Global Learning Solutions

Design Justification for the L5500 Differences Training Course

Information Made Powerful

Message Design – IT 5130
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Global Learning Solutions
L5500 Differences Training

Section 1. Introduction

Course Title

L5500 Differences Training Course

Course Purpose

The purpose of the L5500 Differences Course is to provide the necessary information, skill development and practical hands-on training to enable service personnel to install, configure, operate, and troubleshoot the L5500 tape libraries, including a variety of cartridge tape drives. Course information will be provided via CD ROM.

Instructional Objectives

Upon completion of this course, the student will be able to successfully fulfill the following enabling objectives:

1. From memory, explain the function and applications of the L5500 tape library. The students' answers should closely parallel the functions and applications listed in the L5500 Overview Manual.

2. From memory, describe the similarities and differences between the 9310 Powderhorn and L5500 tape libraries. To be acceptable, the student must describe at least 50 percent of the similarities and differences listed in the L5500 Overview Manual.

3. Given a list of terms, abbreviations, or acronyms, match each with the proper definitions. To be acceptable, the student must answer (from memory) 70 percent of the questions correctly.

4. Given a list of fill-in-the-blank questions, provide the proper high-level library specification. To be acceptable, the student must answer 70 percent of the questions correctly.

5. Given a list of information resources (documents, collateral info, URLs, CD-ROM) and an arbitrary topic, locate the source of that information. To be acceptable, the student must locate the answer within ten (10) minutes.

6. From memory, define the safety and electrostatic discharge (ESD) requirements that apply to the libraries. To be acceptable, the student must describe three requirements in each area. The students' answers should closely parallel the cautions and warnings provided in the User's Guide.

7. Given a pictorial diagram of a L5500 library with arrows pointing to the various components, correctly identify the components and define their purpose. 100% accuracy.

8. Given a set of connectivity parameters involving platforms, O/S software, and independent software vendor (ISV) software, determine whether the hypothetical configuration will work with specific library configurations. 100% accuracy.

9. Given a L5500 library, drives, cables, and requisite documentation, demonstrate how to properly unpack, install and configure the library for a predetermined customer application. The instructor will verify that the procedures in the L5500 Installation Manual are performed satisfactorily.

10. Explain where to find the latest code versions on the StorageTek website and demonstrate how to download microcode from a laptop. The instructor will verify that the procedures in the L5500 Installation Manual are performed satisfactorily.

11. Given a fault symptom code (FSC), explain where to find the definition and then explain the most likely cause of this error message. 100% accuracy.

12. Explain the maintenance philosophies for this family of libraries. To be acceptable, the students' answers should closely parallel the philosophies listed in the L5500 System Assurance Guide.

13. Explain and demonstrate the various diagnostic testing capabilities, both from the front panel and using a laptop. The instructor will verify that the procedures in the L5500 Installation Manual are performed satisfactorily.

14. Given a library or a diagram of the front panel, explain the purpose of the display, buttons, and indicators. To be acceptable, the answer should closely match the description given in the User's Guide.

15. Given a library, demonstrate how to traverse through the menu system and explain the purpose for each menu option. To be acceptable, the answer should closely match the description given in the User's Guide.

16. Given a stack of cartridges, show the proper way to load these cartridges into the cells. 100% accuracy.

17. From memory, demonstrate the proper procedure for removing a "stuck tape" from a drive and hand assembly. The instructor will confirm the acceptability of the procedure used.

18. Given any Conversion Bill and accompanying instructions, properly install the Conversion Bill and then reconfigure the L5500. The instructor will verify that the procedures are performed in accordance with the Conversion Bill instructions.

19. Given a 9741E cabinet, drives, and PLM enclosure, properly install the subassembly and reconfigure the L5500. The instructor will verify that the procedures are performed in accordance with procedures described in the L5500 Installation Manual.

20. Given a final examination, the student must obtain a score of 70 percent or higher.

Intended Audience

The L5500 Differences Course is intended for:

- StorageTek customers.
- Customer service engineers (CSEs).
- In-direct partners who install, configure and/or service the L5500, including OEMs, VADs, VARs, and I-VARs.

All members of this target audience are accustomed to installing, configuring and maintaining a variety of tape, disk, network, and SAN solutions that meet customer requirements. These people regularly perform on-site and/or remote diagnostic repair services.

The students must have at least six months of experience with the 9310 Powderhorn libraries. They will gain more from the L5500 Differences Training if they already possess knowledge about:

- Other StorageTek tape libraries.
- Digital linear tape drives.
- External interfaces (SCSI, Fibre Channel, RS423, Token Ring, TCP/IP).
- Advanced troubleshooting techniques.

Instructional Design

The instructional design for the L5500 course is based on sound Instructional System Design (ISD) principles and applications. Specific StorageTek course development guidelines use a competency-based model that takes into consideration all audience archetypes.

Personal workmanship standards are based on the following postulates:

Postulate	Application of Postulate
Students should take responsibility for their learning.	Most of today's training provides "just-in-case" learning. Students learn facts and skills just in case they may need them some time in the future. Courses tend to be comprehensive, teaching all about the subject—everything any student may need to know. In many ways, the instructor is the course. With CD ROM training, it is incumbent of the students to learn the material. The students choose when to seek learning and what specific knowledge or skills they will acquire, and it is the learner who decides when to quit. This "just-in-time, just-enough" philosophy provides training where it is needed, in small units spread over a longer period of time.

