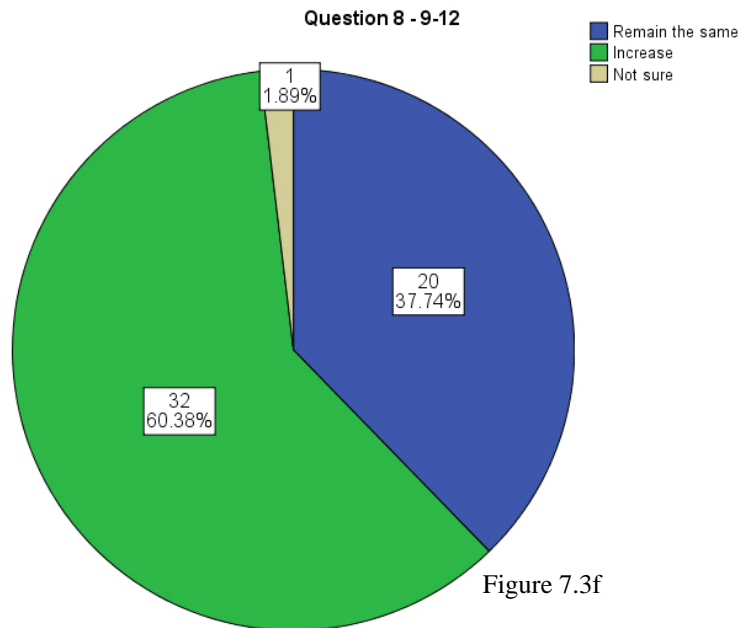
7-8

Of all the 7-8 unit users who answered this question, 54.2% indicated that their use of the LEAF Lesson Guide would increase if new digital forestry education resources were made available to them. 30.6% indicated that their use of the LEAF Lesson Guide would remain the same if new digital forestry education resources were made available to them.



9-12

Of all the 9-12 unit users who answered this question, 60.4% indicated that their use of the LEAF Lesson Guide would increase if new digital forestry education resources were made available to them. 37.7% indicated that their use of the LEAF Lesson Guide would remain the same if new digital forestry education resources were made available to them.



QUESTION 8

Summary of Question 8 Comments

Reasons use would increase:

- "I could share better with others."
- "Especially during winter months."
- "Any multi-sensory/visual resource that helps students of different learning styles to grasp material better."
- "Be more user friendly."
- "Be more effective with less time necessary to prep."
- "Always trying to improve."

Reasons use would remain the same:

- "I'd implement the better product for not so quality lessons."
- "My school - for the most part - lacks decent technology."
- "Until curriculum changes. However, I could sneak some of it into current curriculum."
- "I am able to access outdoor resource and professional forester to supplement. Most all activities can be done with out computers."
- "Perhaps I would be able to deliver the same info in another method more conducive to my student learning."
- "Prefer hands on."
- "At this time remain the same but as standards change so do the requirements for what is to be taught."
- "But be enhanced."

Comments related to the need for implementation time:

- "As long as I would get time to look at the materials."
- "I would need to find time to access the information."
- "Time only allows for a few weeks to spend on forestry. The materials provided are used to make the most of that time."
- "Would increase if other responsibilities for teaching would decrease."

Other comments:

- "I'm still learning my new curricula for a new school/grade level."
- "I don't teach conservation any more."
- "I no longer use it, but I bet the new 4th grade teacher would use it more."
- "If I taught the fourth grade curriculum yearly it would increase. I presently teach a 3-4 curriculum on a 2-year cycle, I only use LEAF every other year."
- "Because I teach language arts this isn't naturally a part of my curriculum but the topic may be used by my students."
- "Because of my grade level it is difficult to have the students use digital resources and the internet."
- "Earth science in 8th grade - not much forestry."
- "May help me with planning but not available to students."

Note:

Comments about time appear in several questions. This illustrates the need for a workshop/planning session in order for teachers to use digital resources. Digital resources could help reduce teaching preparation time.

QUESTION 9

QUESTION 9: My comfort level in using digital resources for teaching students is:

Very Low
Low
Moderate
High
Very High

Comments:

Question 9 Summary

Of the 232 respondents who use the LEAF Guide or intend to use the LEAF Guide, 219 answered question 9 (94.4%). Of those who responded to question 9, 2.7% indicated that their comfort level in using digital resources for teaching was very low; 8.7% indicated low; 44.7% indicated moderate; 28.3% indicated high; and 15.5% indicated very high.

Answer	Frequency	Percent
Very low	6	2.7
Low	19	8.7
Moderate	98	44.7
High	62	28.3
Very high	34	15.5
Total	219	100.0

Figure 9.1

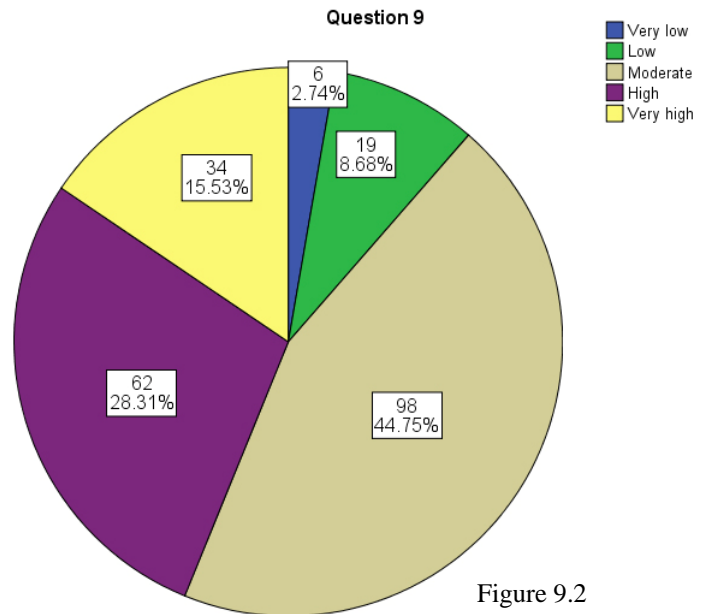


Figure 9.2

Breakdown by Unit Used

K-1

Of all the K-1 unit users who answered this question, 91.7% indicated that their comfort level in using digital resources for teaching was moderate to very high.

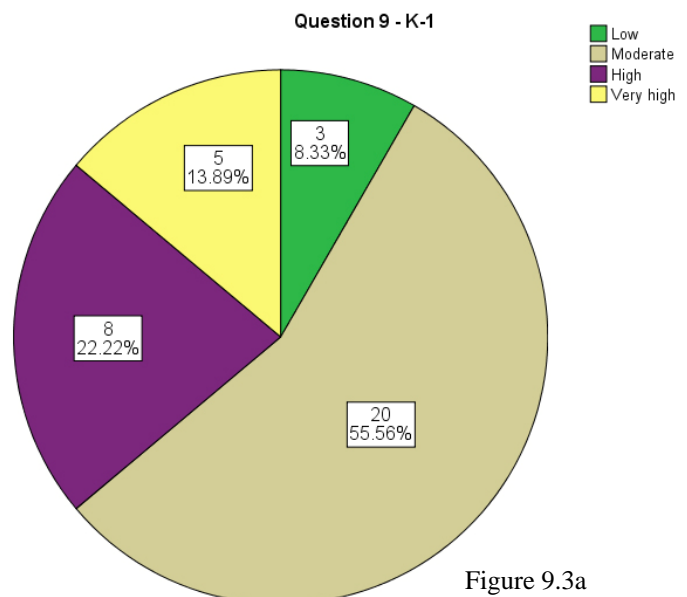


Figure 9.3a

QUESTION 9

2-3

Of all the 2-3 unit users who answered this question, 85.2% indicated that their comfort level in using digital resources for teaching was moderate to very high.

Question 9 - 2-3

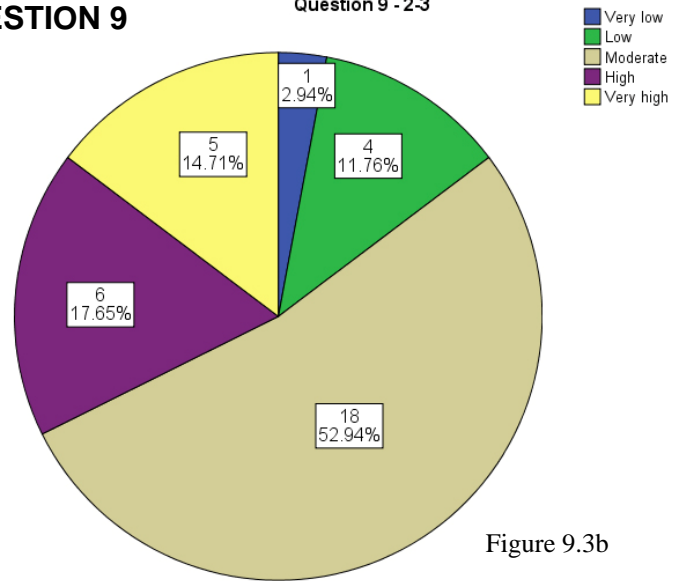


Figure 9.3b

4

Of all the 4 unit users who answered this question, 90.7% indicated that their comfort level in using digital resources for teaching was moderate to very high.

