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LEVELLING UP: DESIGNING AND TESTING A CONTEXTUAL, WEB-BASED

DREAMWEAVER 8 TUTORIAL FOR STUDENTS WITH TECHNOLOGICAL APTITUDE

DIFFERENCES

by

ALICIA NICOLE HATTER

Under the Direction of Jennifer L. Bowie

ABSTRACT

This thesis examines the user-centered design methods and methodology inherent to designing and testing a web-based Dreamweaver 8 tutorial for undergraduate and graduate students who enroll in certain English rhetoric and composition courses at Georgia State University. The tutorial's three interfaces were rhetorically designed to support three corresponding types of user—novices, intermediates, and experts— whose familiarity with Dreamweaver and student web space determined their starting point of interaction with the artifact. Three usability tests examined each interface based on four usability attributes. Findings revealed the novice and expert interfaces to be usable, while the intermediate interface was more problematic. The analysis of findings indicated the advanced documentation theory to be sound; however, the practical implementation of the theory to this artifact was comparatively ineffective. More research is suggested for determining whether a multimodal tutorial design is the most useful and usable for the target audience(s).

INDEX WORDS: User-centered design, Usability testing, Usability, User groups,
                 Documentation, Tutorial, Computers and composition, Technology in the
                 classroom

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ALICIA NICOLE HATTER

A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of

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in the College of Arts and Sciences

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LIST OF ABBREVIATONS

EW&P	Electronic Writing and Publishing
DMXT	Dreamweaver MX Tutorial
D8T	Dreamweaver 8 Tutorial
NU1	Novice User 1
NU2	Novice User 2
NU3	Novice User 3
NU4	Novice User 4
NU5	Novice User 5
IU1	Intermediate User 1
IU2	Intermediate User 2
IU3	Intermediate User 3
IU4	Intermediate User 4
IU5	Intermediate User 5
EU1	Expert User 1
EU2	Expert User 2
EU3	Expert User 3

CHAPTER 1

Project Overview

As user-centered design methodology and usability theory and testing continue to gain

trans-disciplinary support, rhetoric and composition scholars advance investigations of the

heuristic nature of this contextual, participatory research. Engineering a product with a user-

centered focus often means incorporating usability testing into the product's development cycle.

Usability studies have undoubtedly expanded over the last two decades. Among a host of other

areas, the purview of usability includes testing computer documentation as well as studying the

relationship between different user groups and system-supported functions (for example, see

Shneiderman, 2003). Also, in a purpose particularly relevant to rhetoric and composition

researchers, user-centered design is being applied to pedagogy in a variety of ways (see, for

example, Johnson 1998; Blythe 2001). In this thesis, I will address issues of usability, pedagogy,

and diverse user groups by conducting usability testing on a classroom documentation artifact

that contextually interfaces with users of different technological aptitudes with respect to a piece

of web development software used by both undergraduate and graduate students in rhetoric and

composition courses at Georgia State University. The findings from this research are relevant

for technical writers who struggle with writing documentation to maximize usefulness for

diverse audiences of users, and who wish to find ways to contextualize an otherwise static genre,

for teachers who incorporate complex computer technology into the composition classroom, and

for researchers interested in examining the application of a user-centered design methodology to

dynamic documentation writing.

Research Aim

The main purpose of this research project is to determine how usable a computer-based, user-centered documentation artifact is. In particular, I examine how three attributes of usability can be used to evaluate the artifact for usefulness. I employ a "discount" form of usability testing to test the usability of the artifact (Nielson, 1994a), which is a contextual Dreamweaver 8 tutorial I designed and wrote to accommodate three separate audiences or user groups: novices, intermediates, and experts. These categories are not overarching; they do not attempt to define a user's general technological aptitude. Rather, they refer only to users' familiarity with Dreamweaver. As a further point of description, each audience's interface is separate from the others and is tested as such, with test tasks that are mimetic of the particular interface's purposes and goals. Furthermore, each interface is modeled after a distinct documentation writing strategy that is conceptually related to the user group it is written to accommodate. Once the findings from the usability tests are presented and evaluated, I suggest design changes that could improve the tutorial's usability and its usefulness to all those for whom it was created.

Method and Methodological Research Context and Terminology

Usability is not a new concept. The idea has been around at least since the Second World War, and has only progressed in scope and complexity as technology use has become increasingly widespread and diversified. As it has evolved, usability has attracted experts from a wide variety of fields, and has produced standards and heuristics for myriad usable technology designs. To get a sense of the breadth of disciplines from which usability experts draw in their research and practice, the following list specifies a field, and provides the names of scholars and/or practitioners who are associated with usability research in that area:

- *Computer Science* – John Carroll, Alan Cooper, Hugh Beyer, Deborah Hix, Aki Helen Namioka, Kristen Nygaard

- *Human-Computer Interaction* – Susanne Bodker, Pelle Ehn, Joanne Hackos, Michael Levi, Jakob Nielson, Terry Winograd

- *Human Factors* –Susan Dray, John Gould, Clayton Lewis, Jeffrey Rubin, Dennis Wixon

- *Psychology* –Karen Holtzblatt, Donald Norman, Stephanie Rosenbaum, Larry Wood

- *Technical Communication* – Carol Barnum, Stuart Blythe, Horton, Robert Johnson, Barbara Mirel, Christianne Postava-Davignon, Whitney Quesenbery, Jean Pratt, Deborah Ray, Eric Ray, Janice Redish, Michael Salvo, Karen Schriver, Clay Spinuzzi

Usability refers to how easy products are to use. Inherent to the definition of usability is a focus on the user, and on engineering a product that will provide accessible ways for her to complete her work effectively and efficiently. In the beginning of their seminal usability book, Joseph Dumas and Janice Redish (1999) define the term as such: "Usability means that the *people who use the product* can do so *quickly and easily* to accomplish *their own tasks* (p. 4, italics in original). Three years later, Carol Barnum (2002) adds, "Usability must be understood as matching the needs of a particular user for a particular use" (p. 6). At the 2001 annual STC conference, Whitney Quesenbery (2003 p. 100) discussed general usability in terms of five dimensions, which she calls "the 5 E's":

- *Effective* – The completeness and accuracy with which users achieve their goals

- *Efficient* – The speed and accuracy with which users complete their tasks

- *Engaging* – The degree to which the tone and style of the interface makes the product pleasant, satisfying or enticing to use

- *Error tolerant* – The degree to which the design prevents errors, and helps with error recovery

- *Easy to learn* – The degree to which the product supports both initial orientation and deepening understanding of its capabilities

A short time later, Jakob Nielson (2003) created a similar list of the following five quality attributes that relate to usability in an online environment:

- *Learnability* – How easy it is for users to orient themselves and perform vital tasks

- *Efficiency* – How rapidly users can carry out tasks once they have oriented themselves

- *Memorability* – How easily users can relearn tasks once they have been absent from the site for a while

- *Errors* – How many difficulties users run into when attempting to complete tasks had how much these difficulties impact task completion

- *Satisfaction* – How inviting the aesthetics of the site are for users

From all of these definitions, it is clear that usability pays particular attention to usefulness, which is "defined in terms of the user's *need* for the product in the context of the user's *goals* (Barnum, 2002, p. 6) and to user determinations of "when a product is easy to use" (Dumas and Redish, 1999, p. 4).

The importance of usability has been argued by all those who use the technique to improve products. Many of those who argue for usability do so in terms of what can happen when usability is *not* absorbed as part of a product's cycle of development. In a classic example, Ellen Bravo discoursed on the dangers of not considering users at a Participatory Design conference in 1990. "Leaving out the users isn't just undemocratic," Bravo claimed, "It has serious *consequences* for worker health, human rights, job satisfaction, and also for the work

process and the bottom line" (p. 4). She goes on to point out many powerful examples to bolster

this argument, but the most memorable of which recalls the lawyers who had new carpet

installed in their office. To keep this new investment as pristine as possible, they had secretaries'

chairs nailed to the floor. Bravo (1993) finishes this story pointedly:

> Of course, when the secretaries came to work the next
>
> day, they could not perform their job because they had to
>
> roll from the typewriter to the computer to the telephone.
>
> This is a great example of what happens when you omit the
>
> user. Not only does it incapacitate the user, but think about
>
> what the carpet must have looked like when the lawyers had
>
> to have the chairs unnailed (p. 3).