Learning should apply to real-world applications and testing should measure both knowledge and performance.	This CD ROM provides very specific information about the differences between a legacy tape library and the L5500 library, which is ready for market. There is therefore a direct connection between what is known and the "gap" knowledge that is being introduced. As for testing, a review test is included on the CD ROM, a written certification test is accessed from the Learning Management System (Docent), and a practical, hands-on certification process is conducted in the laboratory. This blended approach provides optimum validation and verification.
Don't waste your students' time. Give them what they need to know and eliminate the "fluff".	Unlike instructor-led training, the information on a CD ROM is: ▪ Focused on a specific organization of content. ▪ Based on the characteristics of the particular knowledge discipline and targeted users. ▪ Sequenced for optimum reference. ▪ Primarily centered on effective presentation. All of the above principles are applied to the design of the L5500 Differences Course. The course material is applicable to the target audience users, it is designed for ease of use, and all of the information is germane. No "fluff".
Students will gain more from training if it is combined with entertainment.	I believe strongly in this postulate, but really it is easier to accomplish in live presentations then with a CD ROM. To make the CD more interesting, I used male and female voiceovers and video clips.
The only thing bigger than a very big thing is something so small and simple that it can be understood by all.	Information on the CD ROM is provided in the simplest terms. The graphical user interface and hierarchical structure makes it very easy to access information. Narration and video clips provide easily digestible chunks of information. The CD ROM is available for viewing. The application of these principles is self evident.

Section 2. Justification of Design Decisions

Design Principles	Application of Design Principle
1. Perception of Pictures Winn, page 86, Principle 4.1 "Pictures are usually more memorable than words, and are thus useful when information has to be remembered." "It is generally agreed that information presented in pictures is encoded twice, once as a picture and once as a verbal label that names that picture." If used properly, a picture *is* worth a thousand words. Numerous references throughout this course emphasize the importance of pictures. The underlying premise is that pictures are usually more memorable than words and thus aid in information retention. ----------	For the most part, the L5500 CD ROM is designed so that a new image is presented every 15 seconds or less. The menu system allows the student to go through the training course in a linear fashion, automatically. The visual images (photos or video clips) are supported by narration. The CD ROM also serves as a convenient reference source. Again, using the menu system, a student can quickly access needed information.
Lohr, page 37 "Dual coding typically means text plus image. "…the chance of learning is much greater when two, rather than one, memories are involved." The combination of visuals and words help learners to select, organize and integrate information. Overall, this facilitates the movement of information from sensory to working to long-term memory. ----------	Most visual segments of the course contain pointers, words, or animation that aid information processing. With prior knowledge of legacy libraries, the students should have no problem integrating this new information.
Lohr, page 40 "Integration of visual and verbal information makes it more likely to transfer into long-term memory because it is more meaningful to the learner." By using narration with visuals, information is processed simultaneously and stored in long-term memory. The goal of instruction is to move information into long-term memory as quickly as possible.	Visual information, in the form of photographs and videotape segments, is supported by narration throughout the training material. Evidence of the application of this principle is available throughout the course.

2. Attentive Perceptual Processing – Chunking Winn, page 71, Principle 2.6a **"**Information is processed and remembered in 'chunks' that are organized hierarchically." When information is grouped or "chunked" together we provide learners with a pathway through our information. This reduces the demands placed on the learners' short term memory, thus preventing cognitive overload.	The course material is grouped in a logical manner. An intuitive, hierarchical menu structure provides access to required information with no more than three mouse clicks. The navigation bar on the left side of the web page groups similar information in a chunking fashion.
3. Text Line Length Lohr, page 96 "Generally speaking, if a typeface is small, the line length should be short. A rule of thumb for remembering an acceptable (line) width of 4 to 5 inches is to use your palm as a guide." Winn, page 111, Principle 6.5 "Less text can be displayed on a computer screen than on a typical page. This means that the designer needs to condense text so that more information can be presented in each "screenful," and to provide effective ways of "paging" through electronic text." These references serve as a good reminder not to make text segments very wide, because wide line lengths make reading (and thus comprehension) more difficult.	This course does not contain much textual information, but where there is text (e.g., under the headings of Navigation Buttons, Course Objectives, and Difference Overview) it currently exceeds the optimal line length recommendations. I will fix this design error when the CD is updated.
4. Hierarchy Lohr, p. 226 "Computer or Web-based training typically uses a hierarchical organization scheme. Menus serve as the highest level, units of instruction represent the next level, and instructional content, practice activities, and feedback levels follow. Since CBT and WBT is typically learner controlled, it is important to help the learner see the hierarchical structure of the learning environment. When a course is user controlled, designers	The L5500 Difference Training course is designed in a hierarchical fashion. After entering the CD, the user is given seven options: Using This CD Objectives Training Home FAQ Glossary CD Utilities Feedback By clicking on Training Home, the user is directed to six additional options: Differences Overview New Configurations

should help the users by creating logical, hierarchical structures. This will help them move between pages and find information easily.	9310 Conversion 9741E LSM Configuration Quiz This hierarchical structure continues to additional subsections, but there are clear clues (bread crumbs) regarding where they are on how they might return to higher level topics.
5. Gestalt – Consistency of Location (repetition) Lohr, page 242 Gestalt – "…effective instructional visuals depend on creating gestalt, a total learning or performance environment (the whole) based upon the successful design and integration of all visual and instructional elements (the parts)." Lohr, page 248 "A grid system is an underlying structure that is used to provide consistency throughout instruction. When you create a grid, you create a specific place for specific items. These places are repeated from page to page or from screen to screen. This repetition makes a grid fall under the category of similarity." Lohr, page 248 "It is the predictive value of a grid that has merit for design of instructional materials. Users don't have to relearn the layout when they move from screen to screen or page to page. They know where to find specific information and they can make distinctions between types of informational content." These passages from Lohr discuss the importance of repetition as it applies to the location of elements on a page or screen. With a consistent layout, the instructional designer can reduce the cognitive load of the learners.	Graphical user interfaces and hierarchical menu structures help the students to locate information easily. Evidence of the application of these principles is available throughout the course. The top and left navigation bars (grid system) found on all screens provide a predictive, repetitive path to needed information.
6. Challenge Level – Self Direction Keller and Burkman, page 21, Principle 3.4.b "Develop self-direction by providing a well-defined, but not rigid, structure that gives learners options for assignments, modes of study, and modes of testing." This principle, although inclusive in terms of acceptance, seems true to me. I believe students learn best when they get the	At the beginning of the ***Training Home*** section of the CD, I start my introduction by explaining the purpose of the CD and how the information is accessed and used. Here is the script for that introductory section: *Before I tell you a little about each of these modules though, I want to say something about the design of this CD.* *I am sure that as you go through each module, you will*

