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Using Design Layers Model to Develop Computer-based Training for the Center for Teaching and Learning's Usability Center

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Using Design Layers Model to Develop Computer-based Training for the Center for Teaching and
Learning's Usability Center

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A development project submitted to the faculty of
Brigham Young University
in partial fulfillment of the requirements for the degree of

Master of Science

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Abstract

Using Design Layers Model to Develop Computer-based Training for the Center for Teaching and

Learning's Usability Center

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The Usability Center training course is an instructional resource for BYU faculty, employees, and students to prepare them to effectively use the BYU Usability Center. This document describes the process and results of analyzing, designing, developing, implementing, and evaluating the Usability Center training course.

By taking this course, participants learn the basics of planning, piloting, executing, and reporting their usability activities and the skills prerequisite to using BYU's Usability Center.

Keywords: usability training, focus group training, computer-based training, usability center

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I would specifically like to thank Larry Seawright for the influence he has had on my life and career. He provided me with my first instructional design experience, which became the major factor in my choice to pursue instructional design as a profession. He has become a good friend and colleague.

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Introduction

Brigham Young University's Center for Teaching & Learning Usability Center is a resource available to the entire campus community. Its purpose is to promote user-centered thinking when developing tools and programs associated with BYU. It is specifically set up to support usability testing and focus groups. In the past the Usability Center has assisted in the development of a variety of products, including a redesign of the Harold B. Lee Library website, a high-end universal remote designed by engineering students, a video produced by BYU Broadcasting, and even a teaching approach used in a communication disorders class. Potential clients of the Usability Center include students, faculty, college and department webmasters, and web and software design entities like the Office of Information Technology or the BYU Bookstore's web team. One of the goals for the Usability Center is to be client-run. Prior to computer-based training, each client would generally have an employee from the Center for Teaching & Learning (CTL) present for much of the testing. To eliminate the need for constant CTL employee assistance and to fulfill the goal of becoming client-run, clients would first need to have some degree of training.

Problem Presentation

Evidence of Need

Conducting usability testing at the Usability Center includes testing software for usability and conducting focus groups. Software usability testing consists of user interaction with the product using a prepared protocol or script. Focus group facilitation consists of user reaction and input to the product.

When the Usability Center was first created, there was no training provided for clients to learn the programs and uses other than the documentation provided with the *Morae* software. (*Morae* provides software for usability test facilitation that allows a facilitator to observe and annotate a video feed of a test participant remotely.) A new client of the Usability Center had to either work

directly with or turn usability testing completely over to an employee of the Center for Instructional Design, the predecessor to the CTL. This process was labor intensive and placed much of the burden of usability testing on the employee—generally a student—who also had little formal training.

In order to encourage Usability Center use and streamline the process, an initial training solution was produced, which was the training resource in use before this project began. It covers step-by-step instructions for running the equipment but does not train the client in usability testing. Being able to use the equipment provided does not ensure that it will be used correctly or to its full potential. This training failed to make the desired impact of turning the center over to the clients. Clients still did not know how or where to start usability testing, and they continued to depend heavily on CTL employees. It also failed to attract clients to the Usability Center, which remains vacant much of the time. These factors indicated the need to change the current training procedures for the center.

To address these issues, Larry Seawright, Associate Director of the CTL, asked that new training be designed. This training is directed primarily toward BYU administrative employees associated with web and software design, though it is available to the entire campus. This training addresses the two following issues: (a) training the client in usability principles and (b) making the Usability Center more attractive to potential clients. The equipment setup processes currently available are included, as well as an introduction to usability testing and focus groups; a decision guide to help determine the types of testing, tasks and questions to include; instruction for designing test and focus group protocols; instruction for facilitators; instruction for interpreting results; and examples of effective usability experiences. This last point will be especially important in encouraging new clients to use the Usability Center.

Circumstance/Constraint

Different circumstances influenced this training project. This project had environmental and client imposed-constraints.

Environment and resource-imposed. The design and development of the project was to be completed during fall semester of 2009. After this time the Instructional Designer's employment with the Center for Teaching & Learning ended.

The initial stages of the instruction are mobile, letting the client learn about usability and begin to develop their plans from the place of their choosing. Some later stages of the instruction require the client to schedule time with the Usability Center to perform tasks there.

Client-imposed. CTL student artists and computer programmers had limited availability for this project due to time and budget constraints; all development was executed by the Instructional Designer.

Detailed Analyses

Preparatory to designing the instruction, certain information needed to be obtained. This information was obtained through a target population analysis, a current training and resource analysis, and an existing product and competition review.

Target population analysis. The primary users of this training are BYU administrative employees. These individuals have at least a bachelor's degree, though the type of degree varies. Therefore, the training could not assume any level of ability in using computers, following technical directions, or using audio-video equipment, even though many clients may be software programmers and designers. However, it is likely that the person desiring to perform the testing will be familiar with the product to be tested and will at least have an idea of what he or she would like to learn from testing the product. Secondary audiences include CTL employees, as well as faculty and students. The target population analysis is included as Appendix A.

Current training and resource analysis. The current training consists of a *PowerPoint* presentation detailing step-by-step instructions for running the *Morae* suite, which includes Observer, Recorder, and Manager, found in the Usability Center. Although referred to as training, it would be more accurately described as "help documentation." The current training and resource analysis is included as Appendix B.

Existing product and competition review. There are numerous websites and organizations dedicated to usability, but none offer their training with BYU's resources and facilities in mind. Many of these sites and scholarly articles were used as design resources because they cover the basics of usability and provide principles upon which the design was based.

It was clear that the existing off-the-shelf training was inadequate to meet the needs of the Usability Center. This supported the proposition to design new instruction.

Design Goals

The general objectives for this new training are to (a) remedy the training deficit and (b) increase the use of the Usability Center by attracting clients. By completing the training, the client will be able to design the desired usability test and effectively administer it. Specifically, the client will be able to complete the following tasks:

- Weigh the pros and cons of different usability strategies.

- Articulate their logic in choosing their strategy.

- Apply protocol preparation principles in their own test protocol (whether for a usability test or focus group).

- Facilitate a usability test or focus group using their protocol.

- Run equipment in the Usability Center as follows:

  o Configure switcher

  o Check setup of recording equipment

- o Record to DVD

- o Use the *Morae* suite to record, annotate, and analyze video

- Correctly interpret the results of their tests.

Design Criteria

Initial deadlines for this project were very tight. However, the original goal of completing development before the end of fall semester 2009 was not met. The design documents were completed by December 4th as originally planned, but development of the training took much longer than anticipated. The design documents clearly defined the characteristics of the project, including the following: the scope of instruction, the format of the decision guide with its content, the flow and breakdown of the instruction, and the tone of the instruction that ensured it was suitable to the target population.

During the analysis phase, a target population analysis and a current training and resources analysis were produced. These are included as Appendix A and Appendix B respectively. During the design phase, a design document describing the instruction was produced. The design document is reproduced in its entirety in the following sections.

Design Solution

Process and Rationale

The ADDIE Model was used as a design process for this project. ADDIE provides a systematic process framework for instructional design that is widely accepted in the field. It allows for defined benchmarks and has a standardized terminology, yet it is flexible enough to be adapted to a wide range of instructional design products.

The Design Layers Model was used for the content of the design. The Design Layers Model provides a framework for describing design content. Instead of strictly taking a process design approach, the Design Layers Model poses questions to be asked during design. The answers to those

questions help determine the design content to be addressed, strategy, representation, user controls, messages to and from the user, media logic, and data management strategies for the project.

Relevant Design Principles and Research

Gibbons (2003) asserts that a simple model of layers, outlined by Brand (1994) detailing how an architect views a building, can be applied to instructional design. The layers that Gibbons introduces are "model/content, strategy, control, message, representation, media-logic, and management" (Gibbons, 2003, p. 23). These layers are the choices a designer makes during the design process. Designers tend to concentrate in the layers where they feel most comfortable, described as a "centrism" (p. 22-23); as a designer matures in their understanding of these design layers, their attention will generally shift from a media-centric approach to a model-centric approach. This in not to say that the media-logic layer is the least crucial of the design layers to consider. As Gibbons states, "design tasks most often come with constraints attached, and one of those constraints may predetermine a primary focus on a layer" (p. 24). In the case of the Usability Center training, one such constraint was the need for the training to be delivered via the Center for Teaching & Learning's website. This requirement directed the designer's attention to the media-logic layer first.

Implications of this layers model pointed out by Brand and articulated by Gibbons are as follows:

> Layers of a design age at different rates, that the layers must be replaced or modified on different time schedules, that the layers must be articulated with each other somehow, and that designs should provide for articulation in such a way that change to one layer entails minimum disruption to the others. (p. 23)

In this way, a design becomes a series of designs layered into each other, at once independent yet incomplete alone. Replacing one layer should not require much, if any, change to

the other layers in the design. Gibbons sees "design layers as a means of creating instructional systems that are adaptive, generative, and scalable" (p. 27). Gibbons also provides tables further describing individual layer goals, design constructs, design processes, and design/production tools (p. 26-27).

Gibbons & Rogers (2009) address some of the shortcomings of systems design processes. They assert, "that process is only one of the many approaches to the decomposition of design problems into solvable sub-problems" (p. 312). Instead, they recommend an approach that considers the functionality of the artifact. "Functional design decomposition creates separate design *layers* representing design sub-problems that can be addressed somewhat independently" (p. 313). "Each layer accounts for a certain category of decisions regarding specialized functions that eventually become part of a complete design" (p. 325).

The authors assert that the introduction of design layers in a professional community may be a measure of the maturity of a design field (p. 322). The authors also articulate further implications of design layers originally address by Brand (1994). These are that "layers represent different sets of design skills with different agendas, design goals, and problems to solve and integrate," and "the pace of change within and between layers…is dominated by the slow-changing components; rapidly-changing components 'follow along'" (p. 322).

Gibbons, McConkie, Seo, and Wiley (2009) address design layers in the context of simulation design. They refer to the different layers discussed in the previous literature as "functional headings" (p. 173) and describe in detail the function of each layer in relation to instructional simulation design. The descriptions of the layers as functions further develops the idea that each layer satisfies a certain functional requirement of the instructional design. The content function is described simply as providing model content. These models can take many forms, and specific examples for simulations are provided. Of interest are semantic networks and production

rules, or the rules of "if…then…" relationships (p. 175). These models were particularly useful in the design of the Usability Center training, as one of the designer's objectives was to develop a dynamic course that would differ from learner to learner depending on the choices they make.

The authors describe the strategy function as "the context of instructional settings, social arrangements, goals, resource structures, and events supplied by the designer to augment the learner's interaction with the model" (p. 179). The control function "describes the means by which a learner can convey messages that influence the unfolding content, strategy, or other dynamic elements of the experience" (p. 187-188). The message function describes the "basic building blocks" of the "interactive conversation" consisting of "numerous individual messages" between the learner and the instructional product (p. 190). The representation function encompasses all of the sensations of an instructional experience; it is through this function that the other abstract functions "become visible" (p. 192). "The media-logic function executes representations and carries out the logical operations that allow simulation events to occur" (p. 193). This function consists of the chosen medium and the corresponding capabilities and limitations associated with it. The data management function deals with learner data, its analysis, and interpretation in order to monitor the learner's progress and adjust the instruction accordingly (p. 192-193). Although the authors specifically address simulation design, the designer of the Usability Center training found this article particularly helpful as it provided thorough descriptions of each layer, which helped clear up confusion in the mind of the designer.

