

Design Concept – Computer Security/Virus Prevention Course

Erin Lawler-King

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OVERVIEW

This memo summarizes the design concept for a proposed course to teach computer users how to protect their computer systems from virus infections. The course, entitled “Protecting Yourself from Computer Viruses,” has four primary instructional goals:

1. Build learner knowledge of preventive measures to avoid virus infection;
2. Increase learner knowledge of how to select and use antivirus software for prevention and detection;
3. Increase learner confidence in his/her ability to perform routine maintenance on a computer system; and
4. Build learner knowledge of how to repair virus-related damage once it has occurred.

This course will be designed for delivery in a corporate workplace, with the goal of increasing employee knowledge of virus prevention. Implementing this program will reduce costs associated with lost productivity following virus outbreaks. It will also reduce labor costs incurred when I.T. departments spend hours resolving preventable virus-related support issues.

Although the program will foster immediate application of skills and knowledge in the workplace (near-transfer), the program teaches skills that can be applied to home computer use as well (far-transfer). This transferability is in line with the specifications for teaching of principles outlined by Clark (1999).

TARGET AUDIENCE AND LEARNER GOALS

The target audience includes adults between 18 – 65 years of age who are employed in a corporate environment and whose job responsibilities require use of a computer. These learners also frequently use a home computer for common tasks, such as e-mail and file sharing. The learners' computer skill levels may range from novice to advanced.

The instructional goals are driven by the following learner goals:

1. Prevent loss of data and damage to personal property (computer);
2. Avoid financial loss incurred as a result of needed repair/replacement of a personal computer following virus infection;
3. Have knowledge on preventive measures/behaviors to avoid virus infection; and
4. Increase comfort level about using a computer to conduct personal business (file sharing, online transactions, etc.) due to increased knowledge of maintenance and problem resolution.

DELIVERY SYSTEM

Due to the likelihood that users will have Internet access at both work and home, the course will be delivered as a Web-based program. The course will include printable reference documents, mechanisms for user collaboration, and helpful “tips” that users can reference with regard to best practices in virus protection.

CONSTRAINTS AND ENABLERS

The following enablers and constraints must be considered:

Enablers – Delivery System (Internet)

- Can be updated frequently
- Can be accessed anywhere an Internet connection exists
- Can be used to communicate and collaborate with other learners and instructor
- Enables access to WWW for additional resources/links
- Learners who are comfortable with computers can easily use the program
- Lessons can be paused, started, and repeated at the learner's convenience

Enablers – Learners

- Learners gain knowledge on a topic that can be applied to the workplace and at home
- Learners want to learn how to protect their personal computers and valuable data from virus infections
- Learners can access the training when a virus situation arises (just in time) or complete the training in their spare time (just in case)
- Convenient delivery format for learners who have a hard time making it to training sessions or who don't perform well in face-to-face situations

Constraints – Delivery System

- Technical problems connecting to Internet (computer broken, ISP down) or to Web site (i.e. server down)
- Poorly designed site or course GUI/navigation could push learner away
- Initial production expense (Instructional designers, graphic artists, etc.)
- Expense to maintain a web server and pay for site administration

Constraints – Learners

- May not have a computer or Internet access at home
- May lack technical skills to effectively use Internet-based training
- Because training is not necessarily *required*, learner may procrastinate in using the product and lose initial interest
- May have had bad experiences with Web-based training via Internet and transfer that attitude to new course
- High comfort level with traditional classroom training

COURSE NAVIGATION

Users will be able to move through the course using a navigation bar displayed at the bottom of the course window. This navigation bar will enable the user to:

- Pause and restart the lesson (self-pacing)
- Navigate forward/backward through lesson frames (facilitates review)
- Navigate to the Main Menu from any lesson to access other lessons
- Exit the course at any time



Figure 1: Sample Navigation Bar

COURSE ORGANIZATION

The course will be divided into four modules. Module content is summarized in the table below.