information they want, when they want it. StorageTek operates in a real-time world where innovation reigns supreme, competitors appear from all corners, and knowledge provides more leverage than capital. In order to survive as a viable corporate entity, we need to get information—especially information that is rapidly changing—to large numbers of people faster than ever before. Just-In-Case training is being replaced by Just Enough, Just-In-Time training. We, as instructional designers, must provide both training and quick access to information. It is the responsibility of the employees to take charge of their learning.	*see that some topics are covered in two or more places. That's because this CD can be used in one of two ways—as a training tool or as a reference resource.* *Depending on your application, you can either traverse down through each tabbed module—similar to the way it's taught in a classroom—or, you can conveniently click on a specific module.* In addition to the self-paced structure, there is also a self test included on the main page. This gives the learners a chance to do a self-assessment before taking the "real" test, which is part of the Docent Learning Management System.
7. Integration – The Benefit of Animation and Narration Lohr, page 40 "Integration takes place when related visual and verbal representations are held in working memory at the same time." Lohr, page 40 "Moreno and Mayer's (2000) research supports the interpretation of integration. In a series of experiments, they found that a verbal description of information during animation was better for learning than was a verbal description following the animation. In another experiment they found that the combination of animation and narration was better than the combination of animation and on-screen text." Without even reading these principles, it makes sense that the simultaneous presentation of narration and animation would reduce cognitive load. This technique is employed everyday on the television and it is responsible for all but eliminating any thinking, thus the term "boob tube."	The design of the L5500 Differences Course is based on the use of text, animation, and graphics—all of which are supported by voiceover narration. The best demonstration of animation and narration is found in the discussion of the arrays. The path to this discussion is as follows: ***Training Home → 9310 Conversion → Arrays*** By clicking on the forward arrow four times and continuing through the next two sections, you will see a good demonstration of the principles described by Lohr.
8. Figure/Ground Lohr, page 41 "By making things stand out more than others, you help people select information." Lohr, page 174 "…the topic of figure/ground deals with what seizes our interest."	On the L5500 Differences CD ROM, there are several very good examples of the application of figure/ground principles. Three specific examples are cited below. 1. ***Training Home → 9310 Conversion → Arrays*** Click arrow (▶) on top right one time. During the discussion of the P CEL and L CEL labels, the labels in the foreground are clear,

Lohr, page 175 "Figure/ground – the perception principle that describes the mind's tendency to seek figure and ground distinctions; as a visual designer the figure is typically the information you want to stand out, and the ground is the information you want to recede or support the figure." Lohr, page 177 "Figure/ground essentially names the two types of attention, that which the learner is paying attention to (the figure) and that which the learner is not paying attention to (the ground). Implementing figure/ground to improve instruction is simply the act of making the most important information stand out from the rest of the information. When you do this, you help the learner focus on what is important." From all of the above passages, it is clear that instructional developers should design their visuals in such a way that they direct learners' attention to the most important areas of every screen. The concept of figure/ground is centered on emphasizing exactly what is important on a visual and to de-emphasizing everything else.	while the background image is faded. 2. ***Training Home → 9310 Conversion → Arrays*** Click arrow (▶) on top right nine times. During the discussion of the 80-cell clipper door, the door is highlighted and the background becomes obscure. 3. ***Training Home → 9310 Conversion → Arrays*** Click arrow (▶) on top right twelve times. During the discussion of PCAP, a section of the PCAP is highlighted while the background becomes darker. 4. ***Training Home → 9741*** Click arrow (▶) on top right one time. During the discussion of the 9741E, the entire 9741E cabinet is highlighted while the background is made darker. All of these highlighting techniques focus user attention to the location of specific interest while the narrator describes it. This dual-coding technique is highly effective.
9. Capitalization Winn, page 109, Principle 6.4c "Text set in lower case letters is easier to read than text set in all capitals." Williams, Robin, The Non Designers Design Book, page 109 "All caps are not impossible to read, obviously. Just be conscious of their reduced legibility and readability." Lohr, page 100 "A rule of thumb is to avoid using all caps, unless you are dealing with mathematics (Tinker, 1963) or are working with only a few words." Several sources agree that lower case letters are more readable, so, unless there is a compelling reason do otherwise, avoid	Other than the StorageTek logo and a few acronyms, there are no words or titles that have all capital letters. The principles of Winn, Williams, and Lohr were followed in designing this instructional program ("to the letter of the law").

words with all capitals.	
10. Need Stimulation (Relevance) Keller and Burkman, page 10, Principle 2.2 "People are usually most interested in things that are related to their existing knowledge and skills." "People tend to be most interested in things which build upon existing interests, and they tend to notice and understand things which confirm or build upon their existing knowledge base." Lohr, page 254 "The previous experience rule states that new impressions are influenced by previous experiences or by the immediate context. How the learner analyzes and interprets new information depends in part on a range of learner experiences, emotions, and the prevailing situation (Pettersson, 1993)." Lohr, page 255 "The ability to keep information alive in short-term memory is increased when learners can associate that information with what they already know." I could have easily separated the "need stimulation" and previous experience principles into two justifications, but the tie between them is too close for there to be a separable distinction. The principles cited above are foundational concepts to adult learning. Adults tend to be more interested and more motivated to learn if they can directly tie the new learning to information that is already known and that has direct relevance to their current job.	This training is NOT continuous improvement training because the subject material relates to a new product. This course is a *differences* course, which means it is very similar to information that is already known. The motivation (relevance) to learn is present. There is a strong tie to previous knowledge and this new information is crucial to the learners' success in their respective jobs. The combination of prior experience and the methods used to communicate this new information (animation, graphics, and voiceover narration), made comprehension relatively easy. Information essentially was able to flow from short-term memory to long-term memory unabated.
11. Font Style Lohr, page 82 "Many consider sans serif type more legible for computer-based instruction or presentation, since the resolution of the computer monitors is often not great enough to show the serifs, making the typeface, especially when it is small, and difficult to read." There is no research that conclusively shows	Arial, a san serif font, is used exclusively throughout the training course for the reasons mentioned on the left.