Barnum (2002) and, even more recently, Randolph G. Bias and Claire-Marie Karat (2005) all

underscore Bravo's (1993) argument by adding that refusal to incorporate usability into a

product's development cycle can result in more customer support calls, the need for more

employee training, loss of business to competitors, and the crippling of a company's image.

Although some persist in claiming that usability techniques are too financially and

temporally costly to include in low-budget projects, studies repeatedly contradict such notions

that usability need be expensive and complex to be incorporated properly (see for example, Karat

& Lund, 2005). Based on a compilation of his and other researchers' findings, Nielson (1994a)

wrote persuasively that usability testing can be done both quickly and cheaply by paring down

usability techniques such as thinking aloud, complicated heuristic evaluations, and testing large

amounts of users. In fact, Nielson (1994a) argues, "The benefits from user testing are much

larger than the costs, no matter how many subjects are used. The maximum benefit-cost ratio is

achieved when using between three to five users" (p. 251). Nielson (1994a) also asserts that

usability can be moderated by someone in the field with a minimum amount of training in note

taking and task analysis. Thus, with the advent of these "discount" usability methods, there is

almost no excuse for not including at least a certain amount of usability techniques into a

product's development cycle.

When the decision is made to prioritize and thereby ensure usability, a user-centered

design methodology can be at work. User-centered design places the users' "perception of

usefulness and feeling of satisfaction" at the heart of design considerations (Barnum, 2002, p. 7).

Further, a user-centered design methodology is "based on the needs and interests of the user,

with an emphasis on making products usable and understandable" (Norman, 2002, p. 188). John

Gould and Clayton Lewis (1985) are often cited as the some of the first researchers to establish

the key principles of user-centered design. Jeffrey Rubin (1994, p. 12) synthesizes these

foundational aspects of user-centered design into three main points:

- Early focus on users and tasks

- Empirical measurement of product usage

- Iterative design whereby a product is designed, modified, and tested repeatedly

Dumas and Redish (1999) highlight several other important methodological points inherent to

user-centered design:

- User involvement throughout the product development cycle

- User needs determine design decisions

- Teams composed of specialists in interface design, technical communication, and

  usability testing work together to ensure the final product is user-centered

The above discussion encapsulates what user-centered design means to usability specialists in an industrial setting. For usability scholars interested in user-centered design and technical communication, it is equally important to note the contribution Robert Johnson (1998) has made in advancing a rhetorical theory of user-centered design. In addition to calling for user empowerment through involvement in technologies' design and usability evaluation, Johnson (1998) adds to the list of user-centered design principles. Building on earlier work done by Scandinavian researchers such as Susanne Bodker (1991) and Pelle Ehn (1993), Johnson (1998) stresses, "The core of the user-centered view…is the *localized* situation within which the user resides" (p. 129). User-centered design, then, is a contextual methodology that is both continually "collaborative" and perpetually "negotiated" (Johnson, 1998, p. 135) to fit the needs of the situation at hand.

As research designs evolve under the methodological direction of user-centered design, they are qualitatively and quantitatively evaluated with the method of usability testing. Barnum (2002) argues for usability testing as an empirical method that involves "learning from users about a product's usefulness by observing them using the product" (p. 9). In other words, usability testing is "a process that employs participants who are representative of the target population to evaluate the degree to which a product meets specific usability criteria" (Rubin, 1994, p. 25). Although there are established usability heuristics that have been developed both for general user interfaces (Nielson 1994b), and for documentation (Carroll 1998), it is up to usability specialists to evaluate the users' goals, use context, and needs to determine each usability test's criteria.

According to Dumas and Redish (1999), who are in almost verbatim agreement with Rubin (1994), usability testing has five primary characteristics:

- Improved product usability is paramount. Each test has goals specific to the improved usability of the product, and these goals are articulated during test planning

- Participants either are, or are representative of, actual users of the product

- Test tasks are a sample of the tasks users would engage in when using the product for their real work

- Participant actions are recorded by the usability researcher(s) during the test

- Data are analyzed following the test, and the testing team recommends design changes that address all problems discovered during the test

Although usability testing can be quite involved (as is evidenced by the fact that many of the handbooks on the subject exceed 200 pages), research supports low- or no-budget testing with small sample sizes in non-laboratory settings with manual note-taking and timing as all the observation needed to produce findings and recommendations that will lead to a more usable product (Nielson, 1994a; Barnum, 2004). For small business interested in frugality, and for graduate student research, such "discount" usability testing is ideal.

Contribution of Knowledge to the Field

In the early days of user-centered design, projects usually involved some type of computer technology. For instance, many of the vanguard user-centered design researchers were employed by Apple, Xerox, IBM, or other companies specializing in software development (Wixon & Ramey, 1996). Excitingly, in the last few years, user-centered design projects have become widely diversified. Computer game testing (Pagulayan, et al., 2007), security software development (Zurko & Simon, 2007), online pedagogical models (Blythe, 2001) and computer documentation (Spinuzzi, 2002; Mirel, 2003; Postava-Davignon, et al., 2004) projects all owe debts of success to the philosophy that places users at the heart of design.

However, as mentioned above, even as user-centered design projects proliferate, there will always be those who denigrate usability because they do not believe the benefits outweigh the costs. As Nielson (1994a) points out, one reason many people mistakenly believe usability testing to be prohibitively costly and time consuming is because the studies that tend to be published regarding usability casework are often intimidating in scope. That is, published usability case studies often showcase projects that involve large numbers of participants, expert usability specialists with extensive training in prototyping, task analysis, and heuristic evaluation, and the use of sophisticated testing equipment to capture quantitative data that is mined for statistical significance. Additionally, I encountered case studies in my own reading wherein teams of researchers were brought in to conduct usability testing or to use other user-centered design methods like contextual inquiry to collect massive amounts of data for large user-centered design projects (see, for example, Brown, 1996; Mirel 2003). Even academic projects like those described by Michael Corry (1997) and Barnum (2002) involve teams people who work together to design the usability test, recruit participants, schedule and conduct the tests, evaluate the results, and write the final report.

However, it is not often in an academic setting that funds, even on the order of those required to conduct Nielson's discount usability techniques, are readily available. Also, unlike in an industrial setting, it is not uncommon for academics to work alone or in very small teams on projects when there is a dearth of both time and money (see, for example, Bowie, 2004; McGovern, 2007). I offer this project as a further illustration of the malleability of the user-centered design method of usability testing, and the fluidity of the methodology behind it. If it is true that the methodology and the methods are readily adaptable to the situations that bear out their use, then this project will demonstrate how one researcher can attempt to let the

methodology of user-centered design drive the construction of a contextual, pedagogical artifact that is tested for usability using a method that is as adaptable as the methodology it is in service of.

Furthermore, this study adds to the body of knowledge currently in circulation regarding web-based tutorials and similar online instruction. The D8T is an attempt to fuse the basic elements of web design popularized by notable usability experts like Nielson (1999) with the concept of a functional multi-level GUI as described by Ben Shneiderman (2003). Testing the tutorial examines the usefulness of the three-level approach as well as the different documentation strategies that served as rhetorical models for each of the D8T's interfaces.