MODULE 1: What Is a Computer Virus?	Educates user on the overall impact of virus propagation on businesses and home computer users. Teaches the various types of computer viruses (virus, worm, Trojan horse) and their defining characteristics. Goal is to enable learner to apply knowledge of virus types and characteristics to identify the type of virus that may be present on a computer system.
MODULE 2: Preventing Virus Infection	Educates user on preventive behaviors to avoid installing a virus on his/her computer system. Goal is for learner to apply principles of safe computer usage to prevent virus infection, including proper system configuration and safe e-mail usage. Learner will also be able to list the most common antivirus programs and to describe the primary functions of antivirus software.
MODULE 3: Computer Symptoms and Virus Detection	Educates user on different computer behaviors that indicate a virus may be present, including unusual e-mail activity, file corruption, system running slower than normal, and presence of new, unknown programs. Teaches user how to utilize antivirus software to detect viruses and take appropriate corrective action. Goal is for learner to detect and remove viruses before significant damage occurs.
MODULE 4: Repairing Virus Damage	Teaches user to interpret reports produced by antivirus software, identify the specific virus infecting the computer, and identify possible resolutions for virus removal. Goal is for learner to apply guidelines for problem resolutions: read report, consult reference tools, and implement solution.

MENU STRUCTURE/LESSON ACCESS:

Learners will be able to select lessons of interest in any order. However, it is recommended that learners complete the lessons in the order in which they appear in the menu structure. In this method, the course will allow user control but provide advisement to assist the learner is making good instructional choices (Clark & Mayer, 2003). Each lesson builds on information presented in the previous lesson or module, following Gagne's recommendation to stimulate recall of prior knowledge before presenting new information (Gagne, 1965).