that san serif is better than serif fonts for computer applications, but in my opinion, the san serf fonts have a clearer, cleaner look. Serif fonts are generally preferred for long text passages, but because line lengths are shorter for computer-based applications, there is no distinct advantage.	
12. Font Size Lohr, page 99 "For printed text and computer-based instruction, the most commonly recommended point size is 12 points." Whether for a slide or for computer-based instruction, I believe the text should be viewable from six feet away. I can see 12 point font from six feet away, but 14 point text is easier for me to read. Since most of my audience is "adult learners," I try to make reading text as easy as possible.	There are a variety of font sizes used throughout the training program. Ten-point font is used for the top navigation menu, 12-point font is used for the left navigation, and 14-point font is used for the body text. At the time of design, each size seemed appropriate for location on the screen (it looked correct), but based on what I have learned from this class, changes will undoubtedly be made to the top navigation text in a future revision.
13. Gestalt - Use of White Space Lohr, page 269 "White space is a powerful tool for facilitating gestalt." "White space helps create a sense of balance." As Linda Lohr states, "…white space is a graphic element." And, "…balance is a manifestation of gestalt." I believe that the proper use of white space is just as important as the graphic elements themselves. Everything has to work together to obtain the desired look and subsequent result. As information designers, we must always try to manipulate information in such a way as to improve learner perceptions, which in turn simplifies cognitive processing.	Judicious use of white space is evident throughout the training course. Most screens use white space as a background for the graphics and video images. That said, there is still room for improvement where text is the predominant image on the page (see ***Objectives*** section and ***Differences Overview*** subsections). I will ensure that either less text is used or it is split between multiple pages.
14. Positive Outcomes – Promoting a Feeling of Accomplishment Keller and Burkman, page 23, Principle 4.2a "Promote feelings of accomplishment by including, in the instructional materials, exercises or problems that require the application of the new knowledge or skill to solve."	A challenging quiz, located at the bottom of the **Training Home** screen, is included as part of the course. Based on the distribution of the test scores, I would have to conclude that the quiz provides valid feedback of true comprehension of the course. And, because it covers the objectives and is sufficiently difficult, it provides the learner with a feeling of accomplishment.

Keller and Burkman, page 23, Principle 4.2a "The use of instructionally relevant exercises means that the student will receive an exercise that is congruent with the knowledge and skills that were acquired in the lesson, and that could not be solved without that knowledge and skill." These principles are easy to understand and accept. A test provides feedback to the learner that the most important concepts have been retained. From my own experience, it seems that information that I originally missed on a quiz ends up being more firmly ingrained in my mind, because I had to spend more time and effort to investigate the cause of my error. Consequently, tests/quizzes served as both a valuable learning tool and a source of positive reinforcement for me.	
15. Color – Use in Instruction Lohr, page 135 "Used effectively, color can enhance both the aesthetic and instructional quality of educational or support materials." Lohr, page 135 "Edward Tufte (1990) describes four functions of color, or hue, in information design. The first function is color as method of labeling or differentiating information." In her textbook, Linda Lohr talks about Edward Tufte's four functions of color. Used properly, the use of color can go a long way in differentiating elements in a visual. I applied that principle in my courseware.	***Training Home → New Configuration → Model Configuration → LTO Only*** Click arrow (▶) on top right two times. I effectively used color to show the correlation between model number and slot configurations in the library. When a learner does a "mouse over" of any configuration, the exact slots for LTO or 9x40 cells would appear in blue or green, respectively. Using this method, the learner can easily see what cells are affected. No other visual display (e.g., a table) would have been as effective. Note: When I redo this CD, I will use colors that are more contrasting. The blue and green colors were too close to being the same, which made distinguishing the cell configurations somewhat difficult.
16. Dual Coding Lohr, page 37 "Dual coding typically means text plus image. The chance of learning is much greater when two, rather than one, memories are involved." Lohr, page 40 "Moreno and Mayer prescribe strategies to optimize the integration of visual and verbal memory. They suggest among other things:	Dual coding is used in several places throughout the course. One example can be found at: ***Training Home → 9310 Conversion → PLS to PLF Module*** Here I am discussing the PLS and PLF modules and I use the text and graphic together to explain the conversion process. The cognitive load is greatly reduced by simultaneously showing the graphic, displaying a few short words, and explaining it with a

(1) presenting visual and verbal information simultaneously so that they can be processed at the same time, and (2) limiting the load placed on any one memory system by avoiding the need to split student attention between multiple sources of similar content." Lohr, page 41 "…the combination of text and visuals is a powerful learning strategy." How could I ever get through making justifications without mentioning our favorite topic—dual coding. I think this passage is referenced a lot because it is part of almost every visual design. As visual designers, we create graphics and then add words to aid in comprehension. We want to make sure that our audience fully understands the message we are trying to convey.	voiceover.
17. Simple Shapes – The Use of Arrows Lohr, page 107 "Lines are used to separate and define, set boundaries, show motion and direction, make connections, ..." Lohr, page 107 "Common shapes, including triangles, stars, swirls, **arrows**, brackets, and more, are used to provide direction, imply motion, organize and unify, make something look engaging or fun, and make connections (join items)." Winn, page 69, Principle 2.4c "The sequence in which parts of a message are inspected can also be influenced by showing these sequences explicitly through the use of such graphic devices as lines and arrows." The main focus here is on the use of arrows as connecting symbols. Arrows organize, unify, and make connections between visual elements.	I used arrows in several places in the L5500 Differences Training CD. In the beginning of my introduction, I used them as pointing symbols, but I also used them elsewhere to make connections between visual elements. One such example is found in the opening visual, where an arrow is shown connecting the 9310 to the L5500 library.
18. Text Alignment Lohr, page 163 "Left alignment is fairly common since it is	With the exception of the opening screen, all text is left justified throughout the course. I'm not sure why the text was centered on the opening visual, but I will correct