Overview of Thesis Research Method and Methodology

The methodology that guided the design and writing of the Dreamweaver 8 Tutorial (D8T) was user-centered design. The methodology of user-centered design provides viable methods that can improve designs and ultimately make them more useful and usable for their target audiences. While there are many user-centered design methods, I have selected usability testing as the one I will use to evaluate the D8T because, of the methods Rubin (1994), Dumas and Redish (1999), and Barnum (2004) discuss, usability testing is the only one that allows for evaluation of an already designed and implemented artifact. Other methods such as contextual inquiry (Beyer & Holtzblatt, 1996) and design ethnography (Blomberg, 1993; Wood, 1996) are excellent for collecting data that inform iterative design, but they are not useful for testing a finished product. Usability testing is further appropriate for this project because it specifies proven field testing and participant recruitment techniques, as well as ways of observing and analyzing test tasks that ultimately generate design changes that can contribute to a more useful, usable, and, at best, desirable product (Dumas & Redish, 1999; Barnum, 2002).

Research Design Summary

The main research question I examine in this project is: How usable is a contextually-sensitive Dreamweaver 8 tutorial for the three user groups it addresses—novices, intermediates, and experts? From this inquiry arises the following sub-question, which pertains to specific usability attributes that can be examined through usability testing: How efficient, error tolerant, and easy to use is the D8T for each of its user groups? To answer these questions, I conduct usability testing on each of the D8T's three interfaces. The purpose of usability testing is to ascertain the following:

1. How users interact with the web-based tutorial. To examine this, I recorded task completion times, error frequency, action sequences contributing to task completion, and verbal and written cues pertaining to user frustration and/or delight during testing.

2. How usable the D8T is from the users' perspective. To accomplish this, I analyze both the quantitative data consisting of task completion time and error frequency, and the qualitative data consisting of narratives describing users' interaction with the D8T. These types of data are relevant to determining how efficient, error tolerant, and easy to use the D8T is.

Participants

Since the D8T has three portals on the homepage that lead to three different interfaces, users from each of the three designated levels of familiarity with Dreamweaver (novice, intermediate, and expert) are tested. Nielson (2000) argues that, within the framework of discount usability methods, testing 15 users will isolate all usability problems. For optimum usability according to this model, 15 users would test each of the D8T's three interfaces. However, Nielson (2000) goes on to say that if circumstances surrounding the project do not

allow for this large number of participants, it is acceptable to proceed with three tests involving

between three to five users each. Therefore, five representative users tested the novice and

intermediate interfaces, and three users tested the expert interface, resulting in 13 total test

participants. At this point, it is necessary to mention that I have undergone Institutional Review

Board testing and have received full approval for the involvement of human subjects in this

research project.

Test Plan

There was a fair amount of interaction between the participants and myself during

usability testing. Participants were greeted, briefed on the purpose of the study, handed the

informed consent document to look over and determine if they wished to proceed; if so, they

were shown to a computer terminal in room 303 of Classroom South. As discussed, the

discount usability testing method allows for testing in a non-laboratory setting. In addition, the

methodology of user-centered design emphasizes familiarity with the context of use as a way of

designing products suited to the use-environment. Therefore, I conducted the testing in the

location in which EW&P, Digital Rhetoric, and Technical Communication classes typically meet

and compose assignments that utilize Dreamweaver 8.

Once seated at the computer terminal, I instructed participants to fill out a pre-

test demographic survey asking about their gender, age, level of education, and familiarity with

Dreamweaver. I used this information to describe the actual participant pool. Next, I explained

that they complete a set of eight tasks that should take approximately 30-45 minutes to finish. I

interacted with participants during testing when they committed errors and needed assistance to

complete tasks. Following testing, participants filled out a post-test survey, which broke tasks

down individually, and asked participants their impressions of how easy (or difficult) the D8T

was to use. The post-test survey qualitatively measured users' reaction to the D8T's and their

perceptions of its usefulness in helping them complete the tasks.

Thesis Overview

This thesis is comprised of three additional chapters. Chapter 2 will delve into greater

detail with respect to the research method and methodology. I present a full verbal description of

the content and design of each of the D8T's three interfaces in conjunction with screenshots, and

discuss in more depth the research questions and the rationale behind the design of this study. I

explain the specific application of discount usability testing, and demonstrate how a user-

centered design methodology has been applied to the project as a whole. In addition, I discuss

how the study design responds to the research questions. Chapter 2 concludes with a

presentation of the tools used to gather data from each of the usability tests.

In chapter 3, I present the findings and analysis from the novice, intermediate, and expert

usability tests individually. I discuss the findings from each test in terms of the usability

attributes of efficiency, error tolerance, and ease of use (Quenesbery, 2003; Nielson, 2003).

Triangulation was used to analyze the results and make recommendations for how each interface

might be redesigned to improve the usability of the D8T. I conclude Chapter 3 by definitively

answering the research questions I examined during this study.

Chapter 4 concludes the study. I outline directions for future related research, and re-

contextualize the project in global terms to highlight the implications research of this nature can

have on the discipline as a whole.

CHAPTER 2

Introduction

In this chapter, I explore in detail the method and methodology underlying this thesis.

Here, I reiterate the research question and sub-question, explain the rationale behind the project,

and provide a verbal and visual description of the D8T. I also describe the specific

implementation of discount usability testing as the research method, as well as the application of

the methodology of user-centered design to both usability testing and the creation of the D8T.

Additionally, I explain the research design, and discuss how the design responds to the research

question. Finally, I present the techniques and tools of usability testing used to test the D8T.

Research Question and Rationale

The main research question I investigate in this thesis is:

- How usable is a contextual Dreamweaver 8 tutorial for the three separate user groups it

  addresses—novices, intermediates, and experts?

The sub-question specifically related to this inquiry is:

- How efficient, error tolerant, and easy to use is the D8T?

The remainder of this section provides a rationale for this research project by conferring

the specifics surrounding the contextual nature of the D8T. I discuss Dreamweaver usage in the

rhetoric and composition classes in which the program is utilized, the course objectives that

make it difficult to devote much class time to "teaching" this powerful software which point to a

need for a documentation artifact like the D8T, and give an anecdotal account of the tutorial's

evolution as a user-centered artifact. This section concludes with a detailed explanation of the

three user interfaces and the practical and theoretical models on which they are based.

Macromedia Dreamweaver 8 is a comprehensive web design and development tool. It is often used in rhetoric and composition classes at Georgia State University because it is both powerful and accessible—it is part of a comprehensive Macromedia package that includes Fireworks, ColdFusion, and Flash. This software package is installed in all English computing classrooms, the Usability Testing Lab (also an English classroom), as well as the Digital Aquarium, a state-of-the-art computing area on campus for general student use.

Georgia State students use Dreamweaver to complete course assignments in certain sections of the undergraduate Electronic Writing and Publishing class, (ENGL 3120), the graduate version of the same class (ENGL 8121), and Digital Rhetoric (ENGL 8123), which is also a graduate level class. Additionally, certain sections of both the undergraduate and graduate levels of Technical Writing (ENGL 3110 and 8115, respectively) also use Dreamweaver for web design and writing assignments. Finally, Dreamweaver has been used in the rhetoric and composition special topics course User-Centered Design (ENGL 8900), and could be utilized in future English topics courses with technology as a focus.

It is important to understand that while no prior knowledge of Dreamweaver is required for registration in any of the courses mentioned, none of the classes are intended to be "how to" courses. Although students must demonstrate their ability to design, compose, and upload a website to complete some assignments, the course's objective is to familiarize students with online rhetorical principles such as "audience, purpose and content," "[I]nternet writing strategies," and "[I]nternet ethics, netiquette, and copyright issues" (Bowie, 2007a). Along the same lines, the graduate course of Digital Rhetoric is intended to teach principles of design and writing for the web, as well as advanced usability applications such as prototyping and task

analysis (Pullman, 2007). Finally, the graduate level of Technical Communication mainly

focuses on the ethics behind and the theoretical principles underlying the field of technical

communication, although one of this course's main assignments is to compose as a class a

website using Dreamweaver. These courses' objectives highlight the fact that while

Dreamweaver is sometimes utilized as a way of allowing students to practice implementing web

design principles, none of the courses are designed to provide detailed in-class instruction on

how to use the program (beyond an introduction to the software and its design capabilities).