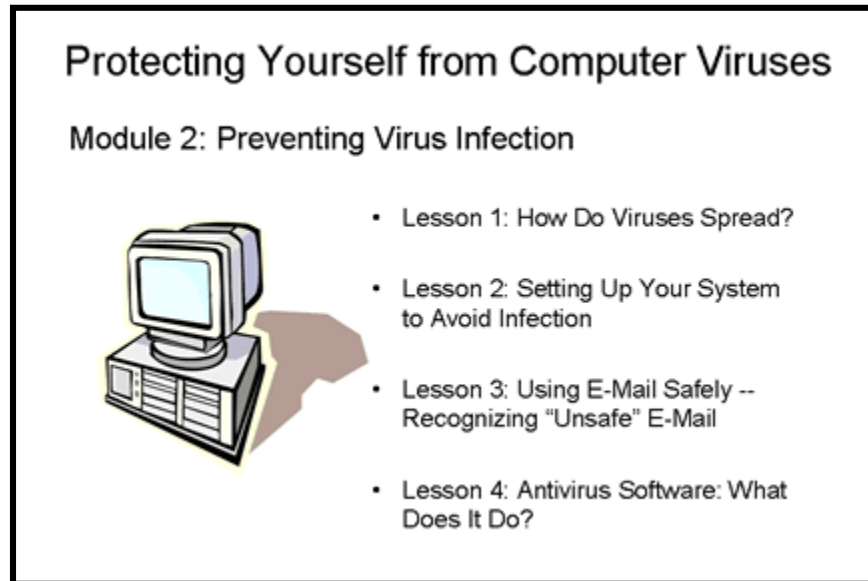


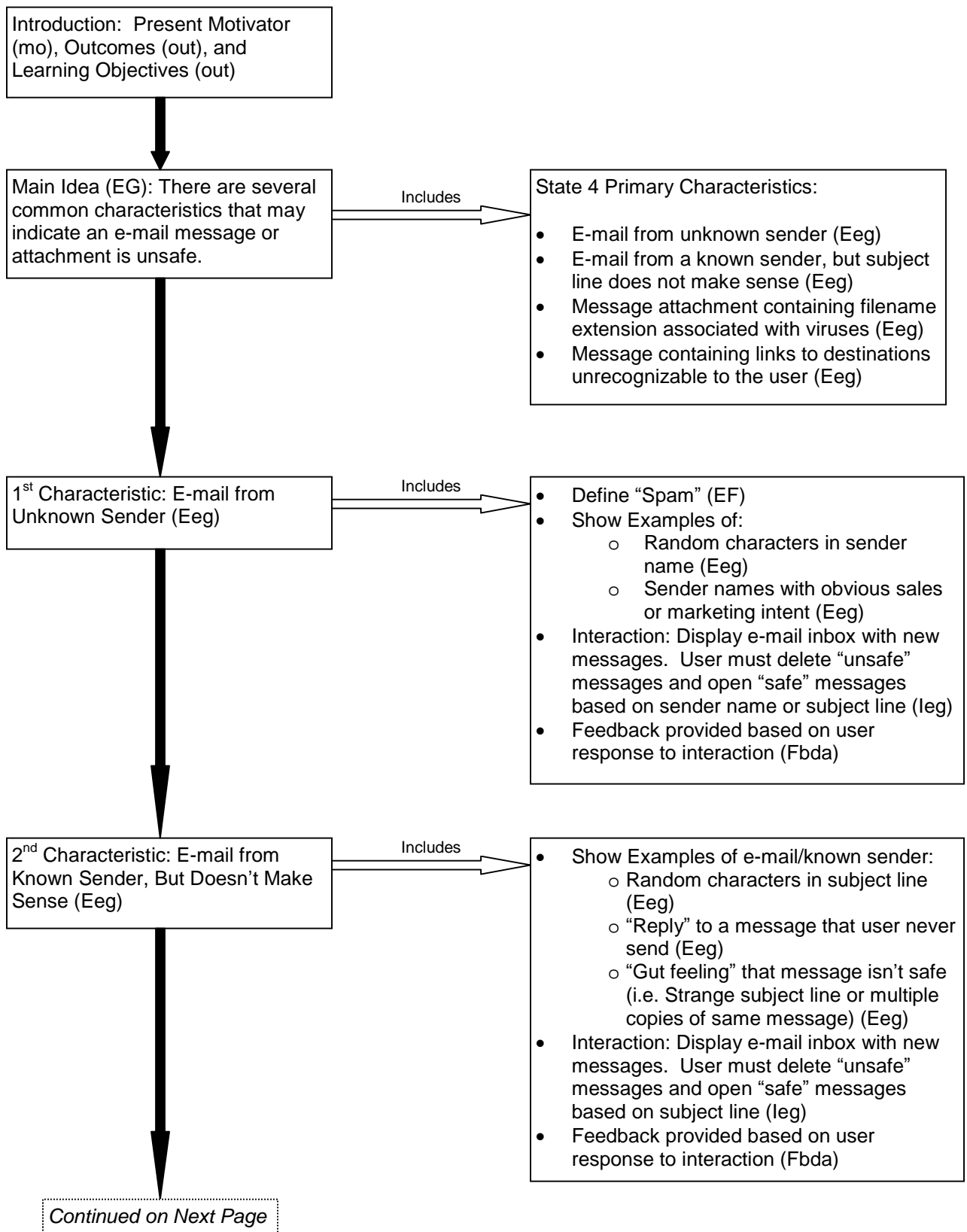
Figure 2: Sample Menu from Course Module 2