used extensively in textbooks and is considered easiest to read." Learners are used to seeing text that is left justified. There is no reason to do otherwise when designing instructional materials.	that during the next revision of the courseware.
19. Use of Human Speech Winn, page 117, Principle 8.5 "Human speech is the most powerful and expressive medium the designer has available for use in instructional messages." Winn, page 118, Principle 8.5 "Speech is naturally expressive. Anyone who can speak is therefore a potential narrator." Human speech can add to a presentation in a unique way. Done properly, a narrator can instill confidence, dismiss fears, and create an excitement for otherwise dull material. The intonation of the voice goes a long way in creating a mood for a presentation.	I am the behind-the-scenes narrator for this course. Being that I have taught almost every library course at StorageTek, my face and voice are easily recognized. We chose to do a voiceover because I have instant credibility with the target audience and I tend to speak in a conversational manner. There are several places on the CD that I try to provide comfort to the learner by making the conversion process seem easy. One such example is located at ***Training Home → 9310 Conversion → Arrays*** Click arrow (▶) on top right eleven times. It is here that I say, *"That's it…only 9 labels. Each label is reported to the LMU and to the host software at initialization time so that the host software can direct cartridges to the proper cell locations."*
20. Interesting Pictures Keller and Burkman, page 21, Principle 9.1 "Use interesting pictures to gain and maintain learner attention in instructional text." The use of real-world pictures and graphics help the learner to connect new information with knowledge that is already present. Good pictures *are* worth a thousand words.	I believe the L5500 Differences Training Course is a success because the information is presented either in graphic or video form. This gives the students the chance to connect new information with information that is already familiar to them. The formative evaluation supports this assertion. Both the learners and the reviewers of the course liked this method of learning a lot. The interesting pictures and video animations did gain and maintain learner attention.

Section 3. Formative Evaluation Results and Revision Plans

In my formative evaluation plan (see attachment to this document), I identified four types of reviewers for the L5500 Differences Training Course. They are: target audience users, instructional designers, multimedia specialists, and subject-matter experts. As part of this formative evaluation, I provided each audience group with a set of review questions. Some questions were common to all groups, but most were geared toward the reviewer's area of expertise.

The following are important considerations when making revisions to the L5500 Differences Course:

- Incorrect Information – I will revise any incorrect or ambiguous information.
- Usability – The CD ROM must be functional on all PCs that are currently available in the field. The Gold Lab is responsible for ensuring that the CD ROM works on all hardware and operating systems. This includes the auto-load feature.
- Intuitive Navigation – If more than one person is confused by any navigation function, I will change the user interface and re-tested it.
- Course Objectives – It is important that the training material fulfill the intended objectives. If the representative target users feel that there are important instructional pieces missing, I will revise the material and re-test it.

For the purpose of this exercise, I chose to report only those items that require revision. I did not provide responses to each and every question asked to the respondents, nor did I record the favorable comments. Instead, I concentrated on problems that directly affect the use and operation of the courseware.

There was a lot of duplication in the responses. For example, there were numerous people who didn't like the red text on the black background and the clicking noise heard in several sections of the CD. Recorded below are all the unique items that require further action.

For the most part, the reviewers liked the course and said they wished there were more like it.

Formative Evaluation Results	Revision Plans
CD ROM did not self load	I will work with the Quality & Testing laboratory to isolate that problem. I will try loading the CD ROM on more platforms and with different software code levels in an attempt to duplicate the error.
If I adjust the sound while viewing the CD, it stops or gets out of sync.	According to the multimedia people, this is an annoyance that cannot be fixed. If a disk is at it's quiescent point, it takes awhile for it to come up to speed. During that time, there may be some skewing in either the sound or picture. This is an inherent drawback in CD ROM presentations.
There were times when I didn't know which major section of the CD I was in. Can that be changed?	The only place where the exact location is not evident is when you are in one of the Training Home areas. Everything else seems obvious. Since this is the only complaint in this area, I will not make any changes at this time.

It is difficult to read the red lettering on the black background in the "Using the CD" section.	Excellent point. I will ensure that this screen is fixed.
Why is the title on the title page centered and not left justified?	This is an easy fix. I will left justify the title during the next revision cycle.
The objectives for each major section should be listed at the beginning of the section.	Two instructional developers said the same things, so I will add objectives to the beginning of each section.
Some of the arrows you use are too big. And, can't you find a better arrow design and a better color.	I talked with the multimedia lab about the arrow design and they agreed to include better looking arrows on the next revision.
The colors used to signify slot configurations for various model numbers is difficult to see. Can the colors be made brighter or perhaps changed so it is easier to see the difference between LTO and 9x40 slots?	The multimedia people agreed that the colors should have been more distinct. This problem will be fixed during the next revision.
There are times when the female voice tails off in the introduction.	It's not that bad. Since the entire segment would have to be re-done, I don't plan to take any action on this comment.
I think there should be review exercises at the end of each major section.	I consulted with other instructional developers about this and they agreed. I will add review quizzes at the end of each major block of information.
Test question 12 is somewhat ambiguous. I can see how it can be answered in two ways.	The subject-matter expert spotted this error. I will re-word the question so that it is less ambiguous.
The course isn't very interactive. Don't you think the students would get more out of the course if they were required to actually do something?	It is true that there is little involvement by the learner during this course, but there is currently no plan to change the format.
Users either forgot how to use the continuous user button (top navigation bar) or they didn't go through the ***Using the CD*** explanation.	I will make a stronger reminder to go through the ***Using the CD*** section before moving through the course.
9741E section – Top of wording is clipped off.	Good catch. The multimedia lab will fix the wording in two areas.
The description of the LTO and 9x40 tape labels was confusing. Try explaining it in a different way.	I consulted with the subject-matter expert about this. He gave me a better explanation, which I will incorporate into the next revision
Text on upper navigation is too small.	The multimedia lab will increase the font size to 12-pt in the next revision.
Opening screens – Move picture of library to lower right corner for better balance of page contents.	This is my catch. I think the library picture should be moved down to the "power zone."
Opening screens – Change upper cap lettering to initial letter cap (title case).	Another catch by me. I don't know why we used capital letters here, but I will change it.