Gibbons (2008) states that "layers (domains) of a design represent functions carried out during instruction" (p. 1). He acknowledges that the message layer can be a difficult concept to grasp. This was true in the case of the Usability Center training. Gibbons elaborates on the role of the message layer and how it influences all of the other layers in a design except for the content layer. "The message layer's function is to translate the strategic intentions of the strategy layer… into

conversational terms that can be represented through one or more media channels in terms of multiple conversation turns" (p. 10). The author points out that the message layer does not define representation, but "only an intention to represent" (p. 10), as any one message may have multiple representations.

In the case of the Usability Center training, the idea of representation and message addressed by Gibbons (2008) solidified in what the designer was calling the Narration script. After reading this article it became apparent that in order to truly design a message layer, this script would need to become more general. The document instead became a text of what messages would need to be conveyed to the learner without identifying whether it would be conveyed visually or aurally. This opened up the possibility of multiple representations for individual messages.

Only recently has the relationship between ADDIE and the Design Layers Model begun to be fleshed out. Gibbons explained in his AECT presentation (2009) how process and content fit together in what he calls functional design. Traditionally, instructional design has concentrated too much on process and has not given enough emphasis to the content or architecture of the design, or to the properties of the instructional product being designed. Designers don't talk about the generic instructional product. Gibbons also asserts that two-dimensional diagrams are not sufficient representation of design models; design really takes place at different levels. These levels are the decision making process, how a team works together (which is usually missing from process), and the nature of the thing being designed because constraints often determine the order of design. This last level is driven by the context and constraints of the problem, and depends on a description of artifact functions, which become the domains, or layers, of the design. These layers are the same that have been addressed previously.

Using this material, the designer identified a way to reconcile ADDIE and the Design Layers Model. ADDIE was employed as a process management tool to guide the process along, while the

Design Layers Model was specifically used to complete the Design aspect of ADDIE. This provided much more guidance in terms of the content of the design than the approach typically employed during the ADDIE Design phase.

While literature on design layers helped to inform the design of this training, literature dealing with usability helped to inform the content. Dumas and Redish (1999) begin their explanation of usability by stating that "usability means that the people who use the product can do so quickly and easily to accomplish their own tasks" (p. 4). They cover aspects of planning the test, which includes defining goals, choosing participants, and writing test scenarios. Use of pilot testing is stressed as a means of ensuring that a test team is prepared and materials are appropriate for the test. The authors also provide practical solutions for executing usability tests, analyzing the data, and reporting findings. They present the idea that "[a] test report is not an academic paper. It is a functional document that people want to skim quickly and refer to later" (p. 351). This helped establish what topics the Usability Center training should incorporate, including introducing usability, preparing for a usability test, pilot testing, practical instruction on administering the test, and reporting the usability finding.

Early in her section on usability testing, Mayhew (1999) stresses determining whether to test ease of use, ease of learning, or both. This author stands out from other authors in somewhat discounting the effectiveness of focus groups. She states that "formal evaluation techniques are much more objective and effective than just doing a demo and asking for subjective feedback from users" (p. 229). Developing iterative tests is also highly stressed as a means of assuring that usability issues are satisfactorily resolved, an idea which was adopted into the Usability Center training by reiterating the importance of early and frequent usability testing.

Nielson (1993) breaks down usability into the following five components: "learnability, efficiency, memorability, errors, satisfaction" (p. 26). The author presents some testing strategies to

get the most from users; for instance, "the very first test task should always be extremely simple in order to guarantee the user an early success experience to boost morale" (p. 186). Nielson also advocates a unique approach to providing tasks to users at the time of the task. Nielson states the following:

> Since users will feel inadequate if they do not complete all the given tasks, one should never give the users a complete listing of all the test tasks in advance. Rather, the tasks should be given to the users one at a time such that it is always possible to stop the test without letting the user feel incompetent. (p. 187)

This author also highly endorses think-aloud protocol, or having the user vocalize thoughts and inner dialogue as they execute tasks. Many of these suggestions were incorporated into the Usability Center instruction. Nielson also delves into the topic of focus groups as a type of usability assessment and, unlike Mayhew (1999), lists them as an effective means of obtaining usability data. As focus groups are one of the major functions of the Usability Center, and therefore an essential part of the Usability Center instruction, this point-of-view provided reassurance and valuable information, describing focus groups as a viable usability test approach.

Preece & Benyon (1993) define components of usability that match fairly closely with Nielson's, although the terms used differ. The terms these authors use are learnability, throughput, flexibility, and attitude (p. 47). Preece & Benyon are the first of those researched to cite any potential problems with the think-aloud protocol: "Users often find it difficult to put their thoughts into words while trying to solve a difficult problem" (p. 113-114). Regardless, think-aloud protocol was included in the instruction as Preece & Benyon do not offer a viable alternative. The authors also provide a list of common performance measures, which were included in the Usability Center instruction for the learner to reference. These are frequency of correct task completion, task timing,

use of commands, frequency of user errors, and time required for various cognitive activities (p. 114).

Rosson & Carroll (2002) stress the importance of creating an authentic user experience with the product when performing usability testing. One of the ways they suggest creating an authentic experience is to purposefully allow certain user distractions that will exist in the actual environment where the product will be used. Another method they mention is to ensure that users have access to other workplace tools they will use during actual use. The authors argue that think-aloud protocol can be a hindrance to this idea of authentic environment:

> Tracking and narrating mental activity are tasks in and of themselves, and they compete with the application the user is trying to perform. Task performance times and errors are much less meaningful in think-aloud studies. The reporting process also leads users to pay careful attention to their actions and to system responses, which may influence how they plan or execute their tasks. (p. 243)

Just as with Preece & Benyon above, Rosson & Carroll do not offer alternatives that solicit the same types of data as think-aloud protocol.

Rubin (1994) provided much of the information that formed the Usability Center training. He introduces the terms "preference" and "performance." Preference is used to describe attitudes, opinions, values, and beliefs that users hold, particularly toward the product with which they are interacting. Performance describes the actions of the user, how well they performed, the errors that were committed and so on. While preference data is qualitative in nature and more subjective, performance data is quantitative and tends to be more objective. This idea was stressed in the Usability Center training as a key consideration when designing questions and tasks. Rubin introduces different types of testing as well. He calls these types exploratory tests, assessment tests, validation tests, and comparison tests. "The main objective of the exploratory test is to

evaluate…the effectiveness of preliminary design concepts, also known as the user's conceptual or mental model of the product" (p. 31). An assessment test "seeks to examine and evaluate how effectively the concept has been implemented" (p. 38). A validation test comes late in the development cycle. This test compares usability data with a predefined standard and evaluates the integration of components such as documentation, help, software, and installation (p. 38-40). Comparison tests simply compare the results of any of the types of usability tests listed above with usability data obtained from testing a different product in the same manner. The other product can be an alternate design, a previous release of the same product, or a competing product. It is concerned with not just *if*, but also *why* one option is better than the other. "The best design turns out to be the combination of the alternatives, with the best aspects of each design used to form a hybrid design" (p. 41). Suggestions of these different testing types were included in the decision guide found in the Usability Center training. These suggestions were adapted to fit multiple products throughout the development cycle. The bulk of this book includes many of the same strategies and principles described in other sources including preparing test materials, choosing participants, and moderating skills. The author's suggestions for analyzing results, making recommendations, and reporting findings heavily influenced the Usability Center training. Its lists of performance and preference measures to consider were quoted word-for-word in the training. The steps outlined by the author for making recommendations for change were those included in the training as well. The author stressed that "what the test report *should* do is initiate change, direct action, provide a historical record, and educate—all at the same time. Above all else, it should communicate to people" (p. 289).

Initial Solution

The description that follows contains the original design content. It is presented in the past tense as many of these plans changed during design and development.

Originally, in order to satisfy the design goals of (a) remedying the training deficit and (b) increasing the use of the Usability Center by attracting clients, the instruction was to be broken down into two phases.

The first phase would be mobile, delivered via the Internet. The learner would participate in this phase at the place of his or her choosing. The phase would include usability testing models, examples, and success experiences. A decision guide would help the client choose what type of usability testing to perform based on his or her project type and phase of development. This phase also would include some kind of initial advertisement, probably in a video format, to attract clients to the training and ultimately the Usability Center.

The second phase would concentrate on building competency. It would be anchored in the Usability Center and would include demonstrations of usability tests, simulations, and hands-on practice with feedback.

Design architecture/modularity principle. The training would be divided up based on topics covered and depending on the client's specific needs. For instance, if after using the decision matrix the client determined that he or she would be best served by a focus group looking at a low fidelity mock-up, he or she would not have training on software usability testing. Using this matrix the training would be adaptable to the learner's specific needs.

Surface design. Adobe *Captivate* would be used to create a presentation consisting of a visual slide combined with a voiceover audio track. Rather than a typical *PowerPoint* in which a learner progresses in a linear fashion through static slides, this presentation would be timed with the audio, allow for input and choice, and allow for a nonlinear progression through the topics if the learner so desired. User controls were to include links to outside material, navigation buttons, the decision guide, and would give clients the ability to skip units of instruction if desired.

Strategy design. Personal experience in training clients on Usability Center use has shown that many feel they already know enough about usability testing and only want to learn to use the equipment. The tests they conduct, however, show that many would benefit from training in the design of usability studies. In order to instruct this kind of client, the initial solution for this training was to spread instruction on usability testing principles throughout the instruction on using the equipment in the Usability Center. For example, there would be principles and training on focus group facilitation interspersed with instruction on operating the video input/output switcher for recording a focus group. The objective would be for the client to unknowingly be exposed to principles of usability throughout the instruction instead of being overtly introduced to the principles in sections that could be easily skipped or ignored.

Early in the instruction, the client would be presented with a decision matrix for determining the type of usability testing to perform. This decision matrix would be the basis for the entire instruction; although the general topics would stay unchanged, the content would differ to reflect the type of testing the client anticipated using. For example, if a client were to use the decision matrix to choose a type of focus group to perform, later, when the client would complete the section on conducting a pilot test, the instruction would provide only content dealing with focus groups. The axes of the decision matrix were to be a stage of development and a type of tool/artifact to be tested. The individual cells would suggest usability testing and focus group strategies that the client could then select. The client would choose the type of testing to perform based on the decision matrix. The decision matrix is included as Appendix C.

Logic/software design. This instruction was to be created using Adobe *Captivate* due to its ease of use, potential for interactivity and ease of delivery via the Internet. The training would be delivered on the Internet via the CTL website.

Evolution of the design

The initial solution described previously evolved significantly based on numerous factors. These factors include information obtained through the literature review; suggestions from committee members, stakeholders, and peers; and issues discovered during formative evaluation.

Design versions. One of the strengths of the design layers model is that changes to one layer should have a minimal impact on the other layers. In this way, the only part of the design that is affected is how the layers integrate together. However, while certain layers of the design did pass through multiple iterations, there were not multiple "design versions" per se.

As each layer was designed independently, each will be addressed individually in the descriptions that follow. A description of the final version of the design is provided, including the designer's rationale for selecting the chosen approach.