LESSON STRUCTURE

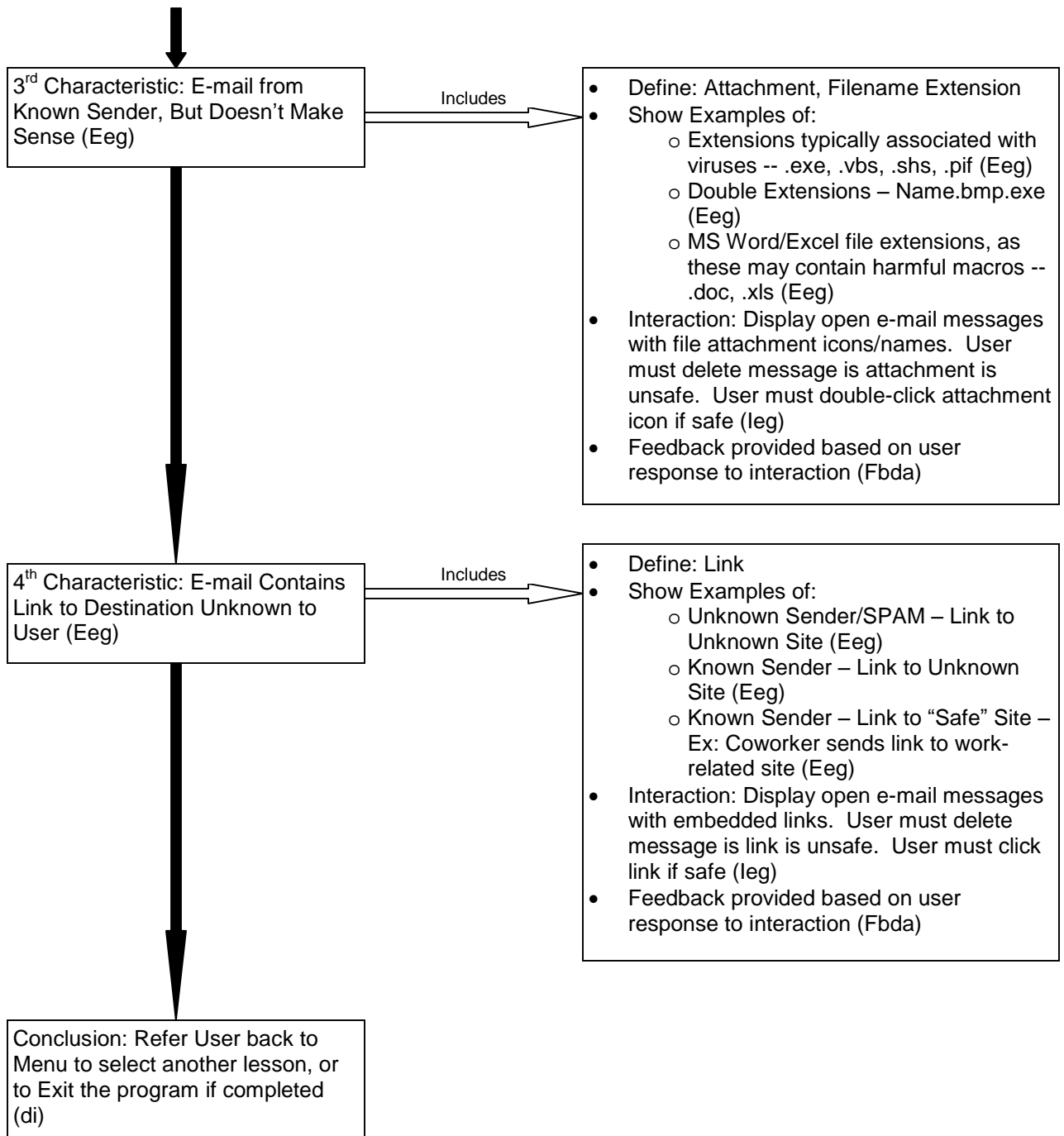
To illustrate the model used to develop lessons in the Computer Viruses course, this memo will examine a specific lesson in detail. The lesson described in the following section is entitled "Using E-Mail Safely: Recognizing 'Unsafe' E-Mail," and is located in course Module 2.

Lesson Objective: User will learn characteristics of e-mail messages and attachments that may indicate they are unsafe to open. Characteristics include: a) e-mail from unknown sender; b) e-mail from a known sender, but subject line does not make sense; c) message attachment containing filename extension associated with viruses; and d) message containing links to destinations unrecognizable to the user. Learner will successfully avoid virus infection by applying knowledge of these e-mail characteristics and taking appropriate action when reading e-mail (i.e. open message or delete it).

Lesson Flow: The following diagram represents typical lesson flow as exemplified by Lesson 3, "Using E-Mail Safely."



Lesson Flow (Continued):




SAMPLE LESSON SCREENS

The following pages display sample lesson screens and represent the order in which information is presented to the user. The screen samples include motivators, learning outcomes, expository screens, and interactions.

Lesson Introduction: Sample Motivator (*mo*):

Using E-Mail Safely: Recognizing "Unsafe" E-Mail



E-mail is a tool that you use daily at work and at home. It has greatly simplified our ability to communicate with others, and allows nearly instant responses.


However, e-mail can also be a threat to the security of your computer and valuable data. It is one of the most common methods of virus propagation among computer systems.

So how can you protect yourself?

Figure 3: Sample Motivator Screen (Lesson 3 Introduction)

Lesson Introduction: Sample Learning Objective (*out*):

Using E-Mail Safely: Recognizing "Unsafe" E-Mail




In this lesson, you will learn to identify key characteristics of e-mail messages and attachments that may indicate they are unsafe to open.

By applying your knowledge of these characteristics while reading e-mail, you will be able to successfully avoid infection of your computer system by an e-mail propagated virus.

Figure 4: Sample Learning Objective Screen (Lesson 3 Introduction)

Lesson: Sample Presentation Screen (EG):

Using E-Mail Safely: Recognizing "Unsafe" E-Mail



There are four primary characteristics of e-mail messages and e-mail attachments that may indicate that they are unsafe to open – that is, the message or attachment may contain a harmful virus.


These characteristics are:

- 1) The e-mail message is from someone you don't know;
- 2) The e-mail message is from someone you know, but it does not make sense;
- 3) The e-mail contains attachments with filename extensions commonly associated with viruses; and
- 4) The e-mail message contains links to a destination you do not recognize.