Differences Overview section – The 17 subsections seem to be out of place as compared with the rest of the CD.	Some thought this was okay and others disliked all the text on the screen. For now, I will leave it as is.
I periodically hear a clicking noise in some sections of the CD.	I will work with the multimedia labl to see what is causing this irritating noise.
In the discussion of the Universal Cells, the narration doesn't match the order of the graphics shown.	I will change this irregularity in the next revision.
There was never any mention of importance of strain relieves	The subject-matter expert wanted this to be added to the PCAP section. I will do as he requests.
When the CD ramps up after being stopped for awhile, the sound chatters during this time.	Again, this is an inherent flaw in CD ROM programs. It only happens if the learner stops using the CD for more than 30 seconds. No fix is possible.

Section 4. Reflections

1. **What did you learn from this activity?**

   Despite my internal grumbling about how long this was taking, I did learn a lot from this exercise. I forced myself to look more critically at my work and, as a result, I know exactly what I will do to make improvements.

   The distinction between figure/ground and gestalt is finally clear to me.

   I surprised myself about how much I learned and how easily it is now to justify my work to others. A good coach gets you to do more than you would do for yourself. In this regard Jackie, you were successful.

2. **What surprised you or confused you?**

   It is very difficult to explain exactly where I applied certain principles, because, unlike a document where one can reference page and verse, I couldn't do that as easily on a CD ROM.

3. **What would you do differently if you were to do this activity again?**

   I would be better organized. I spent too much time trying to find the exact references I knew existed. I also wouldn't have used so many people to review my courseware. Even though I know it is good to get as many reviewers as possible, it only added complexity to the requirements of this course. I also got carried away with my references, which added a lot of unnecessary time to the project.

   No pain, no gain.

Formative Evaluation Plan for the L5500 Difference Training

Message Design – IT 5130, Spring 2003
Dale Munson

March 8, 2003

A. Evaluation Goal

The purpose of this formative evaluation is to seek constructive criticism on the L5500 Differences Training CD ROM. To attain this goal, I will seek opinions from target audience users, instructional designers, multimedia specialists, and subject-matter experts.

B. Time Frame

This formative evaluation will occur between March 10 and May 22, 2003.

1. Phase 1 – March 10 through April 1

2. Phase 2 – April 1 through April 15

3. Phase 3 – May 15 through May 22

C. Location

1. Phase 1 – Reviewers will come to a classroom at designated times to install, use, and verbally critique the L5500 Differences Training course (provided on a CD ROM).

2. Phase 2 – All reviewers will critique the same course, but this time they will review the CD ROM and answer survey questions at their desk.

3. Phase 3 – I will go to the reviewers' offices to show them the changes that have been made to the course. If required, I will ask follow-up questions.

D. Number and Type of Participants

I will use 12 reviewers during the three phases, as described below.

1. Six target audience users of the training material (three for Phase 1 and three for Phase 2)

2. Two instructional designers (both during Phase 2)

3. Two multimedia specialists (both during Phase 2)

4. Two subject-matter experts (both during Phase 2)

E. Methodology

I will collect data for the formative evaluation as described below.

1. Phase 1
   I will observe as three target audience users interact with the L5500 Differences Training course and tape record all conversations. The recorded dialog will serve as the basis for a well-defined set of written survey questions.
2. Phase 2
   a. I will provide nine functional group members (see above) with a list of survey questions pertaining to their area of expertise or interest. This will include the survey questions listed below, as well as questions that are added as a result of the recorded dialog (see Phase 1).
   b. The nine reviewers will critique the entire L5500 Differences Training course. I will inform the reviewers that the survey should take no more than 2 hours.
   c. The reviewers will sign a Consent Form (see Consent Form at the end of this document) and return it to me before I send them the survey questions.
   d. The reviewers will have ten working days to complete the review (but I will tell them they have only seven working days). If I have not received their completed form at the end of five days, I will send them a reminder message stressing the importance of their input. If, after that time, no response is still forthcoming, I will ask another reviewer for assistance.
3. Phase 3
   During Phase 3, I will meet with all twelve reviewers for approximately 30 minutes each to talk about the course changes, to obtain amplifying information, and to thank them for their involvement in the course evaluation.

F. Measurement Instruments and Data Collection Methodology

First, I will talk with the survey respondents in advance about the importance of the survey and the timetable for the three-phase implementation. At that time, I will determine if they are viable candidates for the evaluation and I will also determine their willingness to assist me.

Next, I will schedule two-hour time slots for the usability testing discussed above. These sessions will be tape recorded so they can both focus their attention on the evaluation. I will encourage the reviewers to ask questions and make comments as they go through the material.

After three target audience users have gone through the information on the CD ROM, I will carefully analyze and categorize all the good and bad aspects of the training. Then I will add specific, amplifying questions to the standard questions listed below.

When all the review questions are ready, I will provide an additional nine reviewers with a copy of the course CD ROM and a list of survey questions. I will send the survey as an MS Word attachment to an email. Users will complete the survey questions and return them to me via the interoffice mail system within ten business days.

Then, at a mutually acceptable time, I will meet with the various reviewers to discuss their concerns and suggestions. I will use this meeting to seek amplifying information and to express my appreciation for their cooperation.

G. Revision Criteria

I will consider all comments and suggestions when revising the L5500 Differences Training CD, but if a conflict exists between me and the functional expert, I will ask the Program Manager to be the arbiter. The following are important considerations when making revisions:

- Incorrect Information – I will revise any incorrect or ambiguous information.
- Usability – The CD ROM must be functional on all PCs that are currently available in the field. The Gold Lab is responsible for ensuring that the CD ROM works on all hardware and operating systems. This includes the auto-load feature.
- Intuitive Navigation – If more than one person is confused by any navigation function, I will change the user interface and re-tested it.
- Course Objectives – It is important that the training material fulfill the intended objectives. If the representative target users feel that there are important instructional pieces missing, I will revise the material and re-test it.