Strategy layer. The strategy employed in this training consists of structured instruction broken up by phases and further divided by topic into lessons. These phases or units consist of a preparation phase that is mobile, a very practical application phase that is fixed to the Usability Center, and a final phase where the user assesses the results of their activities and formulates a final report. Throughout instruction, clients have assignments to complete. These assignments are labeled "Now you try" and require the client to create tools and apply principles as they execute usability testing preparation, execution, and assessment activities. Coaching is provided, and each assignment encourages the client to review their work with a member of the Center for Teaching & Learning's Evaluation Team.

The instruction is broken down into three units, each with two sections, for a total of six sections. Units were used to group subjects that shared common attributes and requirements (see Figure 1). Each section, except the first and final sections, have two possible paths to follow: one path containing usability test specific instruction, and the second containing focus group specific
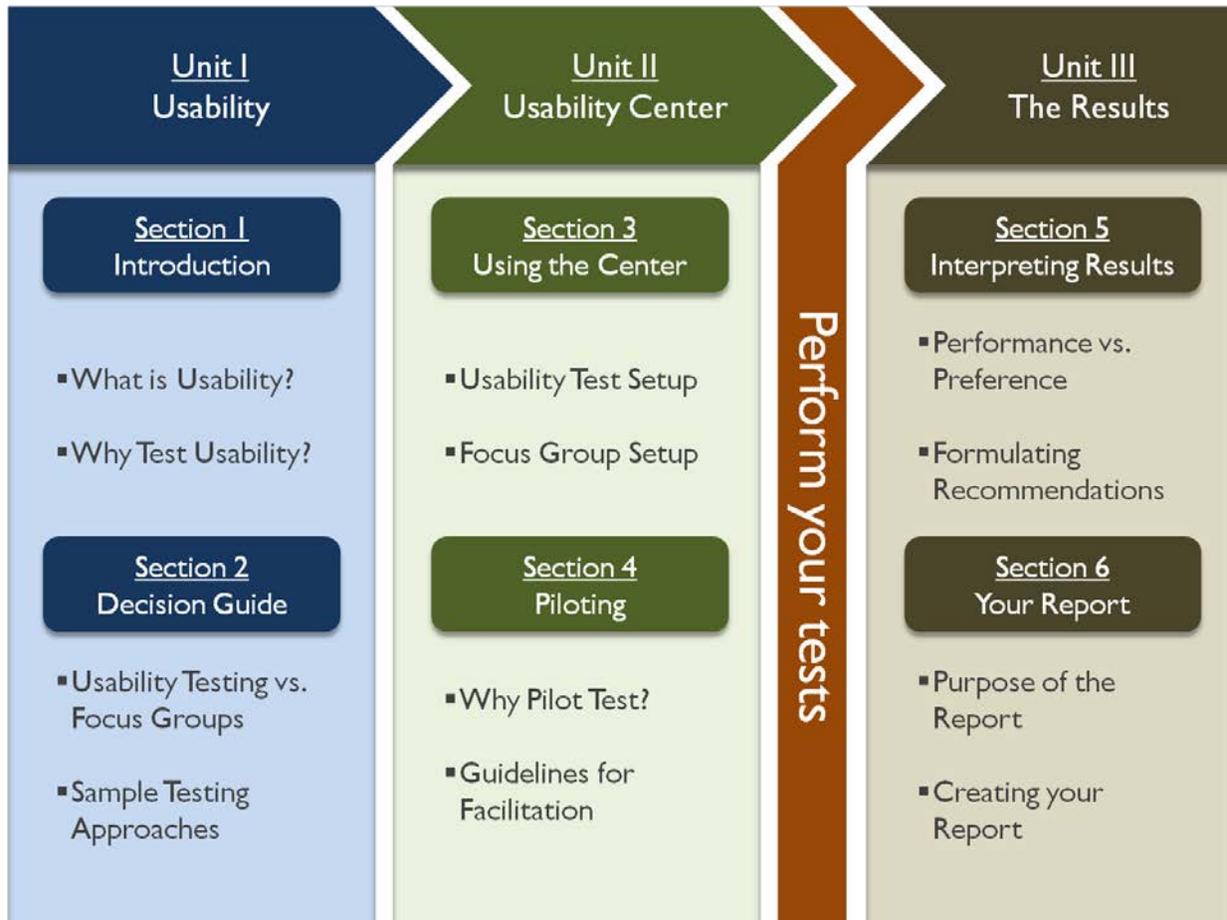
Figure 1. Diagram of the course flow, including Units and corresponding Sections.

instruction. In this way, both types of usability activity are discussed in the same manner and to the same level of detail, permitting a similar learning experience regardless of whether a client decides to execute usability tests or focus groups. This approach also permits the client to explore both activities simultaneously by topic. This can help inform a client who may be unsure of the approach they would like to pursue of the values and drawbacks of either.

The first unit, an introduction to usability and how to test it, is mobile—the learner will participate at the place of their choosing. The designer felt that it was important to provide this initial piece of the training in such a way that clients can freely explore introductory material, without committing to time and location restrictions. This is especially important for attracting clients who are unsure or initially only curious about usability testing.

Section 1 introduces clients to usability and starts to get them thinking about their specific product. Since this instruction's target population has a project in mind when starting the training, the activity for this section is to begin listing areas of the product that they think might have usability issues to address. This approach also helps the client focus on the application of the training from the very beginning.

Section 2 is a decision guide that will help the client choose what type of usability testing to perform based on their project type and phase of development. This decision guide is the basis for the rest of the instruction. Although the general topics addressed in each successive section stay unchanged (regardless of the testing approach chosen in this section), the content of these sections differs to reflect the type of testing the client has decided to use. The two main factors clients will consider in the guide are the type of tool/artifact to be tested and the stage of development when usability testing will first occur (see Figure 2). After the client determines each of these, he or she is presented with suggestions for usability testing strategies that can be explored further. The client will choose the type of testing to be performed based on the decision guide. The goal of the decision

Figure 2. Screenshot of the Decision Guide as it appears in the course.

guide is to inform clients of potential testing activities and approaches, as well as help them design an approach that meets their needs and personal preference. Once the client has chosen a type of testing, he or she will be presented with guidelines for choosing testing objectives and for turning those objectives into tasks or questions for their test participants to address. The activity for this section is to outline their test objectives and create their own script of questions or tasks for their specific product. This activity asks the client to contact the Center for Teaching & Learning's evaluation team to review the work the client has done. Introducing the client to this resource at this point in the training serves at least two purposes: first, it allows the evaluation team member to provide input on the client's work using an assessment rubric; second, it gives the evaluation team member working with the client the opportunity to provide encouragement for continued use of the training and reiterates that the evaluation team member is a resource and support for them throughout their usability effort.

The second unit concentrates on building competency in the client working in the Usability Center. Unlike the first unit, the second unit is anchored in the Usability Center. The client will be more willing to schedule a committed time in the Usability Center after having invested so much time into the project already. This will also provide him or her with hands-on practice using the equipment and running tests before the actual testing activities begin. This section includes hands-on practice and recommendations for moderating usability activities. This second unit culminates with the client's performing a pilot of their testing activity followed by the execution of their actual tests.

Section 3 presents instruction for operating the equipment in the Usability Center. An introduction to the equipment is presented, and step-by-step instructions are provided for configuring the equipment for the most common tasks. This section was designed to function as an equipment guide more than as a standard lesson so that clients can quickly access this section each time they need to use the equipment in a new and unfamiliar way. This section's activity is to

practice using the equipment by setting up the Usability Center for the type of testing the client plans to execute. Information for contacting the evaluation team at the CTL is provided so the client can get additional help configuring the equipment as needed.

Section 4 is designed to prepare clients to perform their usability testing activities by instructing them on best practices and moderator skills. These practical points include: obtaining informed consent, the rights of participants, the number of participants to include, how to remain neutral while moderating, and what to do when problems arise. This section synthesizes recommendations provided from nearly every resource consulted on the topic of usability testing and focus groups. This section also provides a template for an informed consent waiver form. The activity for this section is to conduct a pilot test using the materials the client has produced to this point. This provides hands-on practice with real participants and helps build confidence in the client for when they hold the actual tests. The CTL evaluation team is available during pilot and actual testing to aid and support the client.

Between the second and third unit is when the participants hold their usability tests or focus groups. The third unit presents strategies for interpreting the data the client acquired from their usability efforts. The purpose of a usability report is addressed and a template for a report is provided. If the client participated in usability tests and not focus groups, part of this unit must be completed in the Usability Center due to software requirements; otherwise, this unit is mobile. This was done to allow clients time and comfort while they analyze their results. Although required for a portion of this unit, anchoring the entire unit to the Usability Center could have increased the pressure on the client to work quickly. This in turn could result in a superficial analysis of the usability issues discovered and insufficient recommendations for product improvements.

Section 5 presents instruction for interpreting usability data and making recommendations for product improvement. If the client has performed usability tests, this section must be completed

at least partially in the Usability Center due to the software used to analyze usability test recordings. The process described for making recommendations comes primarily from Rubin (1994), although the other authors consulted suggest similar approaches that differed primarily in vocabulary. The activity for this section is to prioritize the usability issues found and make recommendations for their improvement based on the principles presented in the section. These are to be reviewed with a CTL evaluation team member.

Section 6 provides the client with a strategy for reporting usability findings and recommendations. Following the recommendations of Dumas & Redish (1999) and Rubin (1994), the client's purpose for the report is stressed heavily. A possible reporting format is presented along with descriptions of the recommended report sections. The activity for this section is to compose a usability report that will be reviewed by a CTL Evaluation Team member. He or she will be especially concerned with ensuring that recommendations are clearly presented and the reasoning behind them is sound so that project stakeholders can quickly learn the extent and results of the testing.

Recommendations have been made to the stakeholders at the CTL to include some kind of initial advertisement, probably in a video format, to attract clients to the training and ultimately to the Usability Center. This video would present examples of the kinds of testing clients can perform in the Usability Center. It will also include brief interviews and testimonials from satisfied Usability Center clients. The duration of this video should not exceed three minutes, as an excessive length may deter potential clients from viewing it. This advertisement was not addressed as part of this development project, so if it is undertaken, it will be produced by the CTL video production team.

Content layer. The content of this training can be broken up into three topics: (a) usability test planning, (b) the decision-making process for choosing usability approaches, and (c) the

procedures necessary to perform usability testing. These three topics are addressed individually in the following paragraphs.

In order to perform a usability test, the client first must plan testing activities. Dumas and Redish (1999) state that the considerations that must be made in the planning phase are as follows: the aspects of the product that may have usability issues; the target population and how to represent them in the test; the tasks users will perform during the test; the types of information to collect in testing; how to analyze test results; and what to do with the analyzed information (p. 105-106). These considerations are also outlined by Nielson (1993) and Rubin (1994), although using different vocabulary. Whereas the considerations listed by Dumas and Redish and Rubin are broad categories, Nielson's list contains much more discrete items and serves more as a checklist.