Question 9 - 4

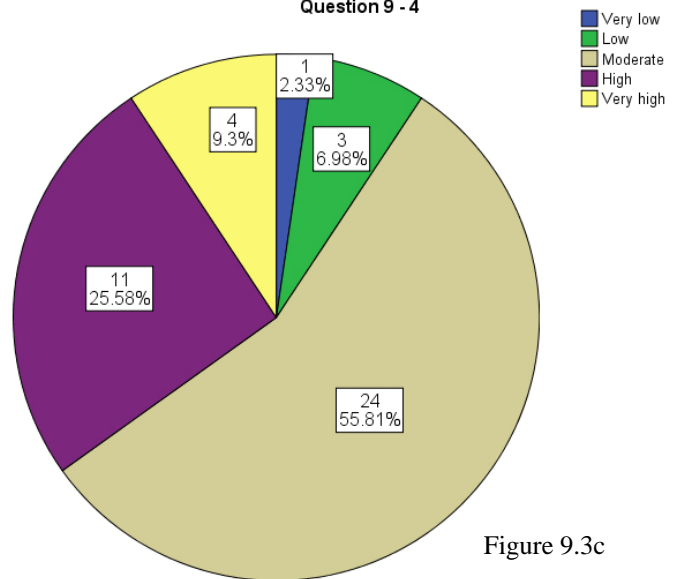


Figure 9.3c

5-6

Of all the 5-6 unit users who answered this question, 86% indicated that their comfort level in using digital resources for teaching was moderate to very high.

Question 9 - 5-6

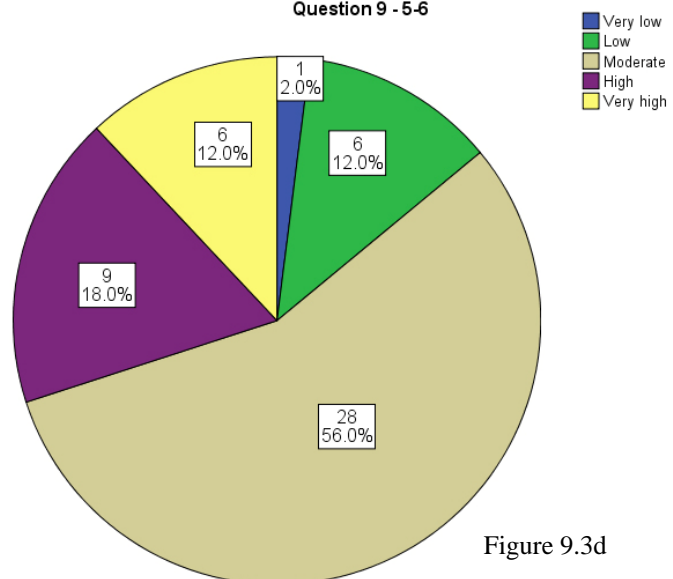
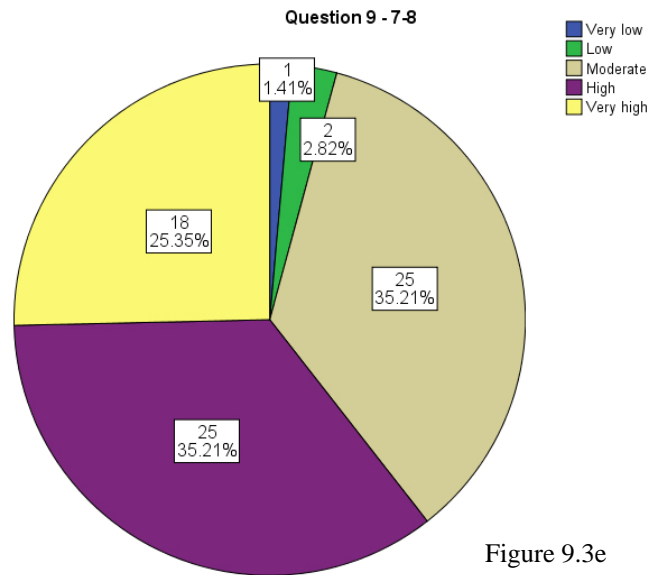


Figure 9.3d

QUESTION 9

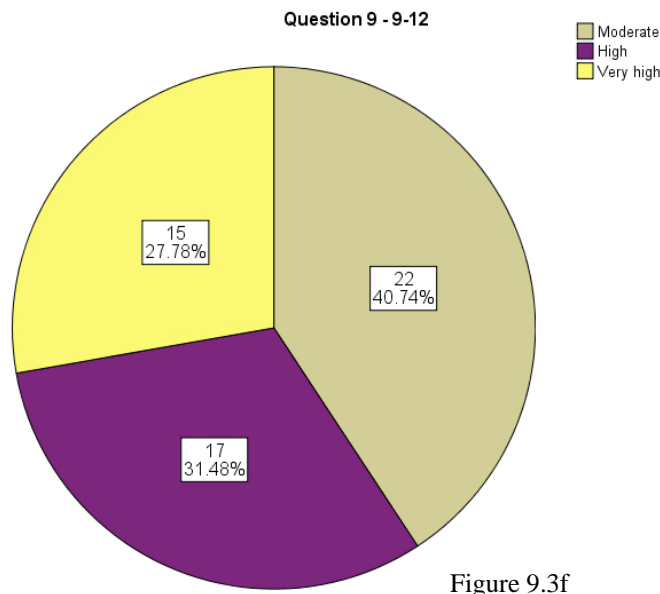
7-8

Of all the 7-8 unit users who answered this question, 95.8% indicated that their comfort level in using digital resources for teaching was moderate to very high.



9-12

Of all the 9-12 unit users who answered this question, 100% indicated that their comfort level in using digital resources for teaching was moderate to very high.



QUESTION 9

Summary of Question 9 Comments

Comments from respondents with a very high comfort level in using digital resources:

- "Use it all the time - cameras, video, computers/internet."
- "We are fortunate in my district to have excellent technology resources with which to teach and use."
- "Use it everyday."
- "I facilitate teacher instruction using an interactive website for environmental problems."
- "My students also have total access to laptops, all day everyday, so my situation is very unique."

Examples of ways technology is being used:

- "We have data projector in the science rooms so digital video clips (<20 min) work well with kids."
- "I would like something that kids can work though individually once I give them the spot to start."

Comments from respondents willing to learn to use more digital resources:

- "If I do not know how to use something I would be willing to take a one credit course if offered."
- "We've never been fully trained to access all that is available on the web."
- "I'm not as computer literate as I'd like to be."
- "I would be willing to learn."
- "I realize its important to expose young students to technology and I am willing to incorporate it into my teaching."
- "I'm a dinosaur, and I haven't always embraced technology, but I'm getting better. The kids teach me some things."
- "I am learning - currently have access to our computer lab."
- "Train me in a weekend in a cheap class locally, and I can do it in some form. We have a district trainer - you can train the trainer."

Barriers to digital resource use:

- "It's getting into the labs that are the problem - or digitals not allowed to be uploaded on school computers."
- "We do not have Internet in our classroom. I would have to print off at home."
- "I only have one computer in class. Our lab is not accessible during class."
- "I'd love to use digital resources but I don't always have access to the equipment so it is dependent on equipment availability."
- "The only resource I believe I wouldn't use would be any resources for computer viewing, as we do not have access to frequent computer use."
- "One teacher in our department has all the equipment, have to sign up in hurry for class - to use computer lab - 2 sets for 1200 students."

Reasons respondents do not use digital resources:

- "I don't use digital resources at the school forest. It's as much hands-on as we can get."
- "I'd rather spend time trying to put together a hands on lesson/even walk in the woods than chasing down technical support and making sure it works."
- "I have equipment, just not the time to integrate it all - yet."

QUESTION 10

QUESTION 10: For each item below, please check the box that indicates the type of access you have for viewing or printing educational materials.

Rarely Available
Sometimes Available
Readily Available

- DVD player (for use with students)
- Black and white printer
- Color printer
- LCD projector and computer
- Computer with speed and memory acceptable to you
- Computer for your use in your classroom
- Computer(s) for students' use in your classroom
- Computer lab
- Internet for your use
- Internet for student use

Summary of Responses

DVD player

Of the 217 respondents who answered question 10a, 85.2% indicated that a DVD player is sometimes or readily available to them for viewing or printing educational materials.