While the purpose of the courses is to ensure students successfully demonstrate

competency with respect to the various course objectives described above, the fact that a

significant portion of students enter these classes knowing little to nothing about Dreamweaver's

interface represents a space teachers must negotiate, given that use of the program is sometimes

required. A recent estimate of the Spring 2007 undergraduate EW&P class demographics

figured at least half of the students enter the class with limited web design experience, meaning

that they have customized MySpace sites or other online community accounts where pages can

be edited using HTML, while only about a fourth have previously created basic and/or personal

websites by hand coding or by using either Dreamweaver or similar web design programs such

as Frontpage or EditPlus. The remaining fourth of students are true novices to writing and

designing for the web, although they are comfortable with basic computing functions such as

Internet browsing and email (Bowie, personal communication, May 4, 2007). With so many

students being new to Dreamweaver, teachers often find that they must repeatedly explain

Dreamweaver functions; these how-to oriented deviations take from class time that is better

served in fulfilling such course objectives as critiquing existing websites for design layout or

considering how the rhetorical concepts of audience and purpose are applied to an online environment.

I created the original Dreamweaver MX Tutorial (DMXT) in the fall of 2005 in response to the complexities associated with using such a powerful and unfamiliar technology as Dreamweaver in the rhetoric and composition classroom. I encountered these difficulties firsthand in Digital Rhetoric when I discovered that no textbook, no matter how thorough, can cover the contextual issues that arise when publishing websites to student web space on university servers to fulfill assignment requirements. My classmates and I often needed reminding when it came to Georgia State's remote host addresses, our student URLs, and our host-specific FTP login and password information. I therefore initially designed the DMXT to be a resource students could refer to on their own for answers to FTP or site definition questions, since these types of inquires are not, and cannot be, contextualized in either the courses' required or supplemental printed texts.

Although intended to be a helpful resource, the DMXT was lacking in its attention to audience needs, and, in fact, its own purpose as a documentation artifact. Since the specific circumstances surrounding the nature of the courses described above seemed to indicate the real need for such an artifact, I began looking into the methodology of user-centered design and the related method of usability testing as inroads to improving the DMXT and making it a resource of value to future EW&P students and to students in other rhetoric and composition courses wherein Dreamweaver is either required or is otherwise utilized to complete assignments.

To improve the usability of the DMXT, I first had to isolate the problem areas within the artifact. I adopted aspects of the user-centered design method of contextual inquiry (Holtzblatt and Jones, 1993; Beyer and Holtzblatt, 1996) to interview students who had used the DMXT and

to map their activity sequences in completing some of the tasks the DMXT was designed to support. I also thought about the relationship between the courses' demographics, their objectives, and the complexity of not only Dreamweaver itself, but of the process of using the program to FTP files to Georgia State's student web space, and of the contextual nature of that interaction. At the same time, coursework and personal interest led me to research user-centered design, usability, and documentation strategies.

An article by Candace Soderston and Thyra Rauch (1996) solidified for me the importance of incorporating a user-centered design process into the development of products that prioritize usability. In other articles specifically pertaining to documentation, Jean A. Pratt (1998) and Deborah S. Ray and Eric J. Ray (2001) discuss and review online and embedded documentation strategies, respectively. Pratt (1998) in particular makes the compelling argument that "online help systems should be developed for a wide spectrum of users from the novice who has never seen the software…to the expert who may need a quick little refresher on infrequently used procedures or shortcuts" (pp. 35-36). Several years later, Shneiderman (2003) acknowledges the universal usability claim inherent to Pratt's (1998) assertion that interfaces should be designed for multimodal interaction (for cautionary remarks on "universalizing" users, see Bowie, 2003). Shneiderman (2003) makes the key point that, although technically complicated to code and cognitively complex to compose, multi-level GUIs can advantageously serve the usability interests of diverse groups by building in a learning curve of sorts that allows users to expand the interface's complexity as they become more familiar with its functionality. Based on the data gathered from the contextual inquiry techniques, my assessment of the learning objectives of the courses mentioned above juxtaposed with the practical problem of teaching students the intricacies of web authoring or publishing technologies, and my research,

the importance of addressing the audiences of the courses as disparate user groups with different

degrees of aptitude with respect to Dreamweaver was apparent.

I accordingly redesigned the DMXT to not only reflect the software's update from MX to

version 8, but also, and more importantly, to account for the different levels of familiarity with

Dreamweaver that both undergraduate and graduate students enter the courses with. The

research indicated that it might be advantageous from a usability standpoint to break the DMXT

into three separate tutorials that would each address different levels of familiarity with

Dreamweaver. This separation would allow the tutorial to specifically accommodate the

different audiences of users who comprise the courses: those who have never used

Dreamweaver before (novices); those who have used Dreamweaver before in a limited capacity

or who are out of practice with the software, but who would recognize the interface when again

presented with it (intermediates); and those who often use Dreamweaver and are current with

regard to their knowledge of the functionality of the program (experts). As students progress

through a semester in any of the courses described, the D8T is designed to support their ascent

from a novice degree of familiarity to an expert understanding of the Dreamweaver functions

that directly pertain to Georgia State students.

Artifact Descriptions

In this section, I describe each of the D8T's three interfaces. I begin with a general

argument in favor of documentation for multiple user groups, and then move into a discussion of

each of the D8T's interfaces in turn. I discuss the interfaces in terms of the models on which

they are based, and the discussion is supplemented with screenshots for added richness.

User-centered documentation research suggests certain models exist that guide the

technical practice of writing a tutorial for a given audience. Barbara Mirel's (1998, 2003) work

in particular has done much to differentiate between documentation strategies that work for

different user groups. In an articulation of the problem of a single (usually task-oriented)

documentation strategy which I find particularly relevant, Mirel (1998) notes,

> On one hand, experts need refresher learning satisfied
>
> by reference materials…On the other hand, novices need to
>
> learn discrete, rule-driven operations and building-block concepts
>
> to develop repertoires of actions incrementally without being
>
> overwhelmed by too many variables…Different from both,
>
> experienced users know many computing repertoires and
>
> shortcuts and are ready to manipulate programs to serve their
>
> purposes, but they are neither as facile nor as intuitive as experts
>
> in finding their way around a program and making it serve their
>
> specific task purposes (p. 13).

While it is usually more difficult, for a number of reasons including cost and size, for a

comprehensive print manual to address different user groups separately, a web-based tutorial can

easily support links to different interfaces for three separate user levels. Thus, in the D8T, each

interface is written and designed for Georgia State students in the aforementioned rhetoric and

composition courses. Furthermore, each of the three interfaces of the D8T is rhetorically based

and draws from established documentation techniques and models.

Novice Interface Description

      I utilized a task-oriented documentation strategy to guide the visual design and writing

style of the novice interface. Thomas Barker (1998) explains that task-oriented documentation is

detailed and linear; it verbally and visually guides beginning application users through every step

of a process. Additionally, a task-oriented writing style is purposefully direct because, as

Johnson (1998) notes, "Novice users want to become involved with the use of the computer

immediately, and reading becomes a hindrance because it disengages the user from the activity

of computer usage" (p. 82). One reason the D8T is an online artifact (as opposed to a printed

packet attached to course syllabi, for example) is in response to user impatience and in deference

to the use context of the artifact. Pratt (1998) cites prior research by Greg Kearsley (1985) to

make the point that "when training is integrated with the work setting/application," productivity

consequently increases (p. 33). Johnson (1998) adds that truly user-centered documentation

supports "learning through doing" (p. 142). The D8T in general supports learning through doing

because it allows users to easily switch between screens or to have both the D8T and

Dreamweaver open at once for adept comparison of screens and execution of accompanying

actions.