As clients choose their testing approach, there is a tradeoff not only with choosing to hold usability tests over focus groups, but also in the specific focus or approach of their test. Nielson (1993) states, "focus groups often bring out users' spontaneous reactions and ideas through the interaction between the participants and have the major advantage of allowing observation of some group dynamics and organizational issues" (p. 214). Usability tests, on the other hand, consist of observing a single user at a time and tend to be more procedural and quantitative in nature. Choosing one testing approach over another affects the procedures used in testing, the equipment configuration used in the Usability Center, the kinds of information obtained, and ultimately the perceived usability issues and the recommendations to improve them.

Executing a usability test or focus group in the Usability Center involves a set of procedures. The authors agree that usability objectives must first be drafted, after which they must be prioritized according to the criticality of the feature or function addressed in the objective. Once objectives are prioritized, the client must draft tasks or questions that respond to the objectives. These tasks and questions are what prompt users as they participate in the usability activity. Once a client is prepared

to execute their chosen usability activity, they must reserve facilities and recruit participants from their target population. As the client moderates the activities, they must ensure that user data is somehow recorded. The Usability Center software and equipment is designed to fulfill this requirement. The operation of the software and equipment requires that the user follow specific procedures to set up, initiate recording, and retrieve recorded data. Each individual usability test or focus group session follows a script of tasks or questions as well. Once testing is complete and the data has been retrieved, the client begins the process of analyzing the data. Again, the authors recommend that clients prioritize issues discovered according to criticality (Rubin, 1994, p. 277). Once these usability issues have been prioritized and analyzed, the client must then make recommendations to improve the usability of the product and present the findings to stakeholders.

Message layer. This instruction consists of the many messages that are presented to the client. A sample is included as Appendix D.

Control layer. The basic client controls that learners are able to access are outlined below.

- A Decision Guide appears in *Section 2* that allows the learner to investigate options of where to focus their usability testing efforts.

- The ability to navigate to the next slide of instruction is included in most pages of a section. This functionality is deactivated for certain pages in the Decision Guide and on the last page of each section.

- The ability to navigate to the previous slide of instruction is included in most slides of a section. This functionality is deactivated on the first page of each section.

- The ability to navigate to any topic in a section is included in a section specific table of contents.

- The ability to navigate to the various units and sections of the instruction is available from any page of instruction.

- The ability to access or download external files is provided in sections that have supporting materials or documents.

Representation layer. As clients go through this instruction, they interact with a graphical user interface. This interface has a navigation menu down the left side, a spot for the topic at the top of the page, and a large area for text and other visuals in the center.

The instruction is primarily audio voiceover with supporting visuals. The audio consists of the messages defined in the message layer. In general, the supporting visuals are phrases or points from the audio that appear visually as the point is being made audibly. Certain topics also include animations or pictures that illustrate what is being presented. For a list of the supporting visuals by topic, see Appendix E.

Media/Logic layer. This instruction was created using multiple tools. First, digital audio files were created using a recording booth and Adobe *Soundbooth*. Flash files created using Adobe *Captivate* SWF were then crafted that incorporate the visuals and audio described in the representation layer along with the user controls described in the control layer. *Captivate* was chosen for its ease of use, potential for interactivity, and ease of delivery via the Internet. HTML and CSS were used to create a web interface in which the SWFs could be imbedded. The final product will be hosted on the Internet by the Center for Teaching & Learning on their website.

Management layer. Because this training allows clients to participate in the instruction from the location of their choosing and spread their training over a few days, tracking client data would be difficult. The instruction itself can be different for individual clients because each will have different testing strategies in mind. For that reason there needed to be some mechanism in place to ensure that clients' specific instruction needs would transfer with them from location to location. To remedy this issue, the instruction is broken down in such a way that at the beginning of each new

section, the client will be asked if they are performing usability tests or focus groups. It is a simple solution to keep the instruction relevant to the client.

Many of the sections culminate in "Now you try" activities where clients produce some practical artifact that is used in their usability effort. These activities encourage the client to contact the CTL Evaluation Team to help them assess their performance. This not only gives the client an opportunity to apply what they have learned, but also implements a judgment system. The evaluation team member can help a client determine when they are prepared to leave the current section of training through the use of an assessment rubric. These rubrics help the evaluation team member evaluate the quality of the "Now you try" artifact that the client developed and make suggestions for improving it.

User Testing Plan and Results. Throughout the design process there has been user testing of the materials being developed. The goal was to ensure that any content being developed would be accurate and useful. To that end, the training went through two user-testing phases.

The first testing done involved multiple participants reading through the lesson material for comprehension and style. These users were members of the CTL Evaluation Team, and were therefore part of the intended audience for this training. The users received an electronic copy of the message layer design which included descriptions of the representation approach to be used with each message. The feedback they provided influenced three aspects of the final training product: the topics addressed, the order in which the topics were addressed, and the instructional tone and language of the lesson materials. This first phase of testing determined that the topics and their order as designed were satisfactory. The only changes made due to this testing were in language selection. In general, the testers found the instruction to be too wordy, often resulting in unnecessarily confusing descriptions. Many wording suggestions were offered and subsequently incorporated into the training from this first test phase. An example of this is the Decision Guide;

originally this tool was called the Decision Matrix; however, user feedback suggested that the word "matrix" may be confusing, so the word "guide" was used instead.

The second testing performed consisted of users executing the Usability Center setup instructions in the actual environment. Members of the target audience were brought into the Usability Center and given the completed instructions for operating the Usability Center equipment. They were tasked with using the instructions in the training to operate the Usability center equipment by completing a series of tasks outlined in a test protocol. The test protocol is included as Appendix L. Five users were tested and it was apparent that crucial information was left out of the lesson material, particularly steps that were preliminary to executing the equipment setup, such as powering on machines, locating the correct remote controls, and identifying the appropriate recording media. The setup instructions were revised to include this missing information and detailed images of the needed remotes, webcams, and microphones to accompany the already existing images of the core equipment.

Design Modifications. During the design of this training course, modifications were made to the initial design. These changes were based on the following issues that arose.

One assumption about clients who take this training is that they will already have a usability project in mind. The training was thus designed to walk a usability novice through important introductory material, then help them choose the right type of testing for their project before diving into specifics about testing approaches or equipment setup. To help learners prepare their usability testing materials, each section was given one or more "Now you try" activities. These activities were put in place to help cement concepts in the learners' minds, making the learning applicable to their situation. The activities help a client synthesize the material they experienced during the preceding section of instruction and create artifacts to use when the time comes to run their tests or, as is the case with the last two sections, use the information gained through their testing efforts.

In order to help clients assess the quality of the usability materials they develop during the "Now you try" activities, contact information was provided for the client to contact the CTL's Evaluation Team. Once contacted, a member of the team reviews the artifact using a rubric designed specifically for the activity. These rubrics can be found in the Appendices F, G, H, and I.

This training course was designed to be reusable by the same client. This meant that many of the usability principles covered had to be general enough that they could be applied in multiple usability situations. That said, there was still a need for more specific instruction on the different types of testing approaches, branching depending on the client's choice of focus group facilitation or software usability testing, and specific instructions for setting up and using the Usability Center equipment. This approach required that a branching mechanism be designed into the training, allowing the client to advance from general material to instruction specific to their usability activities, and then back to general material.

This instruction was designed to function as a resource for continued use. To this end it was decided that the section in the instruction on running the equipment in the Usability Center be very practical. In this way, a client who has already completed the training can simply return to the section on running equipment and follow the steps to configure it in a different way from what he or she had done before.

Feasibility Projections

Cost. The vast majority of this project was completed on the designer's time at his own expense. The Center for Teaching & Learning also provided some funds for this project. The cost covered by the CTL to produce this training is as follows:

- Design—$15/hour for 20 hours, or $300

- Development—$15/hour for 50 hours, or $750

- Evaluation—$15/hour for 20 hours, or $300

These hours were not sufficient to complete this project. The designer estimates an additional 120 hours were needed over the space of eight months to complete this course.

Skill. The Instructional Designer was also the product developer for the bulk of the project. The Instructional Designer has at least moderate experience in the following essential technical domains involved in producing this training: use of Captivate, graphic creation using tools such as *Adobe Photoshop* and *Illustrator*, audio recording and mastering, and HTML and CSS programming. Skill requirements above and beyond these were referred to the Center for Teaching & Learning where individuals with greater expertise were then tasked with executing parts of the project.

Resources. All of the necessary technical resources and tools were made available through the Center for Teaching & Learning and the Instructional Psychology & Technology department. These include *Captivate* software, audio recording equipment, access to the Usability Center, and usability literature. Time and funding were provided through the designer's employment with the Center for Teaching and Learning. Additional time spent by the designer was at his own expense.

Maintainability. As time passes, principles underlying the instruction on usability are unlikely to change. The more technical topics presented in this training, however, have a high probability of requiring periodic maintenance. These technical topics are addressed below.

The basic function of the *Morae* software used in the Usability Center is to record a video feed of a user's interaction with a computer-based tool while capturing video and audio of the user. Additionally, the moderator can annotate the feed as they perform the test. As new versions of the software are released vocabulary may change from the previous version, procedures may be altered, and so on. To avoid recreating a section of the instruction affected by a change such as this, the actual instruction on the *Morae* software's use is a file external to the training that is accessed via links in the training. The current version of this external file is the existing training addressed earlier in the problem presentation section. By dividing the instruction up to this level of granularity,

procedures and vocabulary can easily be updated in the *Morae* tutorial without affecting the topics of instruction that will not change as frequently. Also, because only the basics of specific software use are covered in the *Morae* tutorial, clients are referred to the software help documentation, maintained by *Morae*, for help with more in-depth software-related questions.

As equipment in the Usability Center changes there may be updates to the training, but only if the nature of the equipment changes. For example, if the web cameras are replaced with newer cameras, the training will not be affected as they still perform the same basic function. But if the input/output switcher were replaced with a different system, the training would have to be updated to include the change.

Sustainability. The only cost to keep this training available is the web hosting costs associated with it and costs to update the training when the nature of the center's equipment setup is changed. The Center for Teaching & Learning has addressed this project's implementation and maintenance in its budget.

Production Plan/Schedule. The initial production schedule follows, although drastic changes were made to account for factors external to this training:

- 11/20/09—finish initial analysis, including target population analysis, current training and resources analysis, and literature review.

- 12/4/09—finish initial design, including task analysis, work model synthesis, and design document outlining the design layers. Begin production.

- 12/4/09-12/31/09—conduct formative evaluation and usability tests.

- 12/31/09—finish production of materials.

- 1/4/10-1/8/10—conduct summative evaluation.

Elements produced. The following elements were produced:

Representation and control layers—the skeleton for the training including the text, visual elements, and navigation.

Decision guide—this helps the learner decide what type of usability testing to perform and when in the process to perform it. The axes are type of tool/artifact to be tested and stage of development.

Example test and focus group protocols—these provide clients with an idea of item types, grouping, and wording, as well as a template for the client to use when building his or her own protocol.

Audio voiceover—rather than have the training entirely text-based, a voiceover explains the material with visuals and short text passages to illustrate the points expressed.

Evaluation report template—this template is a simple plan the client follows when preparing a usability report for stakeholders.

Production processes. After the design was completed, production was done in stages. First, the lessons were constructed in *Captivate*, followed by a quality assurance review. Then recorded audio was added to the lesson. Finally, the section was evaluated as outlined in the evaluation plan below.