Answer	Frequency	Percent
Rarely available	32	14.7
Sometimes available	48	22.1
Readily available	137	63.1
Total	217	100.0

Figure 10.1a

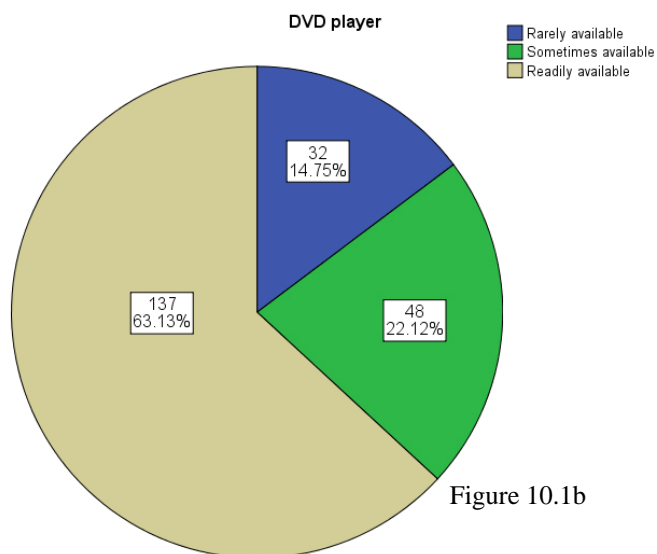


Figure 10.1b

Summary by Unit Used

DVD Player		K-1	2-3	4	5-6	7-8	9-12
Rarely available	Count	11	7	5	6	7	2
	% within Unit	30.6%	20.6%	11.4%	13.0%	10.0%	3.8%
Sometimes available	Count	9	9	11	10	17	11
	% within Unit	25.0%	26.5%	25.0%	21.7%	24.3%	20.8%
Readily available	Count	16	18	28	30	46	40
	% within Unit	44.4%	52.9%	63.6%	65.2%	65.7%	75.5%
Total	Count	36	34	44	46	70	53
	% of Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Figure 10.1c

There is a trend of increasing availability of DVD players from K-1 unit users to 9-12 users. 44.4% of K-1 unit users indicate a DVD player is readily available to them while 75.5% of 9-12 unit users indicate a DVD player is readily available to them.

QUESTION 10

Black and white printer

Of the 220 respondents who answered question 10b, 98.6% indicated that a black and white printer is sometimes or readily available to them for viewing or printing educational materials.

Answer	Frequency	Percent
Rarely available	3	1.4
Sometimes available	9	4.1
Readily available	208	94.5
Total	220	100.0

Figure 10.2a

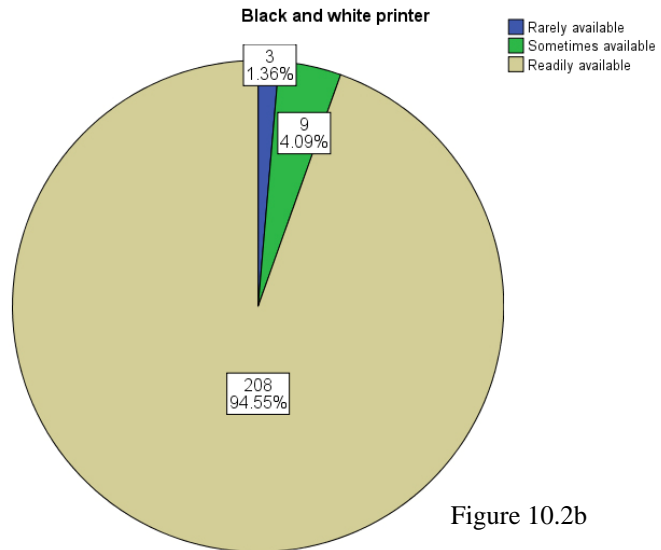


Figure 10.2b

Summary by Unit Used

Black and white printer		K-1	2-3	4	5-6	7-8	9-12
Rarely available	Count	2	2	0	0	1	1
	% within Unit	5.4%	5.9%	.0%	.0%	1.4%	1.9%
Sometimes available	Count	1	1	2	2	0	0
	% within Unit	2.7%	2.9%	4.7%	4.2%	.0%	.0%
Readily available	Count	34	31	41	46	71	53
	% within Unit	91.9%	91.2%	95.3%	95.8%	98.6%	98.1%
Total	Count	37	34	43	48	72	54
	% of Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Figure 10.2c

There is a slight trend of increasing availability of black and white printers from K-1 unit users to 9-12 users but over 91.2% of all unit users indicated that a black and white printer is readily available for viewing or printing educational materials.

Color printer

Of the 222 respondents who answered question 10c, 77.9% indicated that a color printer is sometimes or readily available to them for viewing or printing educational materials.

Answer	Frequency	Percent
Rarely available	49	22.1
Sometimes available	54	24.3
Readily available	119	53.6
Total	222	100.0

Figure 10.3a

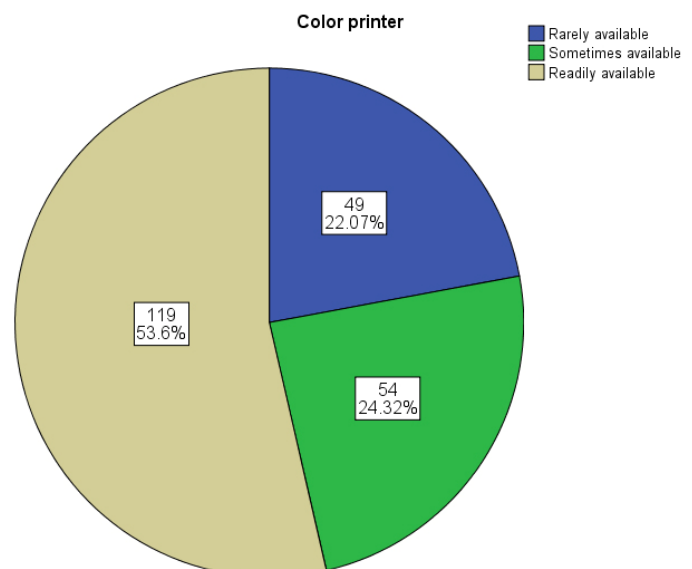


Figure 10.3b

QUESTION 10

Summary by Unit Used

Color printer		K-1	2-3	4	5-6	7-8	9-12
Rarely available	Count	8	7	10	10	13	11
	% within Unit	21.6%	18.9%	22.2%	20.4%	17.8%	20.0%
Sometimes available	Count	6	6	13	13	22	17
	% within Unit	16.2%	16.2%	28.9%	26.5%	30.1%	30.9%
Readily available	Count	23	24	22	26	38	27
	% within Unit	62.2%	64.9%	48.9%	53.1%	52.1%	49.1%
Total	Count	37	37	45	49	73	55
	% of Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Figure 10.3c

Users of all units indicated a color printer was sometimes or readily available consistently from K-1 to 9-12. There is a trend of decreasing readily available color printers from K-1 unit users to 9-12 users. The availability evens out when you account for the percentage of those with color printers being sometimes available.

LCD projector and computer

Of the 218 respondents who answered question 10d, 83.0% indicated that a LCD projector and computer is sometimes or readily available to them for viewing or printing educational materials.

Answer	Frequency	Percent
Rarely available	37	17.0
Sometimes available	96	44.0
Readily available	85	39.0
Total	218	100.0

Figure 10.4a

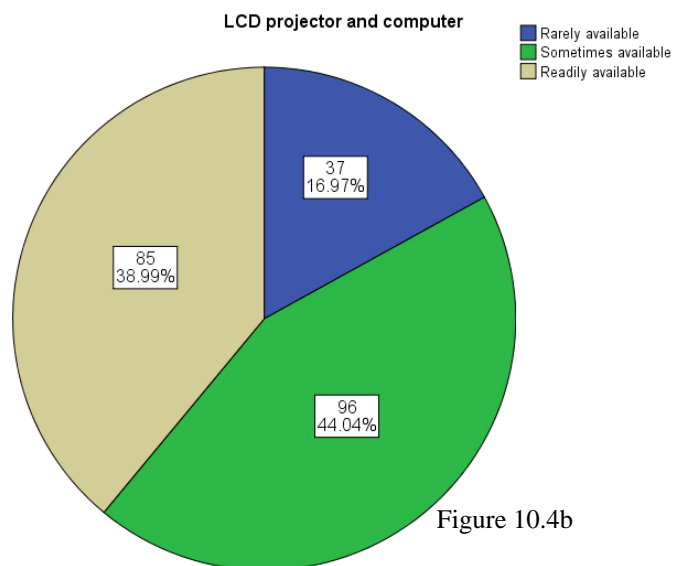


Figure 10.4b

Summary by Unit Used

LCD projector and computer		K-1	2-3	4	5-6	7-8	9-12
Rarely available	Count	9	11	8	7	6	4
	% within Unit	24.3%	32.4%	18.2%	14.6%	8.6%	7.4%
Sometimes available	Count	17	11	15	23	35	26
	% within Unit	45.9%	32.4%	34.1%	47.9%	50.0%	48.1%
Readily available	Count	11	12	21	18	29	24
	% within Unit	29.7%	35.3%	47.7%	37.5%	41.4%	44.4%
Total	Count	37	34	44	48	70	54
	% of Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Figure 10.4c

There is an increasing trend of LCD projectors and computers being sometimes to readily available from K-1 unit users to 9-12 unit users. (K-1 – 75.6%; 2-3 – 67.7%; 4 – 81.8%; 5-6 – 85.4%; 7-8 – 91.4%; 9-12 – 92.8%).