Questions for Reviewers in Phase 2

The following pages contain specific questions for each type of reviewer (target audience users, instructional designers, multimedia specialists, and subject-matter experts) for the L5500 Differences Training. Some questions are common to all groups, but most are geared toward the reviewer's area of expertise.

Representative of Target Audience Review Questions

You have been selected as a target audience user of the information contained on L5500 Differences Training CD ROM. It is very important that you carefully consider each question before answering. Your peers will be the direct benefactors of your constructive criticism. Thank you for participating in this evaluation.

1. Did the CD load automatically? If not, what did you have to do to launch the program?

2. Please describe your initial reaction to the L5500 Differences Training CD ROM.

3. Did you have any problems navigating through the course material? If so, where did you get stuck or what did you find confusing?

4. Was the course material presented in a logical sequence? If not, what would you do differently?

5. Given your expectations and objectives for the course, did the course meet those needs? If not, what is missing?

6. Were the pictures, graphics, and video segments helpful? If not, please explain what would you change or eliminate.

7. At any time, were you tempted to exit the course due to boredom? If so, what would have made it better?

8. Were you able to complete this course without assistance?

9. Was the review quiz helpful? Please explain any changes you would make to the questions.

10. Approximately how many minutes did it take you complete the course?

11. Based on your style of learning, was this method of training effective? If no, what was missing?

12. Do you believe this training will be useful to your peers in the field? If not, please explain what should be added or deleted.

13. What improvements would you recommend?

14. What would you tell another user about this training course?

Instructional Designer Review Questions

As an expert in instructional design practices, you have been selected to critique the L5500 Differences Training CD ROM. It is very important that you carefully consider each question before answering. The users in the field will benefit from your constructive criticism. Thank you for participating in this evaluation.

1. Please describe your initial reaction to the L5500 Differences Training CD ROM.

2. Is the target audience clearly identified? If no, please explain.

3. Does the course initially make clear to learners what they gain by taking the course? If no, what should be changed?

4. Can learners decide which parts of the course to take, in which order, and at what pace? If no, what should be changed?

5. Do the visual effects enhance, distract, or substitute for content? (Circle the appropriate word.) If it detracts, please explain.

6. Did you have any problems navigating through the course material? If so, what should be done to change it?

7. Is needed information is easy to locate? If no, what should be changed?

8. Are all screens readable? If no, please specify which ones are unreadable.

9. Is amplifying help information available? Please explain.

10. Was the course material presented in a logical sequence? If no, what would you do differently?

11. At any time, were you tempted to exit the course due to boredom? If so, what would have made it better?

12. Given your knowledge of instructional design and the stated objectives for the course, did the course its goal? If not, what is missing?

13. Was this method of training effective? If no, what was missing?

14. Do you see any potential copyright issues? If yes, please identify them.

15. Is this course material appropriate for all global cultures? If no, what is inappropriate?

16. What specific improvements would you recommend?

Subject-Matter Expert Review Questions

As a subject-matter expert on the L5500 tape library, you have been selected to critique the L5500 Differences Training CD ROM. It is very important that you carefully consider each question before answering. The users in the field will benefit from your constructive criticism. Thank you for participating in this evaluation.

1. Please describe your initial reaction to the L5500 Differences Training CD ROM.

2. Is the material in the course accurate and current? If not, please note what should be changed. (Use the back of this page if necessary.)

3. Do the course learning objectives match your learning objectives? If not, what needs to be added?

4. Does the course cover the subject in sufficient breadth and depth to meet the defined objectives for the target market (i.e., CSEs)? If not, what needs to be added?

5. Did you have any problems navigating through the course material? If so, what should be done to change it?

6. Is the material presented in a logical sequence that helps learners understand and master the material? If not, please provide suggestions for improvement.

7. Are the narrated video clips presented in a way that prepares learners to apply what they learn to their jobs? If not, what is missing or what can be done to improve learner retention?

8. Is the course material written at a level that learners can fully understand? If not, what should be changed?

9. Is the combination of on-screen instructions and online help sufficient for learners to successfully navigate and operate the course? If no, please suggest changes.

10. Is the visual design one that will appeal to the target audience? If no, please suggest changes.

11. Does the posttest adequately measure accomplishment of the learning objectives? If not, what should be changed or added?

12. What other specific improvements would you recommend?

Multimedia Specialist Review Questions

As an expert in multimedia design practices, you have been selected to critique the L5500 Differences Training CD ROM. It is very important that you carefully consider each question before answering. The users in the field will benefit from your constructive criticism. Thank you for participating in this evaluation.

1. Did the CD load automatically? If not, what did you have to do to launch the program?

2. Please describe your initial reaction to the L5500 Differences Training CD ROM.

3. Do the visual effects enhance, distract, or substitute for content? (Circle the appropriate word.) If it detracts, please explain.

4. Is the training material aesthetically pleasing? If not, what would you do differently?

5. Did you have any problems navigating through the course material? If so, what should be done to change it?

6. Do all the program links work? If not, please specify which ones did not work.

7. Is it clear when an external site is being referenced from the CD?

8. Are all screens readable? If not, please specify which ones are unreadable.

9. Where interactive features such as forms, cgi scripts etc are provided, do these work?

10. What specific improvements would you recommend?

Please answer the following checklist items.