Figure 5: Sample Presentation Screen (Lesson 3)

Lesson: Sample Presentation Screen (Eeg):

Using E-Mail Safely: Recognizing "Unsafe" E-Mail



Characteristic #1:
The E-Mail is from someone you don't know.


Many e-mail users regularly receive unsolicited e-mail from companies and individuals. This type of e-mail is referred to as "spam," and is the e-mail equivalent of the junk mail that you find in your mailbox at home.

When reading e-mail, be cautious if you receive an e-mail from a sender you do not recognize. Spam is often used to distribute virus files.

Figure 6: Sample Presentation Screen (Lesson 3)

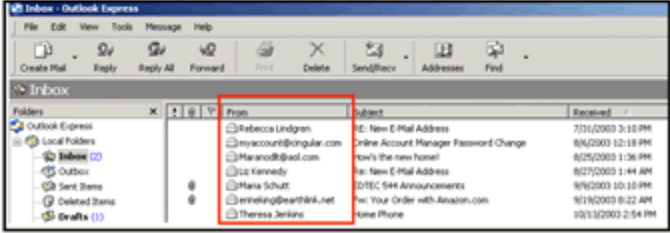
Lesson: Sample Presentation Screen (*Eegc*):

Using E-Mail Safely: Recognizing "Unsafe" E-Mail



Characteristic #1:
The E-Mail is from someone you don't know.

Always examine message sender information in your e-mail inbox prior to opening a message.




From	Subject	Received
Fabeca Lindgren myaccount@ingular.com Maracoo@aol.com	Re: New E-Mail Address	7/19/2003 3:10 PM
	Online Account Manager Password Change	8/4/2003 12:18 PM
	How's the new home!	8/25/2003 1:36 PM
Liz Kennedy	Re: New E-Mail Address	8/27/2003 1:44 AM
Maria Schutt	EDTEC 544 Announcements	9/6/2003 10:18 PM
emmeling@earthlink.net	Re: Your Order with Amazon.com	9/19/2003 8:22 AM
Theresa Jenkins	Home Phone	10/13/2003 2:54 PM

Figure 7: Sample Presentation Screen (Lesson 3)

Lesson: Sample Presentation Screen (*Eegh*):

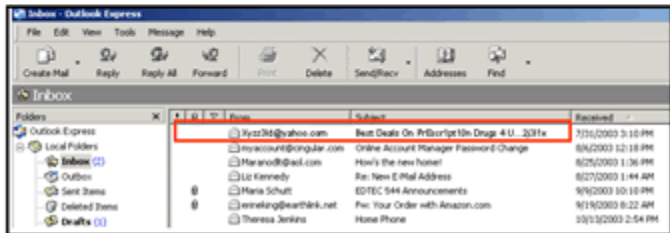
Using E-Mail Safely: Recognizing "Unsafe" E-Mail



Characteristic #1:
The E-Mail is from someone you don't know.

Watch out for: a sender that contains random characters in the sender name or subject line.

Action to Take: Delete these e-mails immediately.




From	Subject	Received
3yc236@yaho.com	Best Deal On Prilosec 120 Drug 4 U... 2031e	7/19/2003 3:10 PM
myaccount@ingular.com	Online Account Manager Password Change	8/4/2003 12:18 PM
Maracoo@aol.com	How's the new home!	8/25/2003 1:36 PM
Liz Kennedy	Re: New E-Mail Address	8/27/2003 1:44 AM
Maria Schutt	EDTEC 544 Announcements	9/6/2003 10:18 PM
emmeling@earthlink.net	Re: Your Order with Amazon.com	9/19/2003 8:22 AM
Theresa Jenkins	Home Phone	10/13/2003 2:54 PM

Figure 8: Sample Presentation Screen (Lesson 3)

Lesson: Sample Interaction Screen (*leg*):

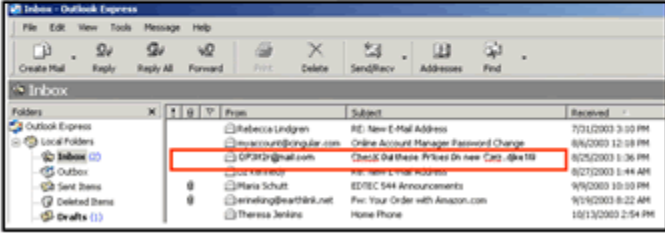
Using E-Mail Safely: Recognizing "Unsafe" E-Mail



Test your skills:

Decide if the highlighted e-mail is safe to open, based on the Sender and Subject line.