QUESTION 10

Computer with acceptable speed and memory

Of the 220 respondents who answered question 10e, 91.8% indicated that a computer with acceptable speed and memory is sometimes or readily available to them for viewing or printing educational materials.

Answer	Frequency	Percent
Rarely available	18	8.2
Sometimes available	52	23.6
Readily available	150	68.2
Total	220	100.0

Figure 10.5a

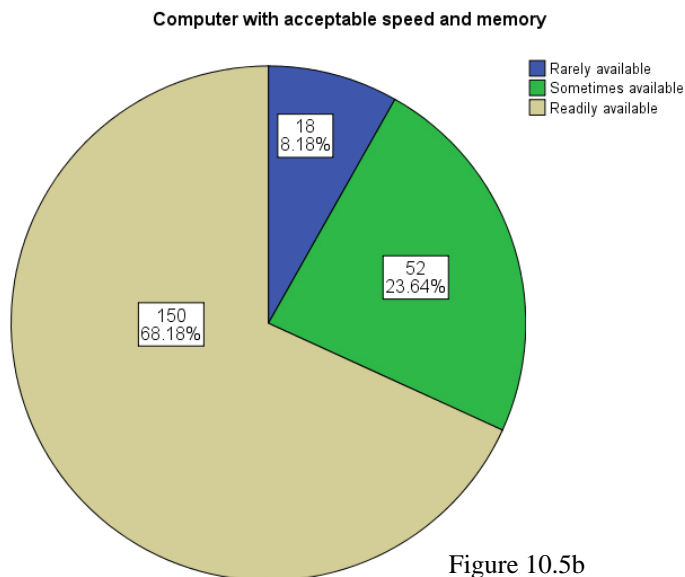


Figure 10.5b

Summary by Unit Used

Computer with acceptable speed and memory		K-1	2-3	4	5-6	7-8	9-12
Rarely available	Count	5	3	2	3	3	2
	% within Unit	13.2%	8.6%	4.5%	6.1%	4.1%	3.6%
Sometimes available	Count	9	8	19	13	14	9
	% within Unit	23.7%	22.9%	43.2%	26.5%	19.2%	16.4%
Readily available	Count	24	24	23	33	56	44
	% within Unit	63.2%	68.6%	52.3%	67.3%	76.7%	80.0%
Total	Count	38	35	44	49	73	55
	% of Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Figure 10.5c

There is a slight trend of increasing availability of computers with acceptable speed and memory from K-1 unit users to 9-12 users but over all 86.9% of all unit users indicated that a computer with acceptable speed and memory is readily or sometimes available for viewing or printing educational materials.

Computer for your use in classroom

Of the 221 respondents who answered question 10f, 95.5% indicated that a computer for their use in their classroom is sometimes or readily available to them for viewing or printing educational materials.

Answer	Frequency	Percent
Rarely available	10	4.5
Sometimes available	24	10.9
Readily available	187	84.6
Total	221	100.0

Figure 10.6a

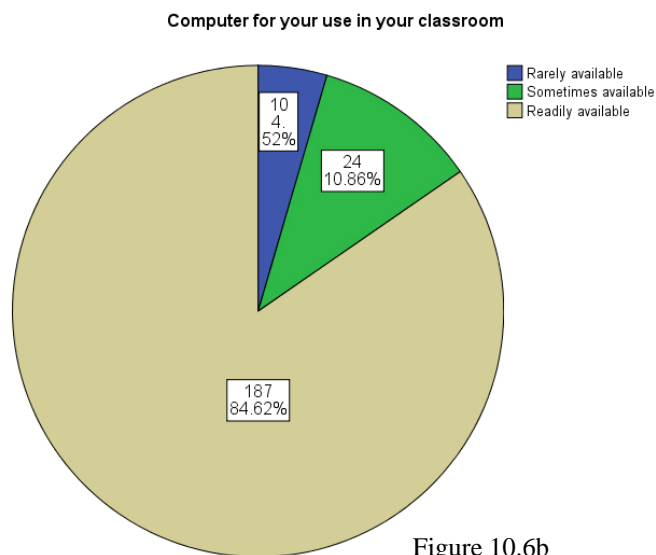


Figure 10.6b

QUESTION 10

Summary by Unit Used

Computer for student use in classroom		K-1	2-3	4	5-6	7-8	9-12
Rarely available	Count	16	11	13	15	20	14
	% within Unit	44.4%	32.4%	29.5%	31.9%	28.6%	25.9%
Sometimes available	Count	7	13	13	16	25	25
	% within Unit	19.4%	38.2%	29.5%	34.0%	35.7%	46.3%
Readily available	Count	13	10	18	16	25	15
	% within Unit	36.1%	29.4%	40.9%	34.0%	35.7%	27.8%
Total	Count	36	34	44	47	70	54
	% of Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Figure 10.6c

The availability of a computer for respondent use in their classroom is consistent from K-1 unit users to 9-12 unit users.

Computer for student use in classroom

Of the 217 respondents who answered question 10g, 67.7% indicated that computer(s) for student use in their classroom are sometimes or readily available to them for viewing or printing educational materials.

Answer	Frequency	Percent
Rarely available	70	32.3
Sometimes available	76	35.0
Readily available	71	32.7
Total	217	100.0

Figure 10.7a

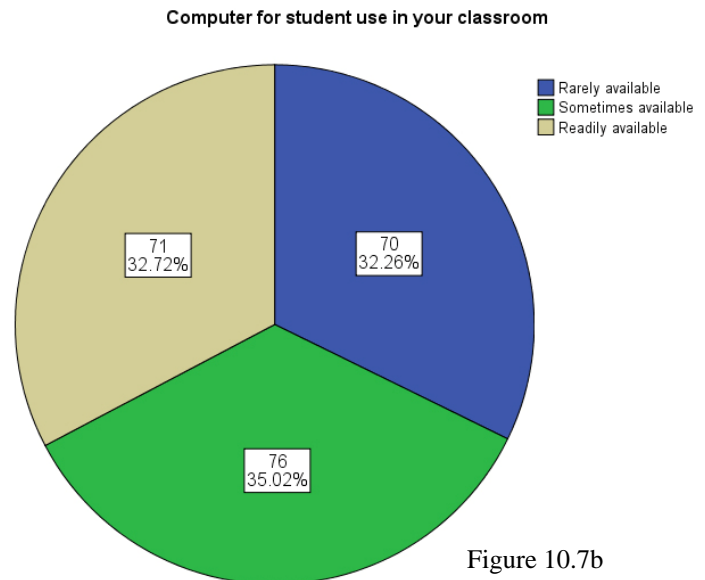


Figure 10.7b

Summary by Unit Used

Computer for your use in your classroom		K-1	2-3	4	5-6	7-8	9-12
Rarely available	Count	2	2	1	3	4	3
	% within Unit	5.3%	5.7%	2.3%	6.0%	5.6%	5.5%
Sometimes available	Count	3	4	4	5	5	5
	% within Unit	7.9%	11.4%	9.1%	10.0%	6.9%	9.1%
Readily available	Count	33	29	39	42	63	47
	% within Unit	86.8%	82.9%	88.6%	84.0%	87.5%	85.5%
Total	Count	38	35	44	50	72	55
	% of Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Figure 10.7c

There is an increasing trend of computers being available for student use in the classroom from K-1 unit users to 9-12 unit users. Computers for student use in the classroom are sometimes to readily available to 55.5% of K-1 unit users and 74.1% of 9-12 unit users.

QUESTION 10

Computer lab

Of the 222 respondents who answered question 10h, 91.0% indicated that a computer lab is sometimes or readily available to them for viewing or printing educational materials.

Answer	Frequency	Percent
Rarely available	20	9.0
Sometimes available	107	48.2
Readily available	95	42.8
Total	222	100.0

Figure 10.8a

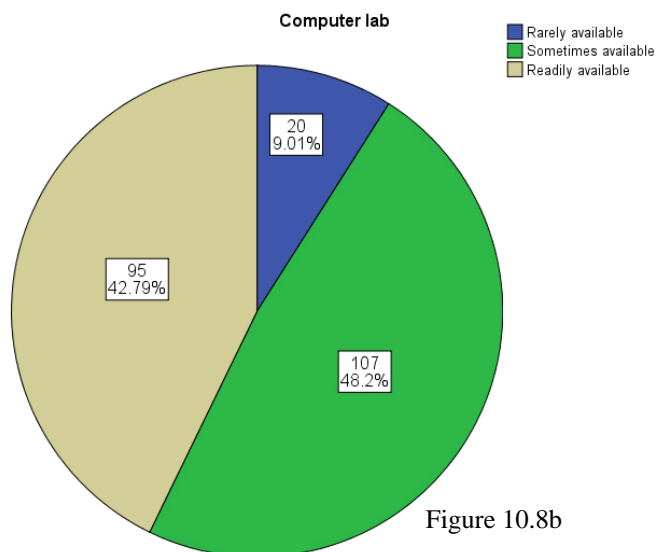


Figure 10.8b

Summary by Unit Used

Computer lab		K-1	2-3	4	5-6	7-8	9-12
Rarely available	Count	6	5	3	5	8	3
	% within Unit	16.7%	13.9%	7.0%	10.2%	11.1%	5.6%
Sometimes available	Count	14	17	19	21	35	27
	% within Unit	38.9%	47.2%	44.2%	42.9%	48.6%	50.0%
Readily available	Count	16	14	21	23	29	24
	% within Unit	44.4%	38.9%	48.8%	46.9%	40.3%	44.4%
Total	Count	36	36	43	49	72	54
	% of Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Figure 10.8c

The availability of a computer lab varies between different unit users. Percentages of those indicating a computer lab was sometimes to readily available are 83.3% for K-1 unit users, 86.1% for 2-3 unit users, 93.0% for 4 unit users, 89.8% for 5-6 unit users, 88.9% for 7-8 unit users, and 94.9% for 9-12 unit users.