Design changes during production

One of the advantages of using the design layers model of instructional design to create this training is that individual layers are somewhat independent of each other. This facilitated development in that the content and strategy layers required no changes during development. The more media-dependent control, representation, and data management layers were altered during the development as the designer became more familiar with the nuances of *Captivate* development. The

message layer was also changed during production based on information gathered during formative evaluation.

A significant change that the designer would have readily welcomed but was unable to implement was to the media logic layer. Having settled on producing the training in *Captivate* during the analysis and design phases, licenses were obtained for the software. *Captivate*'s primary strength is its screen, mouse, and keystroke capturing capabilities. This functionality was not utilized in the Usability Center training. It was only after extensive use of and considerable investment in *Captivate* that the designer became aware of a different e-learning development tool—*Articulate*—that would have suited the nature of the training much better. *Articulate* extends the functionality that already exists within *PowerPoint* and adds useful audio editing and animation syncing tools to create narrated flash-based e-learning courses and materials. As the instructional designer was already an expert user of *PowerPoint*, this change could have shortened the production time and added to a more polished look and feel while at the same time requiring fewer CTL personnel resources. That being said, changing at that point became nearly impossible as software costs were prohibitive and the production schedule would have been pushed back even further.

Production Actual

Additional time was required to complete the project. The actual production schedule follows.

- 12/1/09—finish initial analysis, including target population analysis, current training and resources analysis, and literature review.
- 1/20/10—finish initial design, including task analysis, work model synthesis, and design document outlining the design layers. Begin production.
- 2/15/10-2/26/10—conduct formative evaluation and usability tests.
- 4/12/10—finish production of materials.

- 4/19/10-4/30/10—conduct summative evaluation.

Production Issues and Learnings

During production certain issues and roadblocks arose because of the designer's choice of production tool, *Captivate*. As previously expressed in *design changes during production*, it was discovered during production that *Captivate* was not the optimal tool to develop this type of training intervention. The designer discovered that although his original intention was to be model-centric developing this product, he was actually media-centric. Rather than first focusing on the Design Layers Model of instructional design and making all other decisions based around that choice, the designer was unwilling to alter his choice of media even though it may have been optimal to do so. In this way, the instructional design model became second to the media for delivering the product resulting in a product that is, by the designer's standards, inferior to what it might have been. His experience both with this project and professionally have helped the designer gain a greater appreciation for the importance of choosing a medium that meets the instructional objectives and business requirements rather than one with which he is familiar or excited to try.

When compiling the lessons into one deliverable, it became apparent that additional web programming expertise was needed. Although the designer has some experience, issues arose that the designer was not readily able to address. The overall size of the training necessitated splitting the content up into individual *Captivate* files by lesson. This rendered linking between lessons more complicated as JavaScript would have to be used to create the links and give the training a seamless look. Connected with this issue was how to make downloadable content available using *Captivate*. Although confident of his ability to address all of the technical requirements for this project at the outset, the designer realized that there was an unanticipated level of complexity that would require others with greater skills in certain domains. This has stressed the importance of collaboration in design and production to assure a high quality product.

Time management and project duration estimation were also identified as areas where the designer will need to focus effort in the future. Deadlines were repeatedly lengthened as design and production proved more time consuming and complicated than anticipated. This is somewhat to be expected as this was the designer's first attempt at developing a computer-based training composed of multiple learning modules. To a certain degree, the experience gained with the process and tools alone has greatly educated the designer in the area of time management. Additional experience will be needed to help the designer gain better understanding of his skills and workload capacity. This in turn will help the designer more accurately predict timelines, assign deadlines, and meet the set time requirements.

Product Description

The final product does not differ from what was described in the design section. It consists of six *Captivate* presentations, one for each lesson, embedded in HTML web pages to be hosted on the Center for Teaching & Learning's website. The lessons cover the following topics: an introduction to usability, choosing a usability testing approach, usability skills and best practices, using the usability center equipment, analyzing your results, and compiling a usability report. A decision guide helps learners choose a usability testing approach based on their needs. The lessons contain participant practice exercises labeled "Now you try." These exercises task the learner with applying the knowledge gained during the lesson to either create materials to be used during usability testing or practice procedures used while administering the usability testing approach chosen. Contact information is provided for the CTL's Evaluation Team allowing the learner to check their work and receive feedback from evaluation practitioners. Rubrics provide the Evaluation Team members with criteria on which to base their evaluations of learner produced materials. It is estimated that it will take learners approximately two hours to complete all of the lessons with

additional time required to complete the "Now you try" exercises, depending on the individual learners and the scope of their usability testing effort.

Implementation/Management Plan

Ownership of this training has been transferred to the Center for Teaching & Learning. It is now managed by the Associate Director over Evaluation. As equipment is replaced and software is updated, the director will track needed changes to the instruction and ensure that they are completed and implemented appropriately. Copies of all materials developed for this project have been supplied to the director.

Evaluation Plan

Stakeholders. Stakeholders are as follows: the Associate Director over Evaluation for the Center for Teaching & Learning, Larry Seawright; Brigham Young University administrative employees; CTL student employees; focus group and usability test participants; and members of the university community who will use tools put through usability testing.

Evaluation Objectives. This evaluation's objectives were three-fold:

1. Determine the degree to which the new training prepares Usability Center clients to perform required tasks without other aid.

2. Determine the accuracy of the instruction presented.

3. Determine the effectiveness of the presentation of the instruction.

Standards. The evaluation employed Dr. David D. Williams' Evaluation Principles Worksheet to ensure that requirements of utility, feasibility, propriety and accuracy were addressed in the evaluation process. This checklist is based off the Joint Committee Program Evaluation Standards.

Methods. The evaluation consisted of usability tests administered to a random sample of CTL student employees. These tests included both a task completion section and open-ended

questions about the clients' experience, things that were helpful about the training, suggestions for improvement, their likelihood of using the training, how the training might increase the use of the usability center, and deficiencies of the training.

Budget. The Center for Teaching & Learning provided the funds for the evaluation of this training. The budget is as follows:

- Evaluator—$15/hour for 10 hours, or $150

- Participation incentive—$5 for 10 participants, or $50

- Total—$200

Participant Consent. A participant consent form was provided to participants of the usability tests. This form follows the outline on BYU's Institutional Review Board (IRB) website. Answering the questions on the survey was considered participant consent. This consent procedure was made clear during the evaluation.

Reporting. The evaluation findings were used internally by the instructional designer to make improvements to the training product prior to implementation. A simple report containing the findings is included in Appendix K.

Testing

Implementation

History. The final product was delivered to the CTL stakeholder for implementation. As of the writing of this report, the training has mainly been used to train evaluation team members so that they in turn can provide expert assistance to faculty.

Issues and Learnings. In retrospect, not enough attention was given to the implementation phase. It was always agreed upon that once development was complete, the designer's role in implementation would be to deliver the training product to the CTL for

deployment. Communication should have been better between the designer and the CTL to ensure the training product was correctly implemented and made available to the university.

Evaluation

History. The evaluation plan did not change throughout the design and development of this project.

Issues and learnings. The evaluation found that certain changes needed to be made to the final product before completion. These changes were addressed previously in the user-testing plan and results section of this report. Participants generally agreed that they would use this training if they were tasked with conducting a usability test of their own, but the training alone would not make them anymore likely to use the Usability Center. The report is available in Appendix K.

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Results/Conclusions

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Ultimately, this project helped prepare the designer for full-time work in the corporate sector. While there were shortcomings on the part of the designer throughout this project, it was extremely helpful in preparing him to rapidly create training materials with little to no direction. The chance to take a project from analysis through evaluation and make mistakes helped him avoid making the same mistakes in his employment. Following are some of the mistakes and other learning opportunities the designer discovered throughout this project's lifecycle.

Modification of Theory and Theoretical Insights

It became clear as design was begun that the layers of the Design Layers Model were not defined well enough in the mind of the designer. Substantial research into the model, including frequent discussions with the model's creator, Dr. Andrew Gibbons, prepared the designer conceptually to use this model. However, in practice it was more difficult to separate one layer from the others. For example, as part of the control layer, buttons were needed to navigate through the training, but they also had to be represented visually. It was hard to make the distinction of which

layer to use to define that object. Ultimately it became clear that the functionality of navigating through the training is described in the control layer, while the button is described in the representation layer. The distinctions between the layers became more apparent as time went on, and ultimately more practice with the Design Layers Model should help solidify the distinctions in the mind of the designer.

As was stated previously, the designer approached this project with what Gibbons (2003) referred to as a media-centric outlook. The designer was so caught up in the novelty of using *Captivate* to produce the training that its use was never questioned. Had the designer focused more on the model and the idea of designing for easy revision or replacement of individual layers, *Captivate* would have been regarded as only one option out of many. It is believed by the designer that this would have saved on effort during development and contributed to a more polished look and feel for the final product.

Modification of Product and Product Insights

This product became larger and more complicated than it needed to be. Part of this is the media logic choice addressed previously, but other factors contributed as well. Very specific visuals were painstakingly created when stock images could have been equally useful. An effort was made to simplify the presentation of the lesson material by keeping the entirety of each topic contained to one slide in *Captivate*. This actually had the opposite effect as it created some slides that lasted well over two minutes, which made coordinating the presentation of the various visual elements greatly complicated. Rather than set up styles for use throughout the training, all styling of elements was done on a component-by-component basis. The majority of this can be attributed to poor planning in the media logic and representation layers. Had the designer addressed these issues earlier, the schedule would probably not have been extended so much.

In an effort to expand his skills and experience, the designer chose to use a media with which he had little experience. As discussed previously, this choice became a central point around which the training was built. In this effort to gain a broader knowledge of e-learning tools, the designer neglected strengths and skills he already possessed. Video production is one such skill, and ultimately the designer would like to work in instructional video production. In hindsight, using skills already developed in this medium to develop a high quality training video product could have served two purposes: it could have met the requirements of the stakeholder and also been included in an instructional video production demo reel for obtaining further employment.

After all of the effort to create this training, the quality was quickly surpassed by the designer's next project created for his current employer. That said, this was a learning experience and the mistakes and victories in this project directly resulted in the increased quality of subsequent projects. If it had to be redone, the resulting end product would be significantly different.

Modification of Process and Process Insights

One area where the designer failed was in communicating with stakeholders. Rather than keeping them apprised of the project's development, he often worked alone asking for little direction. Only after significant effort was already exerted pursuing a particular course of action did the designer approach the stakeholder to get clarification. Looking back, the designer feels that had the stakeholder been given an opportunity sooner, he may have requested a different direction or approach to the training; however, due to the time the designer had already dedicated to the project in one direction, the stakeholder may have just accepted the project as-is feeling that it was too late to make changes without significantly adding to the workload. This lack of communication handicapped the stakeholder and contributed to a product that could have met his needs better had the designer focused more intently on open and frequent communication. In his current employment, the designer has made sure that at least weekly status meetings are held with

stakeholders to get their signoff before too much work is done and too much time is wasted going back to make changes that should have been communicated sooner.

ADDIE is valuable for managing the process of designing, but it can also hinder the creative process when adhered to too rigorously. The designer was reluctant to revisit earlier phases of the ADDIE process to make changes he knew could improve the overall quality of the product because to him it felt like losing ground on the project. The designer allowed the project to be defined by the process, rather than the designer using the process as guidelines or best practices to help focus the project. The designer now sees ADDIE as a tool to help ensure that important process related questions are addressed throughout a project's lifecycle and not as a series of rooms that must be passed through in order to arrive at the desired destination.