- If safe to open, double-click the message line.
- If unsafe to open, click the Delete toolbar button.




From	Subject	Received
Rebecca Lindgren	RE: New E-Mail Address	7/31/2003 3:00 PM
rebecca@bingular.com	Online Account Manager Password Change	8/6/2003 12:08 PM
GPR2@gmail.com	Check Out these Prices On new Cars @K4TR	8/25/2003 1:36 PM
car-wares	car-wares.com address	8/27/2003 1:44 AM
Maria Schutt	EDTEC 544 Announcements	9/6/2003 10:00 PM
emwelling@earthlink.net	Free Your Order with Amazon.com	9/16/2003 8:22 AM
Theresa Jenkins	Home Phone	10/13/2003 2:54 PM

Figure 9: Sample Interaction Screen (Lesson 3)

Lesson: Sample Interaction Screen with Feedback (*FBda*):

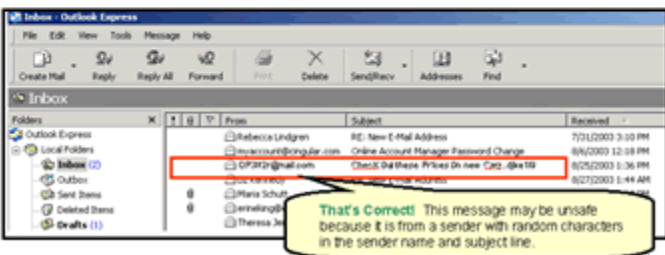
Using E-Mail Safely: Recognizing "Unsafe" E-Mail



Test your skills:

Decide if the highlighted e-mail is safe to open, based on the Sender and Subject line.

- If safe to open, double-click the message line.
- If unsafe to open, click the Delete toolbar button.



From	Subject	Received
Rebecca Lindgren	RE: New E-Mail Address	7/31/2003 3:00 PM
rebecca@bingular.com	Online Account Manager Password Change	8/6/2003 12:08 PM
GPR2@gmail.com	Check Out these Prices On new Cars @K4TR	8/25/2003 1:36 PM
car-wares	car-wares.com address	8/27/2003 1:44 AM
Maria Schutt	EDTEC 544 Announcements	9/6/2003 10:00 PM
emwelling@earthlink.net	Free Your Order with Amazon.com	9/16/2003 8:22 AM
Theresa Jenkins	Home Phone	10/13/2003 2:54 PM

Figure 10: Sample Interaction Screen with Feedback (Lesson 3)

JUSTIFICATION FOR DESIGN

The course design draws heavily from the work of Clark (1999) and the use of the Component Display Theory. In particular, the design incorporates the following recommendations from Clark on how to teach principles:

- Presentation of relevant guidelines for safe computer usage
- Varied examples to illustrate guidelines
- Practice activities which prompt the user to apply guidelines in realistic situations
- Incorporation of simulation (e-mail software and other programs) to enable practice of principles in a Web-based training format

The end goal of the program is for learners to understand best practices in safe computer usage and apply these principles when working with a computer. In the lesson example described in this memo, the learner is presented with general principles for safely working with e-mail, and then prompted to apply those principles to specific examples. The learner is provided feedback as to whether the principles are correctly applied or not.

The design is also strongly influenced by the work of Clark and Mayer (2003) in the following ways:

- Text and graphics are combined to illustrate examples and non-examples of applicable principles
- Interactions mirror actual usage of described computer programs and software packages
- Practice exercises are frequent and distributed throughout the lesson to improve learning and long-term retention
- Learner control in lesson selection and lesson navigation, but with recommendations on “preferred” lesson order

FORMATIVE EVALUATION QUESTIONS

1. Does the Web-based course provide enough examples and non-examples of the desired principle for the learner to be able to apply the principles in his/her daily computer activity?
2. Would the learner benefit more from a course that incorporates more multimedia elements (i.e. animations and audio instead of text)?
3. Are the practice activities sufficient to ensure that the learner can apply principles in real-life scenarios?

REFERENCES

- Clark, R. (1999). *Developing technical training*. Silver Spring, Maryland: International Society for Performance Improvement.
- Clark, R., & Mayer, R. (2003). *E-learning and the science of instruction*. San Francisco, CA: Pfeiffer.
- Gagne, Robert (1965). *The conditions of learning*. New York: Holt, Rinehart and Winston.