Internet for your use

Of the 224 respondents who answered question 10i, 97.8% indicated that internet for their use is sometimes or readily available to them for viewing or printing educational materials.

Answer	Frequency	Percent
Rarely available	5	2.2
Sometimes available	14	6.3
Readily available	205	91.5
Total	224	100.0

Figure 10.9a

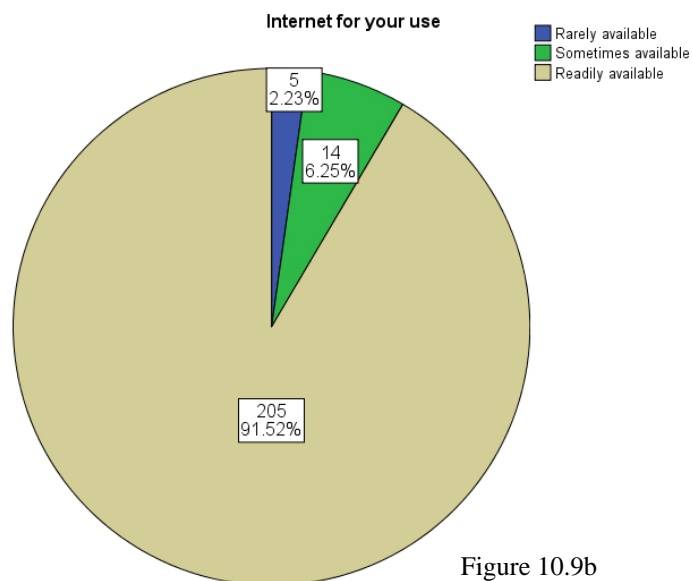


Figure 10.9b

QUESTION 10

Summary by Unit Used

Internet for your use		K-1	2-3	4	5-6	7-8	9-12
Rarely available	Count	3	0	0	0	1	1
	% within Unit	8.1%	.0%	.0%	.0%	1.4%	1.9%
Sometimes available	Count	0	3	3	3	2	2
	% within Unit	.0%	6.8%	6.8%	6.1%	2.8%	3.7%
Readily available	Count	34	41	41	46	69	51
	% within Unit	91.9%	93.2%	93.2%	93.9%	95.8%	94.4%
Total	Count	37	44	44	49	72	54
	% of Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Figure 10.9c

The availability of the internet for respondent use is consistent among users of all units.

Internet for student use

Of the 221 respondents who answered question 10j, 91.4% indicated that internet for student use is sometimes or readily available to them for viewing or printing educational materials.

Answer	Frequency	Percent
Rarely available	19	8.6
Sometimes available	89	40.3
Readily available	113	51.1
Total	221	100.0

Figure 10.10a

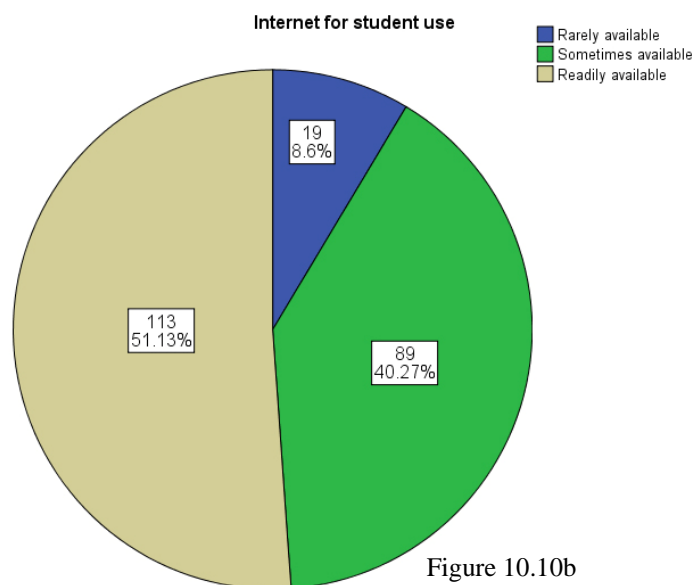


Figure 10.10b

Summary by Unit Used

Internet for student use		K-1	2-3	4	5-6	7-8	9-12
Rarely available	Count	7	4	4	2	5	3
	% within Unit	18.9%	11.4%	9.1%	4.2%	6.9%	5.6%
Sometimes available	Count	14	12	14	17	26	22
	% within Unit	37.8%	34.3%	31.8%	35.4%	36.1%	40.7%
Readily available	Count	16	19	26	29	41	29
	% within Unit	43.2%	54.3%	59.1%	60.4%	56.9%	53.7%
Total	Count	37	35	44	48	72	54
	% of Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Figure 10.10c

The availability of the internet for student use shows an increasing trend from K-1 unit users to 9-12 unit users. Those indicating that internet for student use was sometimes or readily available was 81.0% for K-1 unit users, 88.6% for 2-3 unit users, 90.9% for 4 unit users, 95.8% for 5-6 unit users, 93.0% for 7-8 unit users, and 94.4% for 9-12 unit users.

QUESTION 10

Recommendations

Overall the availability of technology resources (e.g., computers, printers) to survey respondents is high. Therefore, access to technology resources should not limit the creation of digital resources. The use of technology continues to increase, which reduces limitations to technology access.

Whenever possible, alternatives for using a particular technology resource should be suggested so that a topic can be taught without technology. This will be helpful to educators who have limited access to technology. It is better that a teacher have the ability to teach a topic in a low tech manner than not to teach it at all because their computer crashed or the school's Internet connection is down. Educators should be encouraged to print materials well in advance of using them, test Internet resources prior to the day they will use them with students to ensure links are still accessible, and download materials from CD-ROMs or the Internet prior to class time.

Detailed instructions should be provided for accessing technology resources (e.g., downloading, accessing a media player, printing, etc.). Troubleshooting suggestions should also accompany digital resources. It should not be assumed that people will know how to use all types of digital resources or have the ability to get assistance from their information technology staff. LEAF may want to consider providing contact information for a staff person who can assist educators in accessing digital resources.

Nearly all respondents have the ability to view on a screen and print in black and white resources that would be provided on CD-ROM or the Internet. Just over 75% of respondents have access to a color printer. For resources that must be printed in color, LEAF should suggest ways educators can accomplish this, including requesting materials from the LEAF Program (possibly for a fee). Full-color resources should be developed for both printing and viewing on screen. This will give teachers the option of having students view resources on a computer or with an LCD projector if they do not have access to color printing.

Resources should be created in a manner that allows them to be used and disseminated in multiple ways to provide maximum access. For example, resources provided on a DVD can also be placed in an online LEAF digital resources library, allowing those without a DVD player to access the information online. Items meant for student exploration should be created so that students can use them independently on a computer or in a group setting shown to the entire class using an LCD projector.

QUESTION 11

QUESTION 11: If you have computer(s) in your classroom for student access, how many do you have?

Of 186 survey respondents who answered question 11, 19.4% have no computer in their classroom for student access, 33.9% have one computer in their classroom for student access, 18.3% have two computers in their classroom for student access, and 5.4% have 20 or more computers in their classroom for student access.