The first page of the novice D8T demonstrates the integration of verbal and visual

elements in task-oriented documentation. Figure 2.1 illustrates the use of headings and color to

direct the eye. It also shows the navigation scheme this interface utilizes. At the top of the page,

there is global navigation to the two other interfaces as well as back to the D8T's homepage, and

underneath this, separated by headings in red, is navigation within the novice interface, which

appears as two underlined links. Figure 2.2 shows how each task on the novice interface (in this

screen, for example, the task is creating a site in Dreamweaver) is broken down into numbered

steps. To add a further level of detail to the documentation, the screenshots were edited with red

marks that either set off the part of the screenshot discussed in the step, or that succinctly

describe an action to be taken on that screen. The novice interface is streamlined with this step-

by-step verbal and visual approach.
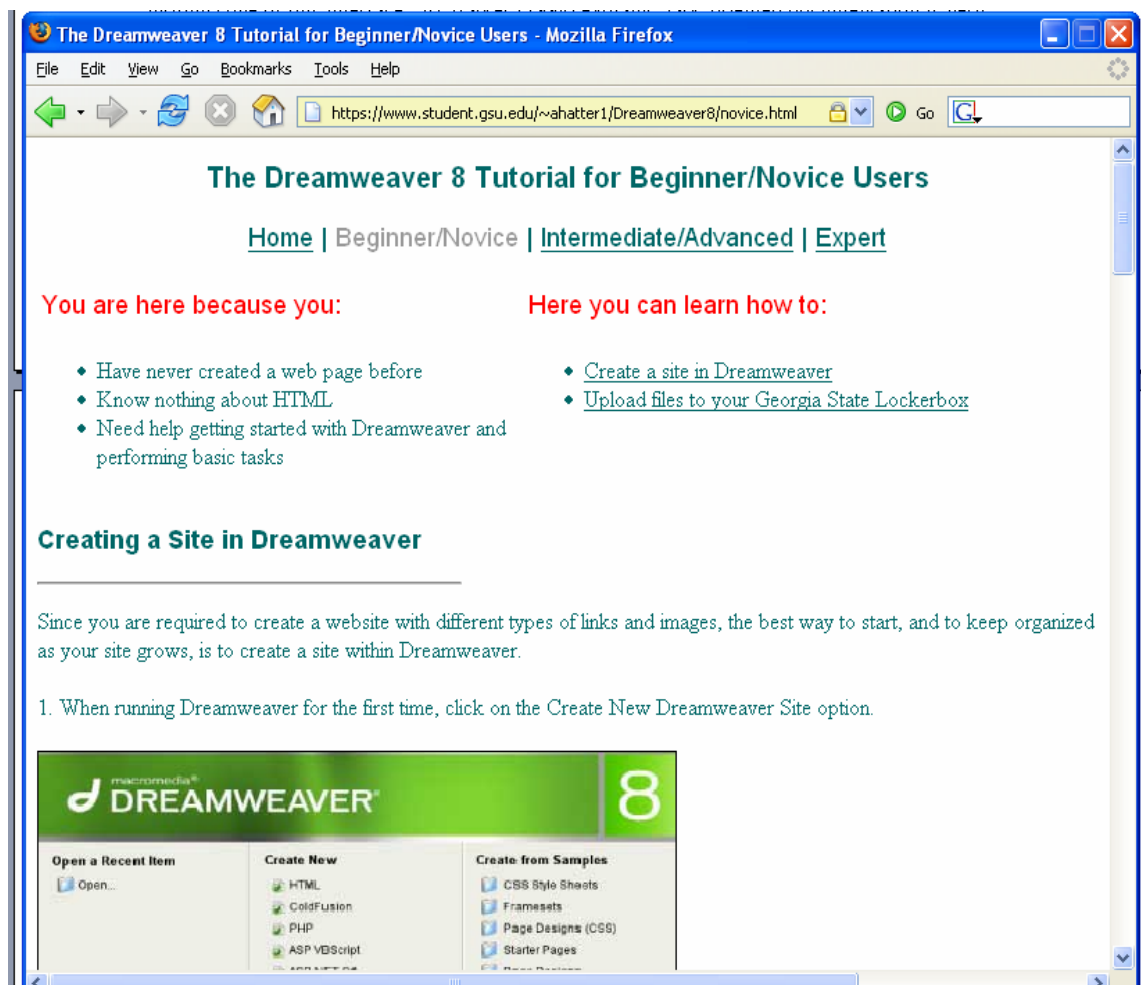
Figure 2.1. The first screen of the D8T's novice interface.
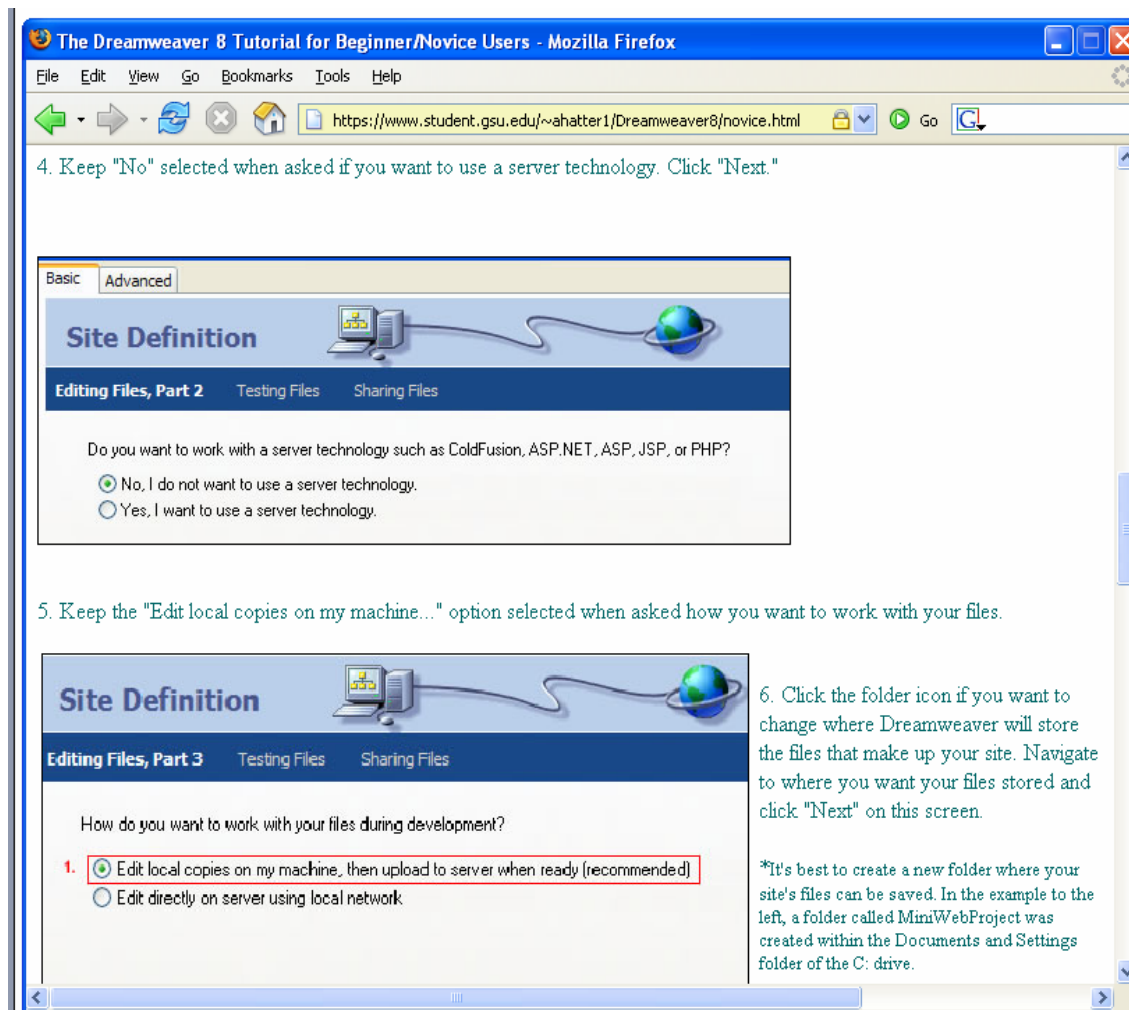
Figure 2.2. Step-by-step instructions in the novice D8T.