Additionally, the designer had the tendency to view ADDIE as a checklist of disjointed, unrelated tasks. For instance, in the analysis phase one is supposed to conduct a target population analysis. Once the analysis phase was deemed complete, the designer rarely referenced the target population analysis. As the designer recognized this flaw in his perceptions, efforts were made to change. Instead of this rote checklist, the designer began to see ADDIE as a series of questions and points to address that work together to help define the product.

In an effort to reduce dependence on other resources the designer undertook this project by himself. In this way he could ensure that time would not be squandered waiting on others who may or may not have been as vested in the completion of this project as he. This choice handicapped the designer and led the designer to isolate himself with the project, rarely seeking others' opinions unless it was part of user testing and evaluation. Much could have been gained through a more collaborative approach, as the designer has learned first-hand subsequent to completing this project. Where now the product is possibly a little stale and monotonous, the training solution could have

become a highly creative, innovative, and engaging tool that would have better met the project objectives.

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Appendix A

Target Population Analysis

Audience – BYU administrative employees designing and creating usability protocols

Characteristic	Finding	Source	Implications
Occupation: BYU Administrative Employee	Most learners participate in software design or development	Personal observation	Varying specializations necessitate general instructional approach
Education Level: At least a Bachelor's degree, may have a higher degree	Degree field varies widely between learners	Brigham Young University administrative employment requirements	Instruction that is too simplistic may lose learners' attention; cannot assume level of proficiency with computers, audiovisual equipment or usability testing
Existing skills and knowledge in target content: Learners will have at least an idea of what they want to learn	Potential for some learners to be very experienced in usability testing	Personal observation	Some learners may get bored quickly with basics. Could be wise to allow for self paced learning and non-linear navigation through topics
Time limitations	Learners have a timeline for when they want their project completed, usability testing is one step	Personal conclusion	Learners may get frustrated if the pace of instruction is slowed for a struggling learner Group work may frustrate learners as they already have their own project when beginning instruction Instruction should not require too much formal time to accommodate deadlines and schedules
Reasons for pursuing this instruction	Learners already have a project when beginning this training	Personal conclusion	Learners will want to test their own project in conjunction with instruction Group training and assignments may frustrate learners unless all group members have a shared interest or project responsibility

Appendix B

Current Training and Resources Analysis

Topic	Finding	Source	Implications
Usability Center equipment guide	Basic step by step instructions for setting up and using equipment in the Usability Center Equipment specific No usability instruction or suggested usage	Center for Teaching & Learning	Useful for users already familiar with usability testing Training has to be updated when equipment is changed or upgraded Describes the tools in the center without providing instruction on proper usage
Usability web resources	Broad overview of usability issues No specific instruction, only general principles Not instruction so much as guidelines	usabilty.gov, useit.com, upassoc.org, usabilityfirst.com	Useful for introducing users to usability concepts Not sufficient to inform on the how, only the why of usability testing
Usability testing web resources	Broad overview of usability issues No specific instruction, only general principles Not instruction so much as guidelines	digital-web.com, usability.gov, webcredible.co.uk	Useful for introducing users to usability testing
Focus group web resources	Broad overview of focus group use Discounts value of focus groups Not instruction so much as guidelines	usabilitynet.org , stcsig.org	Useful for introducing users to focus groups

Appendix C

Decision Matrix

	Analysis	Design	Development	Implementation	Evaluation
Website	Values group: Ask users about their related values and needs in a focus group Review current group: Review the current solution in a focus group Test current: Usability test the current solution	Compare low-fidelity with current group: Conduct a focus group to compare a low fidelity prototype with the current solution Generate group: Generate feature/func tionality ideas in a focus group Paper prototype test: Usability test of a paper prototype	Prototype feedback group: Gather user feedback on a prototype in a focus group Test prototype iterations: Usability test prototype iterations Test complex navigation: Usability test complex navigation	Release candidate test: Usability test the release candidate Secondary test: Usability test the secondary functionality (if primary functionality was tested previously) Test help: Usability test the operation instructions and help documentation	Final current compare group: Conduct a focus group to gather opinions about your product when compared to the current solution Summative current test: Compare summative usability test data with data from the current solution
Software user interface	Values group: Ask users about their related values and needs in a focus group Review current group: Review a competing product in a focus group Test competing: Usability test a competing product	Compare low-fidelity with competing group: Conduct a focus group to compare a low fidelity prototype with a competing product Generate group: Generate feature/func tionality	Prototype feedback group: Gather user feedback on a prototype in a focus group Test prototype iterations: Usability test prototype iterations Help desk test: Conduct a usability test involving a simulated call	Release candidate test: Usability test the release candidate Secondary test: Usability test the secondary functionality (if primary functionality was tested previously) Test help: Usability test the operation instructions and help documentation	Final competing compare group: Conduct a focus group to gather opinions about your product when compared to a competing product Summative competing test:

		ideas in a focus group Paper prototype test: Usability test of a paper prototype	to technical support/help desk		Compare summative usability test data with data from a competing product
Device	Values group: Ask users about their related values and needs in a focus group Review current group: Review the current solution in a focus group Test competing: Usability test a competing product	Compare low-fidelity with competing group: Conduct a focus group to compare a low fidelity prototype with a competing product Generate group: Generate feature/func tionality ideas in a focus group Paper prototype test: Usability test of a paper prototype	Prototype feedback group: Gather user feedback on a prototype in a focus group Test prototype iterations: Usability test prototype iterations	Potential use group: Gather opinions on potential use in a focus group Release candidate test: Usability test the release candidate Test help: Usability test the operation instructions and help documentation	Final competing compare group: Conduct a focus group to gather opinions about your product when compared to a competing product Summative competing test: Compare summative usability test data with data from a competing product
Video / presentation	Values group: Ask users about their related values and needs in a focus group Review current group: Review a current solution in a focus group	Storyboard group: Discuss storyboards or scripts in a focus group Generate group: Generate ideas in a focus group	Test complex navigation: Usability test complex DVD navigation	Potential use group: Gather opinions on potential use in a focus group	Finalized group: Conduct a focus group after viewing the finalized presentation Summative competing test: Conduct a focus group to gather

					opinions about your product and compare them with a competing product

Appendix D

Sample Lesson

Section 1: Introduction.

By the end of this lesson you will:

- Understand what usability is

- Be able to identify types of data to collect

- Understand the importance of early iterative testing and

- Be introduced to the Usability Center

We have all used some product that was frustrating to use. It may have been a website that buried what you were searching for beneath five or six pages of navigation. Or it may have been a VCR that devoted three pages of its user's manual to setting the clock. The product still worked as designed; the frustrating part was that it was seemingly designed without users in mind.

"Usability means that the people who use the product can do so quickly and easily to accomplish their own tasks" (Dumas & Redish, 1999, p. 4).

To test a product's usability, therefore, one must (a) learn typical users' feelings and perceptions about it and (b) capture how efficiently a typical user can accomplish tasks with it. These requirements can be summarized as preference and performance data.

When to test. Developing any product is a series of decisions. Each successive choice limits the choices you have down the road. If, for instance, you decide to create a video, all of your design choices now have to be made with video's strengths and limitations in mind. Each decision you make can have an impact, either positive or negative, on how well users like your product. In order to assure your product will be well received, it is necessary to make the most informed choices possible.

There is great value in finding usability issues early. If you wait too long, they become rooted in the product and too expensive to change. Think of it like a high rise building: each new floor is built on top of the one below it. Should the structure of the third floor fail every floor above it will be in danger as well. The foundation, above all else, must be sound to support the rest of the building. Just like the building, the general, global design choices made early in development must be stable enough to support the design structure built on top of it. To achieve this stability in terms of usability, user-centered thought must be incorporated from the first steps of analysis all the way through the final product evaluation.

The Usability Center. The Usability Center was established to help the campus community with their efforts in user centered design. The Center is composed of two rooms designed for usability tests and focus groups. Usability tests and focus groups are widely regarded as excellent means for obtaining user preference and performance data. It is located in the Harold B. Lee Library on the fifth floor.

The first room is the focus group/observer room. This room can comfortably fit ten people. It has a large video display and a white board for demonstrations. There is a video camera that can record the entire room so you can review your focus groups at a later time. For usability tests, there are two moderator computer stations that allow a moderator to observe participants in the next room without distracting them.

The second room is the usability test participant room. It is where usability test participants interact with the products being tested. There are two participant computer stations each with a camera and microphone. This allows the moderator in the first room to see the participant as they interact with the product. Special software allows the moderator to observe the participant's computer screen as well. These stations are separated by an office wall so that two usability tests can take place simultaneously. There is a camera here as well that can record the entire room. This

camera can be used to monitor usability tests that require interaction between users, as well as tests on devices that are not computer based, such as a clicker remote.

Since the Usability Center location only supports activities related to focus groups and usability tests, this guide will only address those two items. But there are many tools available for usability studies.

Review. Usability means users can efficiently use a product. Testing a product's usability consists of collecting data about user preference and performance. Usability testing is an iterative process that is most effective when started early in development and continued throughout the project. The usability center has facilities for usability tests and focus groups, two activities highly effective at determining user preference and getting performance data.

Now you try. Begin thinking about the product you plan to test. What kind of product is it? Make a list of the features you may want to examine. Indicate in which stage of development you can start usability testing your product. When you finish you can move onto the next section. It will help you decide the type of testing to perform, whether focus group or usability test, by offering suggestions based on your product type and its stage of development.