Number of computers	Frequency	Percent
0	36	19.4
1	63	33.9
2	34	18.3
3	16	8.6
4	8	4.3
5	3	1.6
6	5	2.7
7	1	.5
8	2	1.1
9	1	.5
13	2	1.1
14	1	.5
15	2	1.1
18	1	.5
19	1	.5
24	2	1.1
25	4	2.2
30	2	1.1
32	1	.5
36	1	.5
Total	186	100.0

Figure 11.1

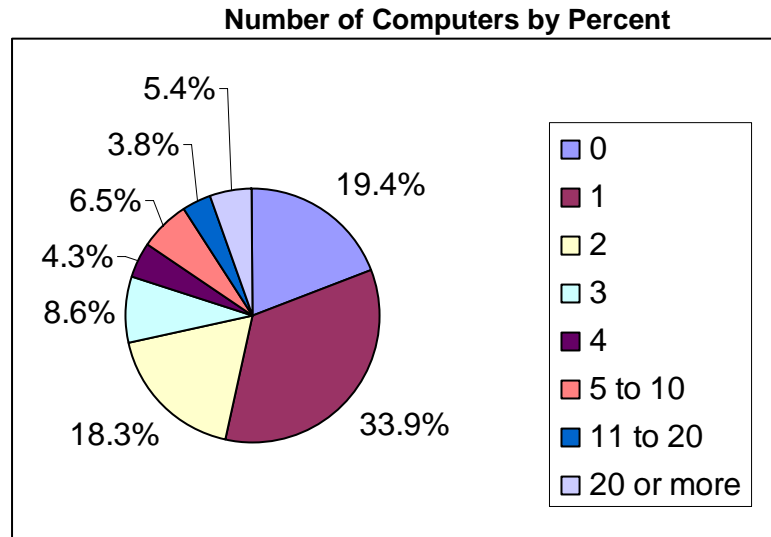


Figure 11.2

QUESTION 12

QUESTION 12: Which unit(s) of the LEAF Lesson Guide do you use to teach students? (circle all that apply)

- K-1
- 2-3
- 4
- 5-6
- 7-8
- 9-12

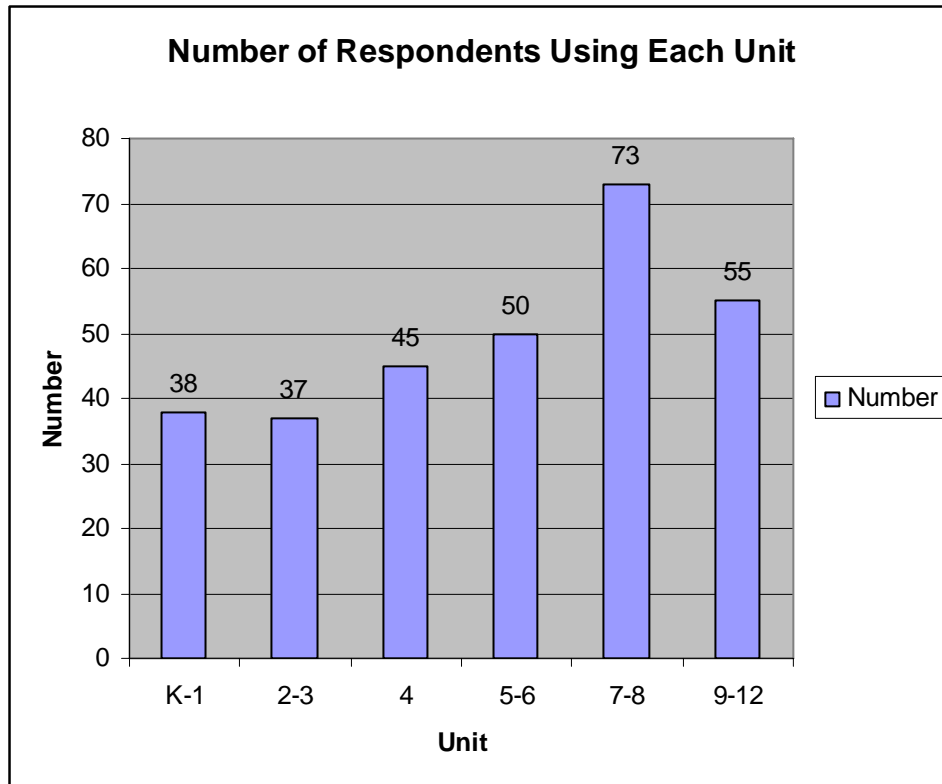


Figure 12.1 shows the number of respondents who use each unit. The total number of units used does not equal the total number of survey respondents. Survey participants were asked to indicate all units that they use. There are teachers who teach multiple grade levels and therefore utilize multiple units of the LEAF Guide.

Figure 12.1

Number of Respondents Using Multiple Units	
Number of Units Used	Number of People
N/A	36
1	157
2	42
3	12
4	1
5	1
6	2

Figure 12.2 shows the number of respondents who indicated using one or more units. Of the 215 respondents who answered question 12, 58 or 27.0% use more than one unit of the LEAF Guide.

Figure 12.2

QUESTION 13

QUESTION 13: What grade level(s) do you teach? (circle all that apply)

- Kindergarten
- 1st grade
- 2nd grade
- 3rd grade
- 4th grade
- 5th grade
- 6th grade
- 7th grade
- 8th grade
- 9th grade
- 10th grade
- 11th grade
- 12th grade

Number of Respondents by Grade Level Taught

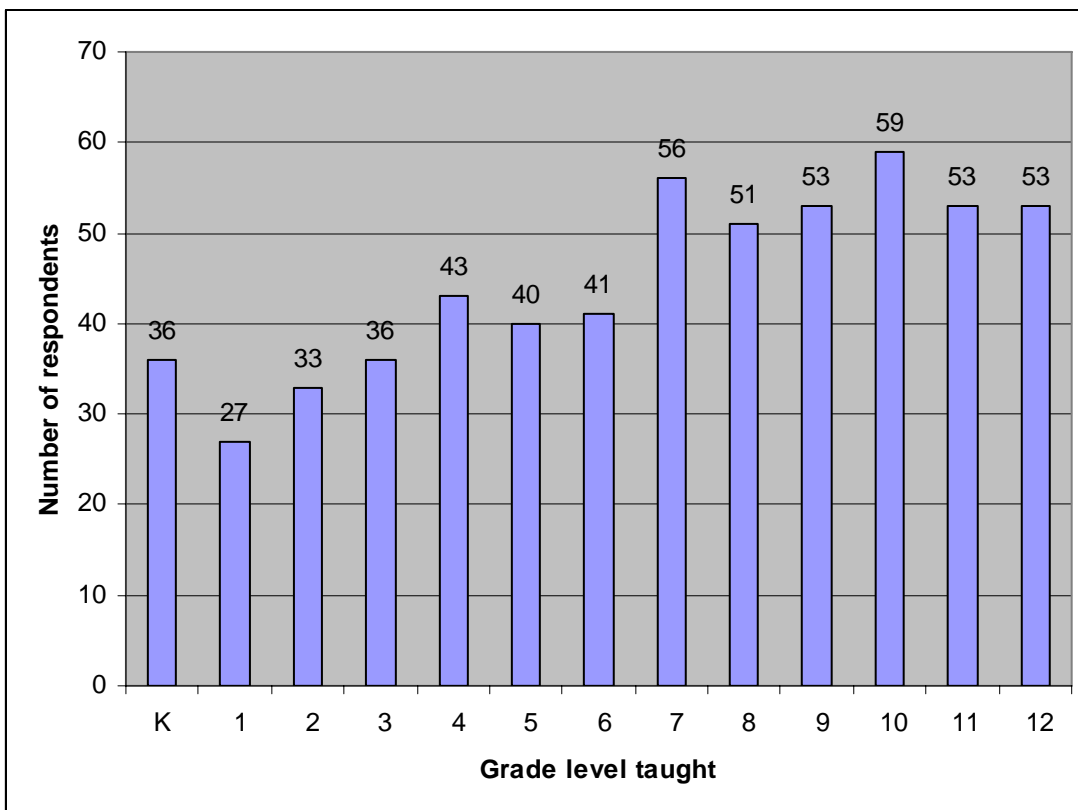
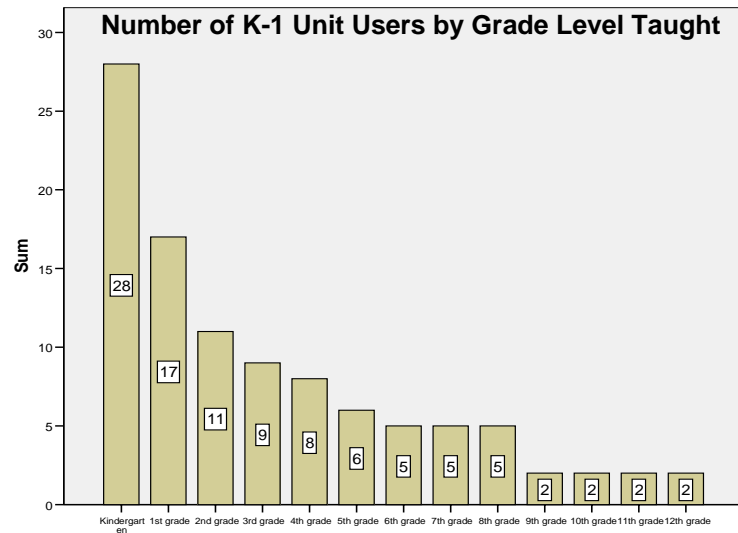


Figure 13.1

QUESTIONS 12 and 13

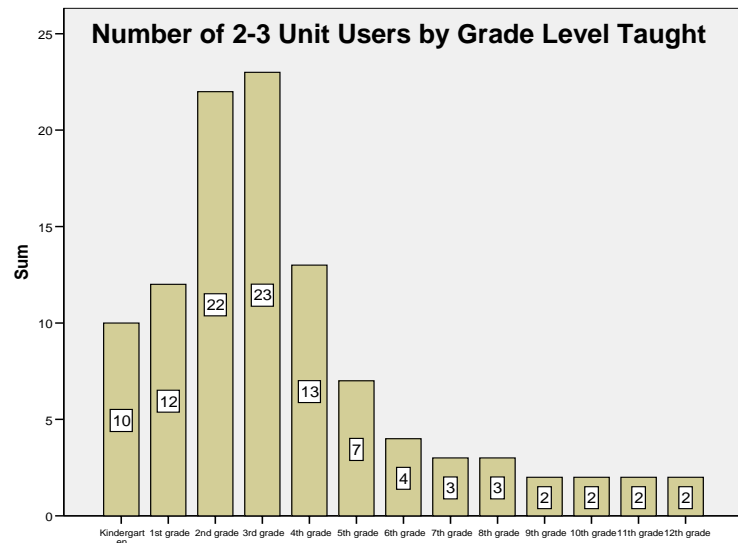
Number of respondents indicating they use the K-1 unit of the LEAF Lesson Guide and the grade level they report teaching.