The secondary novice page is as equally detailed as the step-by-step directions on the main novice page. As shown in Figure 2.3, the second page of the novice tutorial looks very much like the main page. This page is consistent with the main page's navigation scheme. It is also consistent with the use of different types of headings and anchored links, which are underlined. Figure 2.4 demonstrates, again, the use of step-by-step numbering, rich verbal directions, and edited screen captures to supplement the written instructions.
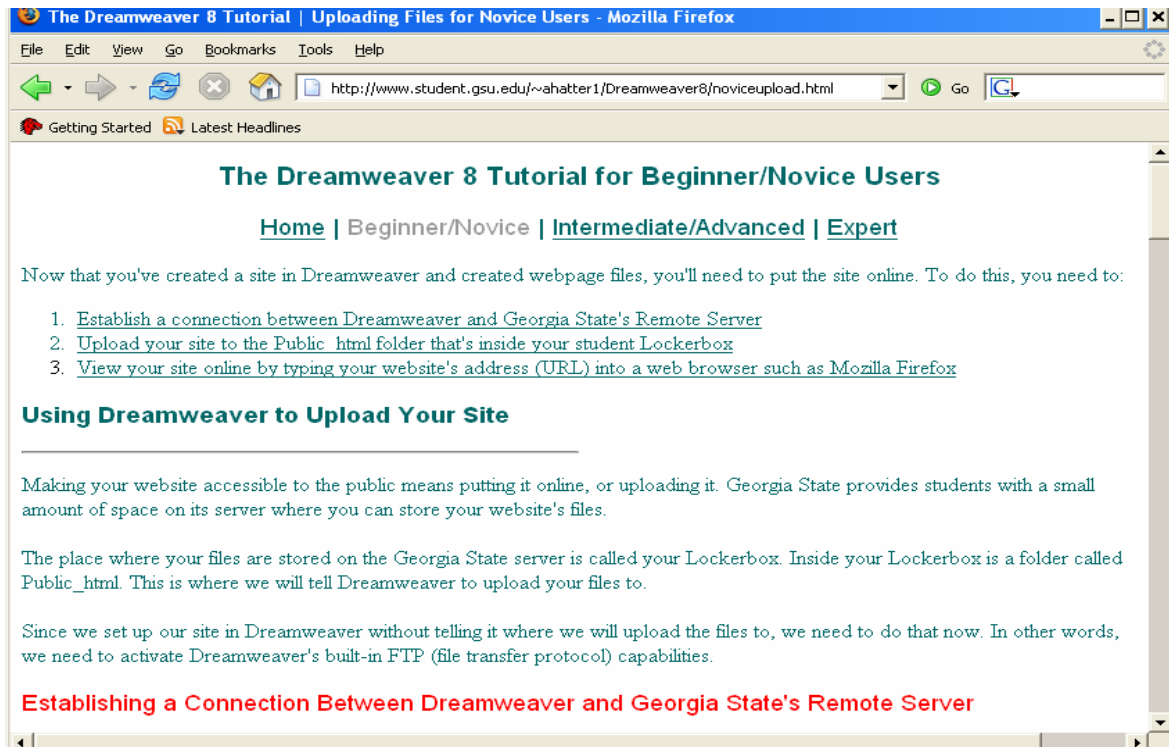
Figure 2.3. The secondary novice D8T page.
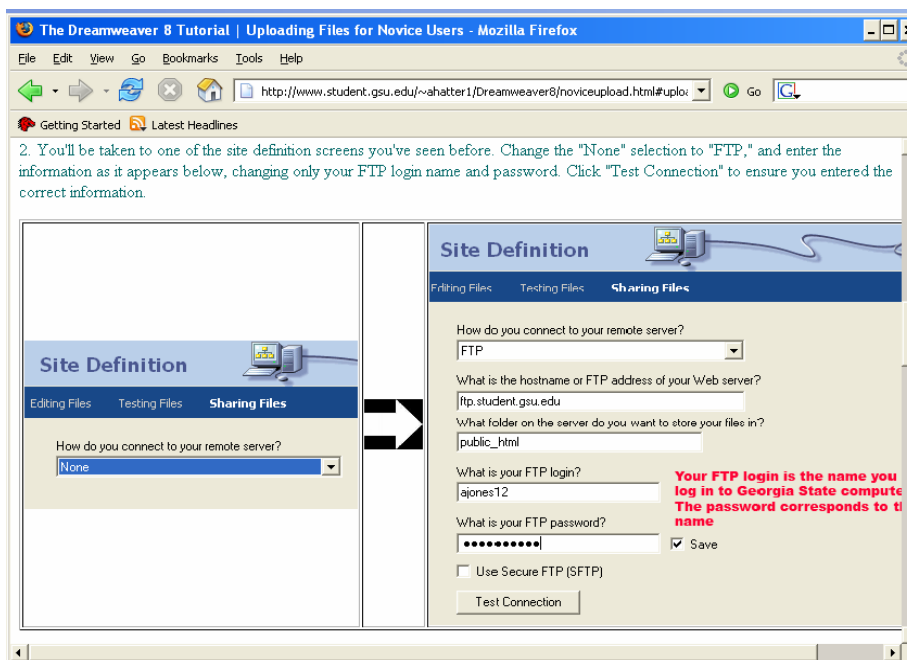
Figure 2.4. More step-by-step instructions on the novice D8T.

All of these screenshots are intended to convey the tone and style of the task-oriented novice interface of the D8T. I offer them as supplementary descriptions of the artifact, and the strategy behind the design and writing of it.

Intermediate Interface Description

I modeled the writing and design of the D8T's intermediate interface after the goal-based documentation technique discussed in Mirel's (1998) article, "'Applied Constructivism' for User Documentation." As Mirel (1998) notes early in the article, the task-based style of documentation that is ideally suited to novice users is ill-equipped to deal with the more complex issues intermediate users of an application encounter in actual use situations.

Interestingly, Mirel (1998) observes that the human mind operates differently once the basic concepts of learning a program have been surpassed. Mirel (1998) further explains that as users move from the novice phase of understanding a product into a more advanced stage, their minds evolve out of the task-based comprehension stage and into a more profound paradigm that is characterized by an understanding that "knowing and learning take place in a dynamic system of people, practices, artifacts, communities, and institutional structures" (Mirel, 1998, p.13). This audience of users who are neither novices nor experts demands a unique type of documentation that appeals to both their actual usage needs, and to the work-based goals that determine those needs. Mirel (1998) alternately terms intermediate documentation "goal-based" or "constructivist," and suggests that this type of documentation be structured as either "richly textured cases or scenarios of work situations" (p. 16). Such conversationally worded scenarios would "bring context to the foreground of documentation" (Mirel, 1998, p. 20). However, Mirel (1998) also rightly points out the difficulty that arises when documentation writers consider context. What is problematic about making documentation contextual is negotiating the space

between the overly general or basic, which would result in a lapse back into task-oriented documentation, and the too-specific, which would limit the use of documentation to local worksites (Mirel, 1998).