Appendix E

Representation Layer Visuals by Instruction Topic

Code	Topic	Description
I	Unit I: Usability	Appearing bullet points;
IA1	Section 1: Introduction	Appearing bullet points;
IA2	(continued)	Images of complex webpage, VCR, manual, frustrated person; Text of quote; Appearing bullet points, labels "Preference Data" and "Performance Data"
IA3	When to test	Animation showing decision limitations; Image of building, with design interpretation and usability specific interpretation;
IA4	The Usability Center	Navigation through Usability Center with images and a map (not interactive);
IA5	Review	Appearing bullet points;
IA6	Now you try	List the questions to answer;
IB1	Section 2: Choosing your testing activity	Appearing bullet points;
IB2	Usability test introduction	Appearing bullet points; Bullets to summarize 2nd paragraph; Outline difference in obtaining preference and performance data;
IB3	Focus groups introduction	Appearing bullet points; Bullets to summarize 2nd paragraph; Flow of focus group; Text of quote;
IB4	Decision guide	Appearing bullet points; Non-interactive decision guide with axes highlighted as they are discussed;
IB5	Usability during Analysis	Non-interactive decision guide with Analysis phase highlighted; Bullets to summarize paragraph;
IB6	Usability during Design	Non-interactive decision guide with Analysis phase highlighted; Bullets to summarize paragraph;
IB7	Usability during Development	Non-interactive decision guide with Analysis phase highlighted; Bullets to summarize paragraph;
IB8	Usability during Implementation	Non-interactive decision guide with Analysis phase highlighted; Bullets to summarize paragraph;
IB9	Usability during Final Evaluation	Non-interactive decision guide with Analysis phase highlighted; Bullets to summarize paragraph;
IB10	Decision guide (choose a cell)	Interactive decision guide; On selection, text box expands from selected cell containing options for that cell; Contains a close button;
IB11	Test current	Non-interactive decision guide in background; Image of a product labeled "Version 1.0", same product labeled "Version 2.0"; Bullets to summarize paragraph;
IB12	Test competing	Non-interactive decision guide in background; Image of a product "Competitor", similar product labeled

		"New Product"; Bullets to summarize paragraph;
IB13	Paper prototype test	Non-interactive decision guide in background; Picture of user interface diagram; Bullets to summarize paragraph;
IB14	Test prototype iterations	Non-interactive decision guide in background; Timeline of prototype iterations with tests marked between each one; Bullets to summarize paragraph;
IB15	Test complex navigation	Non-interactive decision guide in background; Image of back, forward, home, and menu buttons semi transparent; Bullets to summarize paragraph;
IB16	Secondary test	Non-interactive decision guide in background; Two columns, one labeled primary, the other labeled secondary, with items added as they are listed in voiceover; Bullets to summarize paragraph;
IB17	Release candidate test	Non-interactive decision guide in background; Bullets to summarize paragraph;
IB18	Test help	Non-interactive decision guide in background; Screen capture of typical help, like Google's help, partially transparent; Bullets to summarize paragraph;
IB19	Summative current test	Non-interactive decision guide in background; Image of a product labeled "Version 1.0: Control Group", same product labeled "Version 2.0: Experimental Group"; Bullets to summarize paragraph;
IB20	Summative competing test	Non-interactive decision guide in background; Image of a product "Competitor: Control Group", similar product labeled "New Product: Experimental Group"; Bullets to summarize paragraph;
IB21	Determining test objectives	Text of quote; Image of person thinking labeled "Own experience", image of a group around a conference table labeled "Recommendations from team", image of frustrated person labeled "Potential pitfalls"; Appearing bullet points; Now you try text;
IB22	Translating objectives into tasks	Diagram objective is accomplished by tasks, substitute example text; Break out diagram above into Performance and Preference, with "tasks" changed to "questions"; Now you try text;
IB23	Creating a test script	Continue previous diagram by grouping tasks into scenarios; Appearing bullet points; Continue diagram by ordering scenarios into a script; Now you try text or bullets; Contact information box;
IB24	Usability tests review	Appearing bullet points;
IB25	Review current group	Non-interactive decision guide in background; Image of a product labeled "Similar product";

		Bullets to summarize paragraph;
IB26	Values group	Non-interactive decision guide in background; Image of people labeled "development team" has light bulb over it, image of people labeled "users" has light bulb crossed out over it; Bullets to summarize paragraph;
IB27	Compare low fidelity with current group	Non-interactive decision guide in background; Image of product labeled "Version 1.0", image of mockup labeled "Version 2.0"; Bullets to summarize paragraph;
IB28	Compare low fidelity with competing group	Non-interactive decision guide in background; Image of product labeled "Competitor", image of mockup labeled "New Product"; Bullets to summarize paragraph;
IB29	Storyboard group	Non-interactive decision guide in background; Image of storyboard, progresses when talking about flow, label appears "Does this make sense?" when talking about coherency; Bullets to summarize paragraph;
IB30	Generate group	Non-interactive decision guide in background; Image of website, Calendar and links appear on the page; Bullets to summarize paragraph;
IB31	Prototype feedback group	Non-interactive decision guide in background; 2 columns labeled "Pros" and "Cons", include points listed; Bullets to summarize paragraph;
IB32	Potential use group	Non-interactive decision guide in background; Bullets to summarize paragraph;
IB33	Final current compare group	Non-interactive decision guide in background; Image of product labeled "Version 1.0", image of similar product labeled "Version 2.0"; Bullets to summarize paragraph;
IB34	Final competing compare group	Non-interactive decision guide in background; Image of product labeled "Competitor", image similar product labeled "New Product"; Bullets to summarize paragraph;
IB35	Finalized group	Non-interactive decision guide in background; Bullets to summarize paragraph;
IB36	Determining focus group objectives	Text of quote; Appearing bullet points; Now you try text;
IB37	Translating objectives into questions	Diagram objective is accomplished by questions, substitute example text; Show bad example, cross it out, show good example; Arrow pointing to link to get suggested questions; Text of quote; Now you try text or bullets; Contact information box;
IB38	Focus groups review	Appearing bullet points;
IB39	Reserving the Usability Center	Capture of outlook reserving the usability center;
II	Unit II: The Usability Center	The text; Pictures of Usability Center;

IIA1	Section 3: Using the Usability Center	The text; Buttons for focus group and usability test;
IIA2	Usability test setup	Appearing bullet points;
IIA3	Using *Morae*	Screen shots of *Morae*; Bullets to summarize paragraph; Arrow pointing to link to get *Morae* tutorial;
IIA4	Observing the participant	Screen shots of markers, what a timeline marked up looks like; List types of markers; Screen shots of *Morae* Manager; Now you try bullets;
IIA5	Video recording the entire room	Bullets to summarize paragraph; List step with corresponding images of equipment labeled; Now you try bullets;
IIA6	Focus group setup	Appearing bullet points;
IIA7	The input switcher	Image of the equipment with parts labeled as they are described;
IIA8	Video recording the entire room	List step with corresponding images of equipment labeled; Now you try bullets;
IIA9	Changing the monitor display	List step with corresponding images of equipment labeled; Now you try bullets;
IIA10	Review	Appearing bullet points;
IIB1	Section 4: Piloting	Appearing bullet points;
IIB2	Informed consent	Arrow pointing to link for informed consent template; Appearing bullet points; Link to BYU's IRB site;
IIB3	Remain neutral	Bullets to summarize paragraph; Contact information box;
IIB4	Distractions	Image of a telephone, radio, people talking directly behind someone working; Image of someone showing papers to someone else;
IIB5	Rapport	Text of quote;
IIB6	Think-aloud	Text of quote; Link to download the document;
IIB7	Be sensitive when problems arise	Appearing bullet points; Image of someone refusing, someone nervous, equipment malfunction, someone frustrated;
IIB8	Learning from your pilot usability test	Text of quote; Appearing bullet points; Calendar with test start written on it, pilot test appears two or three days before it;
IIB9	Usability moderation review	Appearing bullet points;
IIB10	Informed consent	Arrow pointing to link for informed consent template; Appearing bullet points; Link to BYU's IRB site;
IIB11	Remain neutral	Bullets to summarize paragraph; Contact information box;
IIB12	Flow of questions	Diagram script of questions, arrow to response, arrow from response to a different question (out of order), repeat;
IIB13	Number of participants	Text of quote; Three people, cross them out, then show eight people; Bullets to summarize paragraph;

IIB14	Number of focus group sessions	Text of quote; Bullets to summarize paragraph; Table showing section number, and TA name;
IIB15	Learning from your pilot focus group	Text of quote; Appearing bullet points; Calendar with test start written on it, pilot test appears two or three days before it;
IIB16	Focus group moderation review	Appearing bullet points;
IIB17	Perform your testing	Bullet points to summarize paragraph;
III	Unit III: The Results	The text;
IIIA1	Section 5: Interpreting your results	Appearing bullet points; Include links;
IIIA2	Performance data	Image of someone overwhelmed; Text "Is task straightforward? → Time to complete task" Appearing bullet points;
IIIA3	(continued)	Screen shots of *Morae* Manager; Include link to *Morae* Manager tutorial; Show ten people labeled 10% to 100%, only have through 60% colored differently than the rest, stamp "Problematic"; Show the examples in causes;
IIIA4	(continued)	Diagram Source error analysis; Show examples listed above, observations about their performance, then attribute source to the error; Outline criticality definition including severity and probability definitions;
IIIA5	Preference data	Column comparing Performance and Preference data; Appearing bullet points;
IIIA6	(continued)	Bullets to summarize paragraph; Outline criticality definition including severity and generality definitions;
IIIA7	Formulating recommendations	Bullets to summarize first paragraph; Text of quote;
IIIA8	(continued)	Text of quote; Image of product with band-aid on it, cross it off; Bullets to summarize final paragraph;
IIIA9	Review	Appearing bullet points;
IIIA10	Now you try	Bullets to outline assignment; Contact information box;
IIIB1	Section 6: Making the report	Appearing bullet points;
IIIB2	Purpose of the report	Text of first paragraph; Bullets to summarize second and third paragraphs;
IIIB3	Report sections	Outline key points for each section; Show example table in "Findings and recommendations" paragraph; Link to template;
IIIB4	Review	Text of quote;
IIIB5	Now you try	Bullets to outline assignment;
IIIB6	Conclusion	Text;

Appendix F

Usability Test Script Grading Rubric

	Excellent (4)	Good (3)	Fair (2)	Needs work (1)
Forming objectives	• All objectives clearly describe the issues and questions to be resolved • All objectives focus on the major tasks a user must be able to do	• Objectives describe the issues and questions to be resolved • Most objectives focus on the major tasks a user must be able to do	• Some objectives may be unclear, but for the most part address relevant questions to be resolved • Some objectives focus on the major tasks a user must be able to do	• Objectives are unclear and/or irrelevant to the product being tested • Objectives ignore major tasks and focus primarily on secondary or minor tasks
		Suggestions: • Work with the client to clarify unclear language • Rework existing objectives so they focus on major tasks	Suggestions: • Work with clients to clarify unclear language • Rework or eliminate irrelevant objectives • Help the client create objectives that address major tasks	Suggestions: • Help the client start from scratch creating new test objectives • Ask probing questions about what they want to learn from their usability test • Direct the client's concentration to focus on the product's functionality and its major tasks
Tasks address objectives	• All of the client's objectives are completely addressed by their tasks	• Most of the client's objectives are addressed by their tasks	• Some of the client's objectives are addressed by their tasks	• Few or none of the client's objectives are addressed by their tasks
		Suggestions: • Work with the client to write or modify tasks so that all of their objectives are satisfactorily addressed	Suggestions: • Work with the client to write new tasks so that all of their objectives are satisfactorily addressed	Suggestions: • Help the client start from scratch creating new usability test tasks • Ask probing questions about how they can obtain the kind of information they would like
Wording of scenarios	• All of the scenarios are worded to be unambiguous	• Most of the scenarios are worded to be	• Some of the scenarios are unclear	• All of the client's scenarios are unclear

			unambiguous
	Suggestions: • Work with the client to reword scenarios that may be a little unclear	Suggestions: • Help the client identify the issues with their scenarios • Work with the client to reword scenarios that are unclear	Suggestions: • Help the client identify the issues with their scenarios • Help the client start from scratch creating new scenarios that are clear
Flow of tasks	• The script begins with a simple scenario to introduce the system • Scenarios are listed in a logical order	• The script begins with a simple scenario to introduce the system • Scenarios are listed in a logical order for the most part	• Some of the scenarios are listed in a logical order	• Early tasks are some of the most difficult or frustrating in the script • None of the scenarios are listed in a logical order
	Suggestions: • Work with the client to alter scenario order so related scenarios are grouped together	Suggestions: • Work with the client to alter scenario order so related scenarios are grouped together	Suggestions: • Help the client identify and group related scenarios together • Help the client identify which scenarios may effectively build on experiences from other tasks and order accordingly