Figure 12/13a



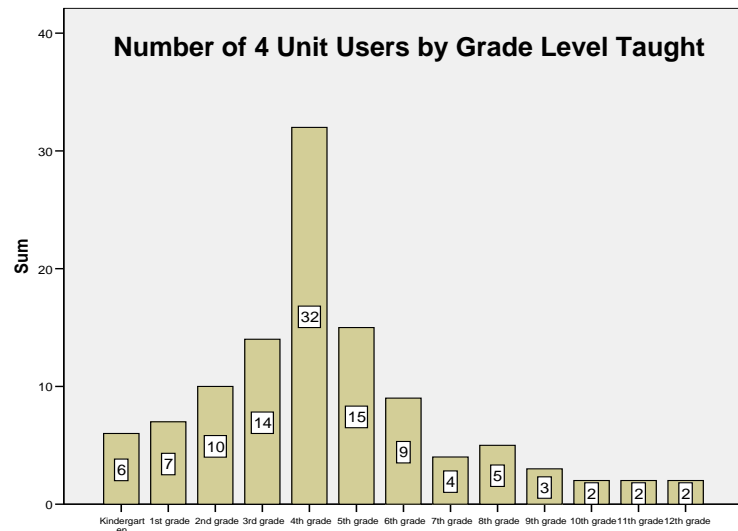
Number of respondents indicating they use the 2-3 unit of the LEAF Lesson Guide and the grade level they report teaching.

Figure 12/13b



Number of respondents indicating they use the 4 unit of the LEAF Lesson Guide and the grade level they report teaching.

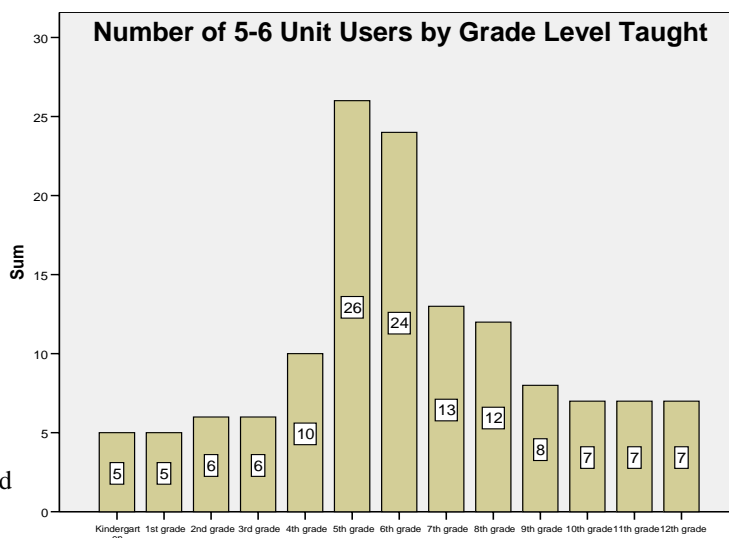
Figure 12/13c



QUESTIONS 12 and 13

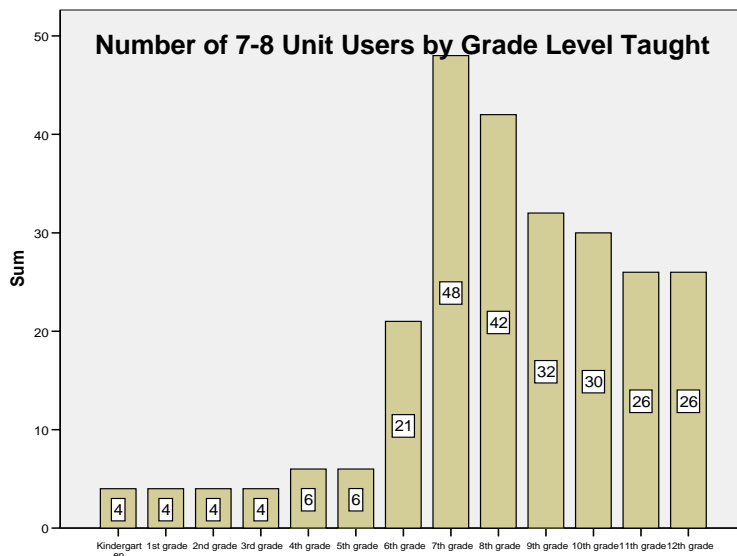
Number of respondents indicating they use the 5-6 unit of the LEAF Lesson Guide and the grade level they report teaching.

Figure 12/13d



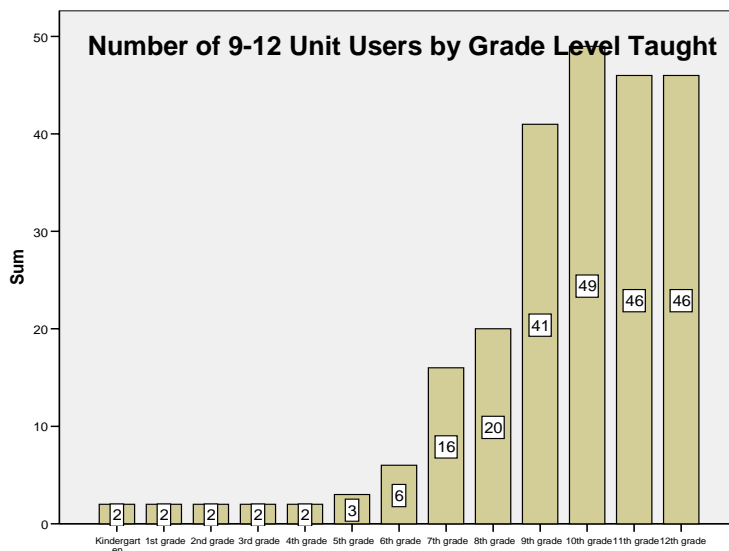
Number of respondents indicating they use the 7-8 unit of the LEAF Lesson Guide and the grade level they report teaching.

Figure 12/13e



Number of respondents indicating they use the 9-12 unit of the LEAF Lesson Guide and the grade level they report teaching.

Figure 12/13f



QUESTION 14

QUESTION 14: Please describe your role with students.

Summary of survey responses

By grade

- 16 kindergarten teachers
- 4 first grade teachers
- 1 first and second grade teacher
- 7 second grade teachers
- 2 second and fourth grade teachers
- 8 third grade teachers
- 2 third and fourth grade teachers
- 12 fourth grade teachers
- 12 fifth grade teachers
- 1 fifth and sixth grade teacher
- 4 sixth grade teachers
- 3 seventh and eighth grade teachers
- 5 teachers of three or more grade levels

By subject

- 16 agriculture education teachers
- 6 environmental education/school forest educators
- 1 environmental studies teacher
- 6 English language arts teachers
- 3 math teachers
- 1 math and science teacher
- 71 science teachers
- 1 music teacher
- 3 physical education teachers
- 13 special education teachers
- 3 social studies teachers
- 4 technology education teachers
- 3 teachers of multiple subjects
- 3 title one teachers
- 2 at risk teachers
- 2 gifted and talented teachers
- 1 at risk and gifted and talented teacher

Summary of Comments from Survey

Support for digital resources

- "The use of digital materials is excellent! I hope you will add it."
- "There is just not enough time in the year to teach as many concepts as we want. Any digital resource that would help streamline information would then allow me to teach another environmental topic in its place."

Concerns about digital resource use

- "Today's student is a very visual, tech. learner. These activities might help some, but surely are not necessary to all. This is a good program with great info/plans. Not enough class time for everything!"
- "My classroom is not internet capable. I would need to print any info from my home computer. A printable educational game would be good."
- "Although having digital resources would really enhance the students understanding of the forestry concepts I think it is just as important to have relevant, hands-on activities that apply to their own situation. For example, if we could find a source of digital maps from 1800-present at different time periods for our own school this would be great. I take my students to our school forest but I don't think they can envision too well what it was like 100 years ago."
- "I will not use the digital resources. Our lab time is limited to once per week for 30 minutes. Students at grade 4 are required to do Type and Learn at this time."
- "I teach kindergarten. This info. would be fine for ME however."
- "Having digital resources to add to it would be nice, but isn't absolutely necessary. Sometimes it cuts down on teacher prep. time, but it can also cut down on student interaction time if it is replacing a game or other activity."
- "I have used Project LEAF curriculum as an enhancement or supplement. It has been a resource that has been worthwhile in that the students can see the relevance. (Wisconsin forestry) I don't use the CD or online information for varied reasons but the "biggest" reason is that I have only one computer. I believe that the program is worthwhile."