Y ☐ N ☐ N/A ☐	Will the course run on the computers users have in the field?
Y ☐ N ☐ N/A ☐	Can learners take the course without having to obtain and install additional software plug-ins?
Y ☐ N ☐ N/A ☐	Does the course comply with applicable technical standards (AICC, IMS SCORM, etc)?
Y ☐ N ☐ N/A ☐	Is the navigation clear and consistent throughout the site?
Y ☐ N ☐ N/A ☐	Does the back button always take them back to the preceding page?
Y ☐ N ☐ N/A ☐	Can visitors easily find an email address to contact if they have difficulties using the site?
Y ☐ N ☐ N/A ☐	Do all buttons and icons have a consistent and unique appearance?
Y ☐ N ☐ N/A ☐	Are visual cues like mouse cursor changes and roll-over highlights used consistently on all buttons?
Y ☐ N ☐ N/A ☐	Are buttons labeled with text descriptions (or with roll-over text)?
Y ☐ N ☐ N/A ☐	Do buttons gray-out or disappear when they are inactive?
Y ☐ N ☐ N/A ☐	Are navigation buttons displayed in exactly the same screen position every time they appear?
Y ☐ N ☐ N/A ☐	Are buttons grouped logically and located where the user is likely to be looking?
Y ☐ N ☐ N/A ☐	Do users have one-click access to help, exit, and the Main Menu?
Y ☐ N ☐ N/A ☐	Are users returned to where they left off after closing the help window and canceling out of the exit screen?
Y ☐ N ☐ N/A ☐	Does every menu have a title?
Y ☐ N ☐ N/A ☐	Does every menu screen include an option to return to the previous or Main Menu?
Y ☐ N ☐ N/A ☐	Are there fewer than three levels of menus?
Y ☐ N ☐ N/A ☐	Are items on menus descriptive rather than general?
Y ☐ N ☐ N/A ☐	Are menu items listed in a sequential or logical order?
Y ☐ N ☐ N/A ☐	Do menus indicate which items the student has completed?

Y ☐ N ☐ N/A ☐ Are error messages written in plain language?

Y ☐ N ☐ N/A ☐ Are there clear instructions associated with menus, questions, and other tasks?

Y ☐ N ☐ N/A ☐ Are confirmation messages used in areas such as student registration, exit, and final exams?

Y ☐ N ☐ N/A ☐ Are exclamation points and sound effects used sparingly?

Y ☐ N ☐ N/A ☐ Is there a bookmaking feature that enables students to exit and resume later where they left off?

Y ☐ N ☐ N/A ☐ Can students move backward, as well as forward, in linear tutorials?

Y ☐ N ☐ N/A ☐ Are all pop-up windows positioned on the screen so they do not cover up relevant information?

Y ☐ N ☐ N/A ☐ Does text appear clearly and with normal margins and spacing?

Y ☐ N ☐ N/A ☐ Do information input screens force all capital letters, and is the evaluation of inputs case insensitive?

Y ☐ N ☐ N/A ☐ Can users interact with the program from either the keyboard or the mouse?

Y ☐ N ☐ N/A ☐ Are text fonts used consistently?

Y ☐ N ☐ N/A ☐ Are audio volume levels consistent?

Y ☐ N ☐ N/A ☐ Do users have the option to replay video or audio narration?

Consent Form

This formative evaluation is part of a project for a class that Dale Munson is taking at the University of Colorado at Denver. The purpose of this evaluation is to improve the L5500 Differences Training course.

Dale will collect this evaluation data by April 10, 2003. Dale will ask you to critique the L5500 Differences Training course and complete a written evaluation. He may also ask you to participate in a brief follow up interview, which he will conduct either face-to-face or by telephone. Your participation is completely voluntary.

Dale will protect your confidentiality by replacing your name with a pseudonym in all correspondence, reports, and discussions of this evaluation.

If you have any questions about this evaluation, please contact Dale Munson via phone 303-427-6669 or e-mail (docmunson@msn.com). You can also contact Jackie Dobrovolny, Ph.D., the professor teaching the course, at 303.368.7290 or jdoffice@attbi.com.

☐ Check here if you would like a copy of this consent form.

☐ Check here if you would like a copy of the report of this study.

_____

Signature of Participant

_____

Date

Formative Evaluation Reflection Questions

1. What did you learn from these activities?

Because I have been doing formative evaluations for years, I didn't learn as much as some of the others in the class, but I may learn more as the evaluation process unfolds.

I did learn, however, that there are many ways of conducting these evaluations and the process changes from company to company. This time I am going to use the active voice and see if there is any resistance from my supervisors at work.

Side Note:

In my opinion, I think these reflection questions should be asked at the end of the process…when there is more to reflect on. (You may have us do it then too.)

2. What surprised or confused you?

There were many things that surprised or confused me, but I mentioned them before, either in class or by email. Rather than go back through them in detail, I am providing snippets of each one.

I don't question the importance of formative evaluations at all. I think they are an integral part of the instructional development process. But, I do question why this topic is being introduced in a Message Design class. To me, it seems like this should have been a bigger part of Joni's class, Instructional Development and Production. It's just an opinion.

Do I follow the guidelines you are providing or do I use the guidelines set forth by StorageTek? And, associated with that issue was the issue regarding the use of active or passive voice. We discussed both issues and I agreed to follow your guidelines, because it would be easier for both of us.

At StorageTek, we watch users as they navigate through our CBT or web-based courses. Their comments and suggestions are tape recorded as they make their way through the material. We find that this information is much more valuable to us because live users are more open with their comments and suggestions. It's almost a game to many of them...to find as many things as possible. In contrast, hardcopy survey respondents either don't remember some of the difficult areas or they don't want to take the time to write them out in a survey. Again, this issue was discussed and you shared your ideas with the class.

Do I tactfully push the ideals espoused by academia or do I "hold my nose" while doing what is considered "ideal" by others in the company?

As I added questions to the various reviewer questionnaires, I realized that there are potentially hundreds of questions that an evaluator could ask. However, it is wise to find a compromise between what you *really* think you need to know and the tolerance of the reviewer. That is, the more questions you ask, the less likely the reviewers are to answer *any* of them in detail. (Or as my father would say, "Don't confuse hospitality with endurance.") For this reason, I like to do the one-on-one sessions first and then use the survey to gain a consensus of what is and is not a problem.

3. What would you do differently if you were to do this activity again?

I honestly don't know. I'm sure I wouldn't add any more questions to my surveys though.

Actually, I will be more prepared to answer this question when I am finished with the entire process. At that time, I will probably wish I had used a two-phase rather than a three-phase approach.