Although the limitations of localized documentation are quite real for many industrial documentation writers, such contextualization is precisely what the D8T aims to do. As course syllabi demonstrate, there already exist many competent manuals that detail the vast functionality of Dreamweaver. What these texts cannot account for, however, are the particular-to-Georgia-State-student tasks of uploading a Dreamweaver site to Georgia State's sever, of using the student Lockerbox (which provides access to the public_html folder where uploaded files are saved) to upload files without Dreamweaver, and of ascertaining the student URL associated with the remote host information. All of these tasks are written into the intermediate interface of the D8T using the principles of contextual documentation writing and design.

Mirel (1998) argues that contextual documentation should be presented as goal-based scenarios. To that end, once users click into the intermediate interface of the D8T, they are greeted with a list of work situations presented as links. I incorporated the linked scenarios shown in Figure 2.5 to pointedly address the goals of the intermediate D8T, which are to re-familiarize those who have been absent from Dreamweaver for a period of time, to provide them with two ways to upload their websites (using Dreamweaver and using the Georgia State student Lockerbox), and to guide them through determining their websites' URLs.
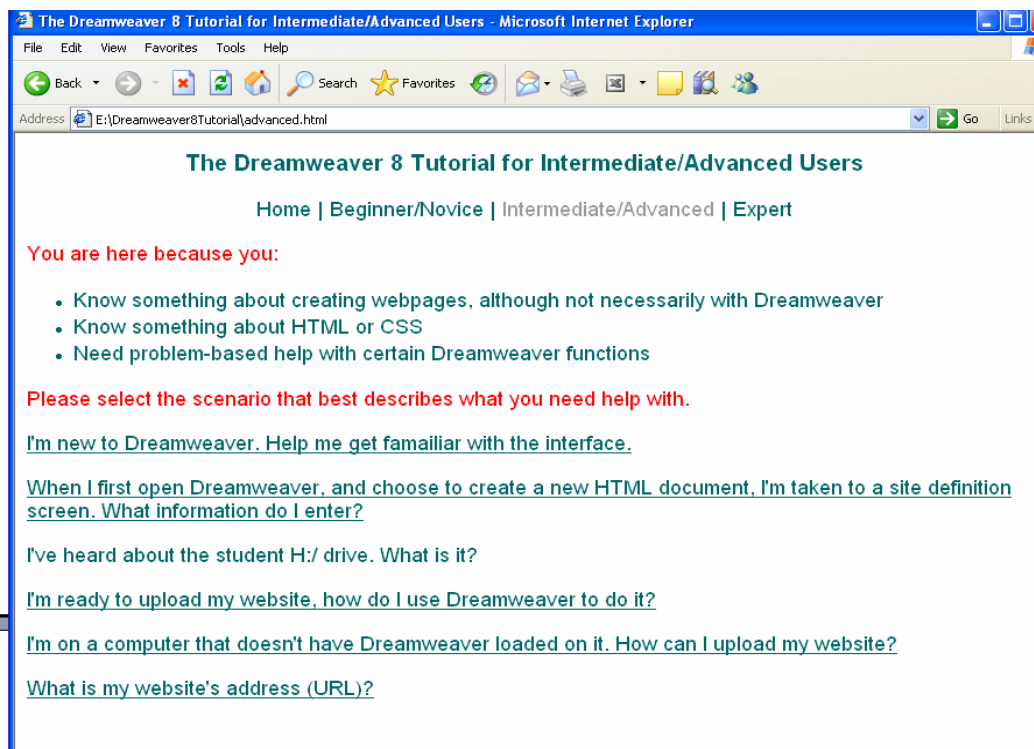
Figure 2.5. The D8T's main intermediate interface.

It is important to note that the intermediate D8T does bear some topical resemblance to

the novice interface. For example, both interfaces describe how to set up a site in Dreamweaver,

and how to upload a site using Dreamweaver's FTP capability. However, the presentation of the

information between levels is purposefully different. For example, the task-oriented

documentation style that guided construction of the novice interface demanded a high level of

both verbal and visual detail. Scenario-based documentation, on the other hand, can be less

detailed, as it assumes a deeper knowledge of the program on the part of the intermediate user.

Figures 2.6.A and 2.6.B are a comparison of the novice and intermediate instructions explaining

how to save local files, which is part of defining a site in Dreamweaver. Note that although both

screens convey essentially the same information, Figure 2.6.A is more instructionally verbose, as

is typical of the novice interface, while Figure 2.6.B is comparatively laconic.
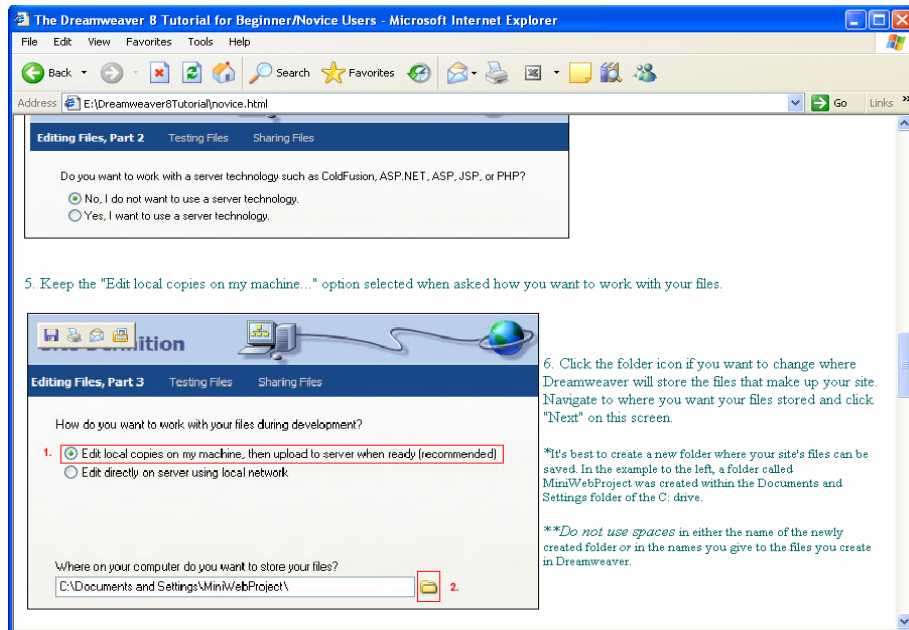
Figure 2.6.A. Task-oriented novice instructions for saving local files in Dreamweaver.
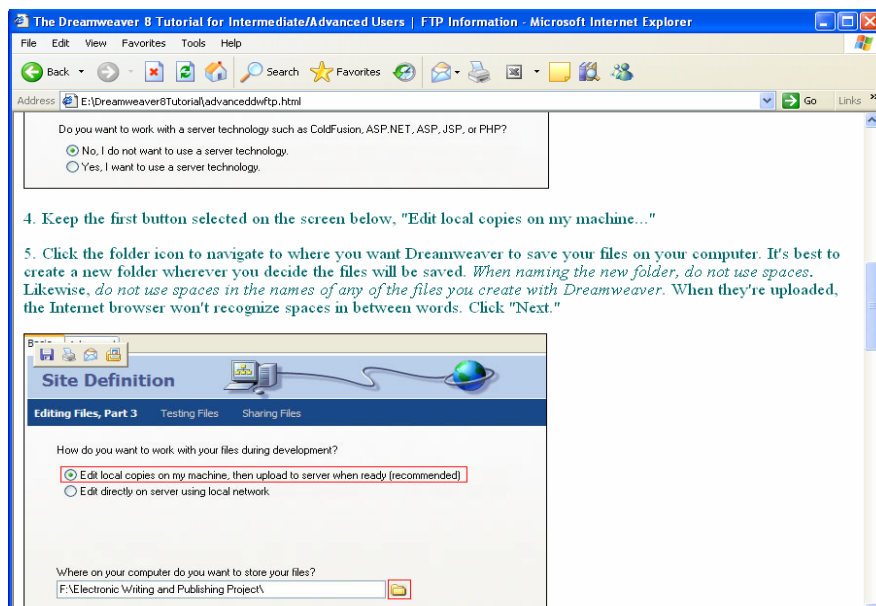
Figure 2.6.B. Goal-based intermediate instructions for saving local files in Dreamweaver.