Appendix G

Focus Group Protocol Grading Rubric

	Excellent (4)	Good (3)	Fair (2)	Needs work (1)
Forming objectives	• All objectives clearly describe the issues and questions to be resolved • All objectives focus on the products usefulness, its ease, and users' feelings	• Objectives describe the issues and questions to be resolved • Most objectives focus on the products usefulness, its ease, and users' feelings	• Some objectives may be unclear, but for the most part address relevant questions to be resolved • Objectives focus on the products usefulness, its ease, or users' feelings	• Objectives are unclear and/or irrelevant to the product being tested • Objectives focus on only one of the following: usefulness, ease, or users' feelings
		Suggestions: • Work with the client to clarify unclear language • Rework existing objectives so they focus on one of the topics listed	Suggestions: • Work with clients to clarify unclear language • Rework or eliminate irrelevant objectives • Help the client create objectives that address each of the topics listed	Suggestions: • Help the client start from scratch creating new test objectives • Ask probing questions about what they want to learn from their focus groups • Direct the client's concentration to focus on usefulness, ease, and users' feelings
Questions address objectives	• All of the client's objectives are completely addressed by their questions	• Most of the client's objectives are addressed by their questions	• Some of the client's objectives are addressed by their questions	• Few or none of the client's objectives are addressed by their questions
		Suggestions: • Work with the client to write or modify questions so that all of their objectives are satisfactorily addressed	Suggestions: • Work with the client to write new questions so that all of their objectives are satisfactorily addressed	Suggestions: • Help the client start from scratch creating new focus group questions • Ask probing questions about how they can obtain the kind of information they would like
Wording of questions	• All of the questions are worded to be unambiguous, open	• Most of the questions are worded to be	• Some of the questions are unclear, close-	• All of the client's questions are unclear, close-

	ended, and unbiased	unambiguous, open ended, and unbiased	ended, and/or biased	ended, and/or biased
		Suggestions: • Work with the client to reword questions that may be a little unclear, too close-ended, or leading	Suggestions: • Help the client identify the issues with their questions • Work with the client to reword questions that are unclear, close-ended, and/or leading	Suggestions: • Help the client identify the issues with their questions • Help the client start from scratch creating new focus group questions that are clear, open-ended, and unbiased
Flow of questions	• The questions are ordered so that the answers from each question should lead naturally to the next question	• The questions are ordered so that the answers from most questions should lead naturally to the next question • One or two of the questions seem out of place or awkward in their current order	• Some of the questions seem out of place or awkward in their current order • Related questions are not always grouped together	• Related questions are completely out of order • Questions that introduce a concept are place after questions that expand the same concept
		Suggestions: • Work with the client to alter question order so awkward or out of place questions fit into a flow of questions	Suggestions: • Work with the client to alter question order so related questions are grouped together and responses will flow into the next question	Suggestions: • Help the client identify and group related questions together • Help the client identify which questions may effectively build on responses to other questions and order accordingly

Appendix H

Recommendations Grading Rubric

	Excellent (4)	Good (3)	Fair (2)	Needs work (1)
Address critical areas	• All recommendations address the critical areas the client identified	• Most recommendations address the critical areas the client identified	• Some recommendations address the critical areas the client identified	• None of the recommendations address the critical areas the client identified
		Suggestions: • Work with the client to review issue criticality • Rework existing recommendations so they better address the most critical aspects of the product	Suggestions: • Work with the client to review issue criticality • Rework existing recommendations and create additional ones that better address the most critical aspects of the product	Suggestions: • Help the client determine the criticality of issues discovered • Ask probing questions about what issues seem to be the most severe and would affect the most users • Help the client draft new recommendations that address the most critical issues
Future versions	• The client addresses issues that are too intensive to complete for this version of the product • All "future versions" recommendations are clearly labeled as such	• The client addresses issues that are too intensive to complete for this version of the product • "Future version" recommendations are not clearly labeled as such	• The client does not make recommendations for future versions	• The client only includes recommendations for future versions
		Suggestions: • Work with the client to correctly label "future versions" recommendations	Suggestions: • Work with the client to identify issues that should be addressed in a future version	Suggestions: • Work with the client to make recommendations for improving the current version of the products
Straight forward and clear	• All of the recommendations are worded to be	• Most of the recommendations are worded to be	• Some of the recommendations are unclear	• All of the client's recommendations are unclear

unambiguous and clear	unambiguous		
	Suggestions: • Work with the client to reword recommendations that may be a little unclear	Suggestions: • Help the client identify the issues with their recommendations • Work with the client to reword recommendations that are unclear	Suggestions: • Help the client identify issues with their recommendations • Help the client formulate their recommendations from scratch

Appendix I

Usability Report Grading Rubric

	Excellent (4)	Good (3)	Fair (2)	Needs work (1)
Executive Summary	• The executive summary clearly and concisely relays the key information in the report • The executive summary is kept to one page	• The executive summary clearly relays the key information in the report • The executive summary contains some unnecessary details	• The executive summary does not include key information, but instead functions only as an introduction to the rest of the report	• The executive summary is too vague or doesn't inform stakeholders at a glance • The executive summary is too short to convey any meaningful information
		Suggestions: • Work with the client to streamline the language in the executive summary	Suggestions: • Work with the client to rewrite the section so that it includes an overview of testing done, summaries of the issues, and descriptions of recommendations for change	Suggestions: • Work with the client to rewrite the section so that it includes an overview of testing done, summaries of the issues, and descriptions of recommendations for change
Method	• Brief summary of the testing approach • Clearly demonstrates testing goals	• Summary of the testing approach • Clearly demonstrates testing goals • Includes some unnecessary information like test scripts	• A vague summary of the testing approach • Testing goals are unclear	• Does not include any details about the testing approach (e.g. "I did usability tests.") • Testing goals are unclear or omitted
		Suggestions: • Work with the client to streamline their method section	Suggestions: • Work with the client to write a clearer summary of their testing approach • Help the client concisely state their testing goals	Suggestions: • Help the client start from scratch describing their approach • Help the client concisely state their testing goals
Results	• Concise summary of the general attitudes and	• Concise summary of the general attitudes	• A vague summary of the general attitudes	• An unrepresentative summary of the

performance of participants • Shares example comments that illustrate the general attitude of participants	and performance of participants • Slight tendency to downplay negative results	and performance of participants • Apparent bias	attitudes and performance of participants • Very biased
	Suggestions: • Work with the client to remove bias from the report	Suggestions: • Work with the client to write a clearer summary of the general performance and attitudes • Work with the client to remove bias from the report	Suggestions: • Help the client start from scratch writing their Results section • Work with the client to remove bias from the report
Findings and recommendations	*See the rubric for formulating recommendations		

Appendix J

Usability Report Template

Executive Summary. The executive summary provides readers with a snapshot of the testing and its results. A stake holder should be able to read this one section only and get a feel for what testing was done and what the recommendations for change are. Keep this section to one page if possible.

Method. The method section should be a brief summary of your testing approach. You don't need to include the scripts you used at this point; those can be included in the appendices. Use this section to demonstrate your testing goals and procedures so stake holders can be informed of the efforts you took in testing usability.

Results. The results section is a summary of how participants performed in the tests and thoughts and opinions they shared. You don't need to include raw data, but be sure to direct readers to where it can be obtained.

Findings and Recommendations. Your findings and recommendations section should be a discussion of the sources of error you discovered and your recommendations for change. A simple way to present them would be to set up a three columned table listing the participants' problem, the source of the problem in the product, and the recommendation for change. Start with the most global problems and work your way through to the most specific. Remember, the key to getting your recommendations read and implemented is clarity, so be as transparent as possible in presenting your recommendations.

Problem	Source	Recommendation
Most global problem	It's source	Recommendations for change
Next most global problem	Etc	Etc

Appendix. In the appendices you can include raw data, sample test materials, scripts, etc. This is a resource to interested individuals who want to learn more about your testing effort. Remember to Avoid including participant names, as confidentiality was promised to your participants.

Appendix K

Evaluation Report

Executive Summary. The evaluation found that certain changes needed to be made to the final product before completion. Participants generally agreed that they would use this training if they were tasked with conducting a usability test of their own, but the training in and of itself would not make them anymore likely to use the Usability Center.

Method. The first testing done involved multiple participants reading through the lesson material for comprehension and style. These users were members of the CTL Evaluation Team and therefore part of the intended audience for this training.

The second testing performed consisted of users executing the Usability Center setup instructions in the actual environment. Five members of the target audience were brought into the Usability Center and tasked with using the instructions in the training to operate the Usability center equipment.

Results. The feedback they provided influenced three aspects of the final training product: the topics addressed, the order the topics were addressed, and the instructional tone and language of the lesson materials. This first phase of testing determined that the topics and their order were satisfactory as designed. The only changes made due to this testing were in language selection. An example of this is the Decision Guide; originally this tool was called the Decision Matrix, but user feedback suggested that this title may be confusing so the word guide was used instead.

During the second phase of testing it became apparent that crucial information was left out, particularly steps that were preliminary to executing the equipment setup. The setup instructions were revised to include steps for powering on equipment and stopping equipment when tasks were complete.

Appendix L

Usability Test Protocol

Welcome

Thank you for agreeing to help us test learning materials designed to help you use the Usability

Center. The information and opinions you provide today will help us make improvements to the

included instructions.

As you proceed through these scenarios, you will be asked to perform functions related to the use of

the Usability Center equipment. For the purposes of this exercise you will play the part of a usability

tester for a new website your team has produced. We invite you to speak your thoughts out loud so

we can capture your impressions of the instruction as you use it.

Remember, your participation is completely voluntary; you can leave any time you wish.

Scenarios

1. You have just arrived in the Usability Center for the first time and wish to familiarize

   yourself with the facilities. Using the descriptions contained in the instructions, locate the

   following equipment:

   a. The participant computer workstations

   b. The facilitator computer workstations

   c. The input/output switcher

2. You and your team have decided that you would like to conduct focus group to gather ideas

   for your website. The focus group will be held later today. Use the instructions to use the

   room camera and VCR/DVD combo to record the focus group.

3. After the focus group, you and your team have implemented many of the suggestions you

   received. Now you would like to perform usability tests on a new prototype of the website.

   Prepare a facilitator and a participant computer workstation to conduct these usability tests.

4. Your team has decided that they would like to see how two users work together to solve a group problem. Your team would like to observe them as they work and record the session to review later. Use the instructions to display the participant room on the monitor and record the session using one of the VCR/DVD combos.

5. Now that the website is complete, your team decides that they would like to hold another focus group to gather initial impressions. You will need to demonstrate the website to the group and you would also like to show them a DVD. Use the instructions to display the desktop of one of the facilitator computer workstations on the monitor and then switch to one of the VCR/DVD combos to play the video.

Please answer the following questions out loud so we can gather your opinion of the instructions.

6. Overall, how clearly do feel the instruction was worded?

7. How sufficient were the instructions in helping you complete the scenarios?

8. What additional information, if any, would you include to better help you accomplish these scenarios?

9. What other comments, questions, or suggestions do you have?

Thank you

This concludes this usability exercise. Thank you for your participation. Your feedback will be invaluable to help us improve the Usability Center setup instructions.