How materials are currently being used

- "My curriculum does not directly include Forest Education skills so it is a big stretch to include more than a few Forest Ed. materials. I try to work it in as part of a water conservation unit in fall and again with Earth Day/month in spring. I suspect I am not the only one in this position."
- "We use the LEAF lessons for planning our outdoor classroom field trips to Lake Wissota. We usually use lessons a week prior to the other lessons we plan for that day. Then we have an activity that ends our unit."
- "I found the materials most useful in Reading class where we discussed different types of text and the use for schema (background knowledge) in reading. I would love to do an expedition on forests some time, so kids understand their local resources and for my own edification."
- "I am working on getting a volunteer to work with kids in the garden, and I will be sharing the curriculum with her/him."
- "I plan to make use of the field enhancements to get all of our k-8 students out to the school forest annually. Additionally, I teach an every other year AP biology class which has a semester of ecology, natural resources. I will use some of the activities in the 9-12 guide for that class. All of the teachers who have taken the k-8 workshop at Newman Catholic High School raved about LEAF. I will be pushing to get another LEAF workshop for the entire k-8 teaching staff and possibly make LEAF a part of our curriculum. Thanks."
- "I would use and am using ag ed listserve thru DPI. My semester course in forestry is in its 3rd week. I have been using the LEAF forestry guide I had the chance to get acquainted with it this last summer at our ag ed summer conference. I like it and so do the students - good activities. Looking forward to more. What you're doing so far is great (LEAF materials, etc.) I'm looking forward to more. Thanks."

Reasons survey may not have been filled out or reasons LEAF is not used

- “The training was wonderful! I don’t teach the material because I am a building principal!”
- “I am in an unusual situation that I mainly teach reading and language arts 50% position. I do help out at our school forest and plan to find full time employment in the near future. I am always taking classes and thought this one would be interesting (which it was), but I won’t be using the materials in the near future so find it difficult to be able to fill out your survey at this time.”
- “I no longer teach conservation - I have nothing against the program. I am sorry I don’t use the program much but we have a pretty set in stone curriculum for by bio classes with not a lot of time for forestry. Our conservation has been replaced by the River Academy - which is a multi class charter school that combines English, social studies, conservation and Phys. Ed.”
- “I retired this past June and don’t have access to the guide. Therefore I will not be completing this questionnaire.”
- “Unfortunately I teach math and am currently unable to use the LEAF materials.”
- “I am sorry; I have transferred schools and no longer teach lessons in elementary school since taking the LEAF course.”
- “Due to budget cuts I don’t know what I will be teaching next year and this year I got changed to literature and social studies. I really like the materials but not able to use them.”
- “I am no longer teaching science, so I do not use the curriculum at all.”
- “I do not use that often because of my role. I enhance and work with regular ed. teachers and what they present to students in their classroom.”
- “I am a library media specialist with the responsibility of four elementary library centers. I have not done much teaching in the past year because we recently closed three elementary schools...and I am still redistributing materials. I enjoyed being in the LEAF class last spring, and was impressed by the materials we were given. I do not feel competent to fill out your survey.”
- “Teach elementary PE K-5 that’s why! Sorry.”
- “I am an LMC director and took the class to support classroom instruction.”
- “Can not seem to fit it into 5th grade curriculum.”
- “I am the principal, so I don’t teach classes.”
- “At this time I am not teaching biology as I have in the past but am an at risk/alternative ed director so my [unknown word] are not as curriculum related as they have been in the past. I now do academic support and find the materials and activities I can use to supplement [unknown word].”
- “Unable to incorporate into the low reading levels of my pull-out program! Good info for myself!”
- “I am not a classroom teacher and so that’s why I haven’t used it.”
- “I think LEAF is a great program, and wish I could fit it into my curriculum for this year. (I just picked up Chemistry this summer, so that limited my revamp time for Earth Science.) I do hope to use it in the future. I’m sure any “extras” that are developed will be beneficial! :)”
- “I enjoyed my LEAF class last spring and used many lessons at the fourth grade level last year. I am now in a new district teaching third grade and haven’t had a chance to use LEAF yet this year. I do have the materials and plan to use them in the spring.”
- “I am over loaded right now in terms of work and trying to fit things in when I can. I believe forestry is very important in this area and we will get to that point where I am teaching it some time down the road.”
- “Biggest roadblock for use is a very crowded curriculum. We have so many ‘dual-minutes’ to account for that planning gets very complex. I have changed grade level and that has impacted use too!”

Survey email reminders were helpful

- “Good luck with your research. The repetitious emails about completing it got me to sit down and do it...Life just gets so busy!”
- “It was an excellent prompt to have sent out the notice in advance that you would be asking about the guide as that was my incentive to look at it right away.”

Suggestions for LEAF

- “As I use the LEAF materials one “problem” that arises is the fact that I have to make my own transparencies of the photos. I’ve found that while they do photocopy fairly well, they don’t look as crisp and clean as I like. I end up with the ring binding and the three holes as part of my photocopied transparency. And if I copy the page first, trim off the unneeded marks and then make my transparency, I lose some resolution. Would it be possible to include the transparencies with the LEAF guide?”
- “9-12 needs a field experience component”
- “In the future I think having K alone and grouping 1-2 and 3-4 would be much better.”
- “We do have cows - computers on wheels - some even work! I’d like to see a contest for grades other than 4th grade - we teach Wisconsin in middle school too. I use the LEAF curriculum all year. We do not have an environmental curriculum in Green Bay, but I believe it to be important enough that I take time to teach this important concept to the ones who will make the decisions regarding trees next.”
- “Keep making ready to use lesson plans - worksheets for students - activities.”
- “I enjoyed taking the LEAF course, but noticed it was not offered as part of the Nicolet College summer program this year. It should be since it was a great course. I’ve mentioned it to my colleagues and have had the Science Specialist look at the LEAF curriculum. I think the CD-ROM of the curriculum is helpful for a classroom teacher and we need to get more copies directly into their hands to use as a resource.”

Program Support

- “Love this curriculum.”
- “I already like and use the LEAF resources.”
- “YOU GUYS ROCK!!!!”
- “Thank you for all of your work on support of forestry education!”
- “LEAF is a great program and a great resource.”
- “Thank you for your help!”
- “Thank you, for offering such a great program! It is obvious that you work hard to maintain and improve the LEAF offerings.”
- “Thanks for all the hard work you do for teachers and students!”
- “I’ve really enjoyed using the LEAF resources - and I like the web site. Thanks.”
- “I use the 4th grade curriculum every other year. My former class really enjoyed the 4th grade lessons!”
- “I really thought the LEAF lesson guide was well done. I’m sure there’s always areas to improve but for my needs, this is an excellent tool. Thank you for the resource! Are these available for other teachers or do they need to complete the LEAF program?”
- “The great plus of the LEAF program is that each lesson is complete and can fit in to many different curriculums or courses. Again a teacher can pull an activity or use an entire unit.”
- “Very helpful - provides additional activities to the materials I already use.”
- “I have enjoyed every class that I have taken through the LEAF program and find the information useful. I take a group of 6, 7, and 8th grade students to Eagle River’s Trees for Tomorrow each year. I believe that students in Wisconsin need to be educated about Wisconsin, its forests, management uses, resources, and energy concerns. The information that I have from these classes enhance our Trees experience. Thank you and keep up the good work.”
- “I really enjoy the lessons. Thank you.”
- “Go LEAF!”
- “I think the resources are great.”
- “I do think that the activities presented in the guides are very well done.”
- “I think this is a great program. At this time our 7th grade curriculum does not include plants so I use the key as part of a classification unit and we discuss habitats for animals that includes forests. As curriculums and standards change I believe the amount of LEAF that will be used will change as well.”

- “I love your materials and encourage you to keep developing, new, interactive, hands-on things in the future.”
- “Keep up the good work.”
- “I did an 8 hour inservice on LEAF last year when I taught 4th grade. I loved it and used most of the lessons. Thank you for the LEAF Program. It is an excellent resource that I appreciated using being new to the 4th grade for one year. I worked with another 4th grade teacher who had LEAF training and we did many lessons together.”

General Comment

- “I’m not sure how the LEAF blog would work. For students who are interested in forestry it might be interesting, however people who don’t know much about topics might find this intimidating. Also, I don’t know how I could justify time for this when I wouldn’t be able to monitor, analyze, or access information being shared. A discussion board would be more appropriate for my school setting. Often times blogs jump around topics too much. Also hard to create additional assignments or themes. A discussion board could be as broad or in depth as you wanted and I would be better able to monitor participation.”

Researcher note

- Survey question 2 was marked often and very frequently with a note that it depended on the year. Reflects the fact that some teachers use LEAF materials on a rotating cycle.