Figures 2.7.A and 2.7.B further illustrate the difference between the novice and the

intermediate interfaces of the D8T. In these figures, both screens describe how students can

determine the URL of uploaded sites, but again, the novice description is much more detailed

than the intermediate one. In addition, the navigation on the intermediate interface is less

prevalent than it is on the novice interface. Note that a breadcrumb system of navigation is

shown at the top of Figure 2.7.B. Essentially, the entire novice D8T is only two pages, with

anchor links within each page. The intermediate interface, on the other hand, is comprised of

many short, scenario-based pages that have breadcrumb navigation at the top of each page

leading back to the main intermediate interface and back to the D8T's homepage. Many short

pages were consistent with the strategy of briefer instructions that could be more pointedly goal-

based and organized into relevant linked scenarios.
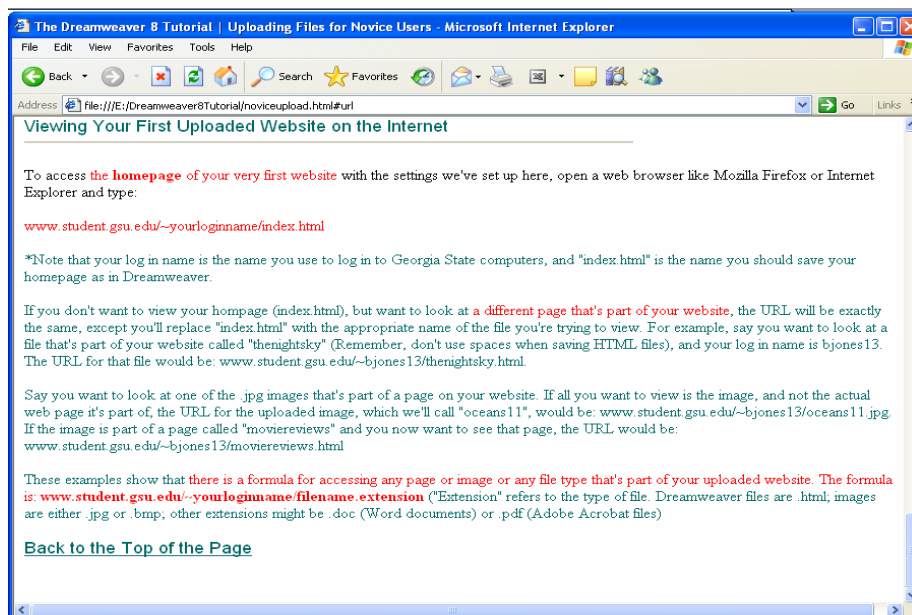
Figure 2.7.A. Novice discussion of student URLs.
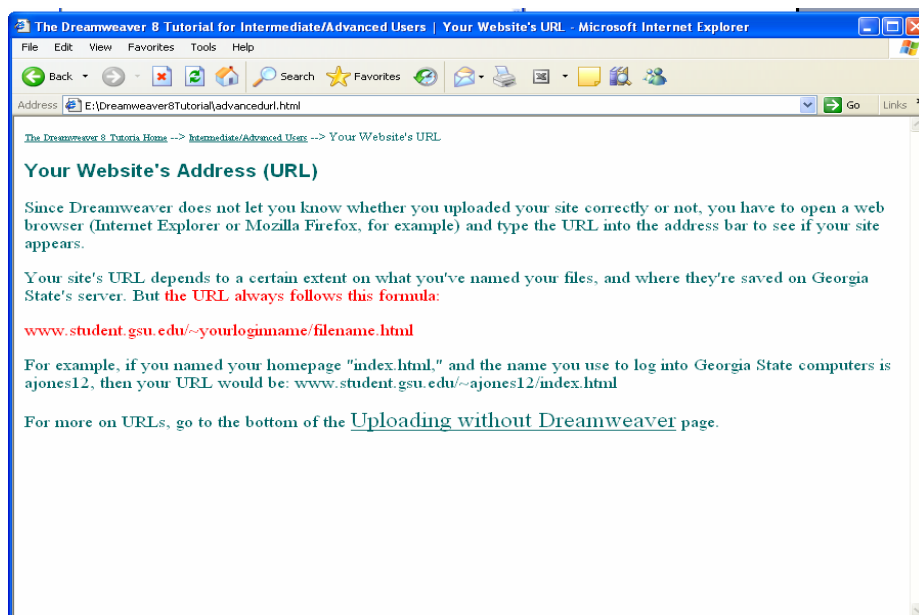
Figure 2.7.B. Succinct intermediate discussion of student URLs.

Although there is some topical overlap between the intermediate and the novice

interfaces, the intermediate D8T does introduce new information to users. As students proceed

through the classes and utilize Dreamweaver on a regular basis, what was once new to them in

the novice interface will eventually become redundant. At this point, they can explore the

intermediate D8T and learn how to, for example, upload a website without using Dreamweaver.

Figure 2.8 shows part of the steps illustrating how to upload a website without Dreamweaver,

and Figure 2.9 is a screenshot of the discussion of URL formulas that is used when a website is

saved in a folder within the public_html folder. These instructions, as well as the discussion of

how to determine the student URL formula when students elect to save their website in a new

folder within their public_html folder, are the additions that are added to the D8T at the

intermediate level.
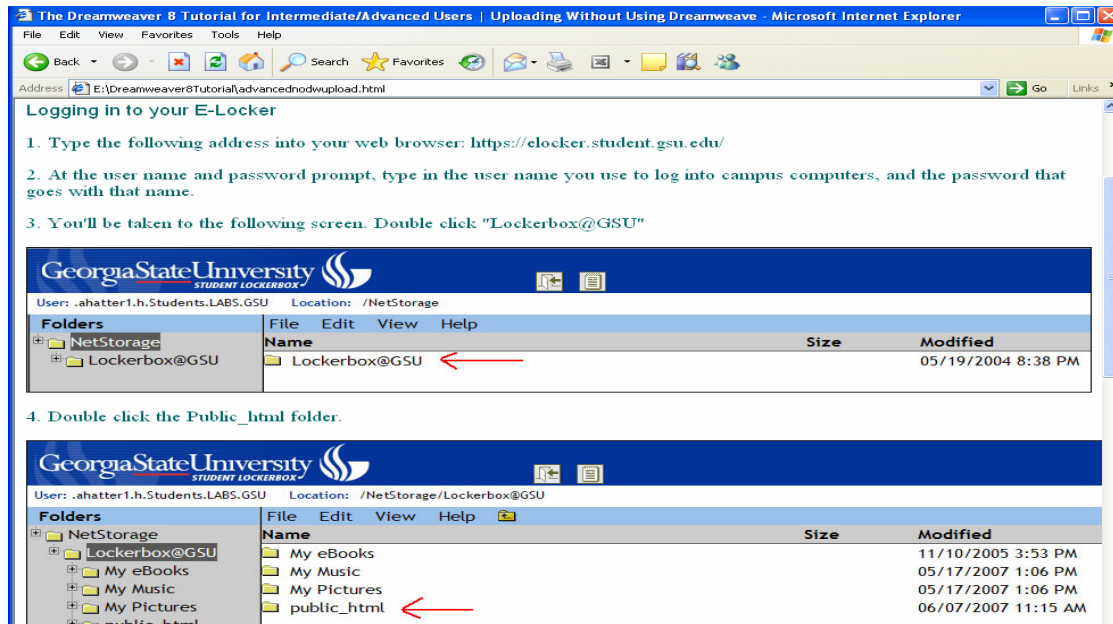
Figure 2.8. Brief step-by-step instructions from the intermediate D8T.
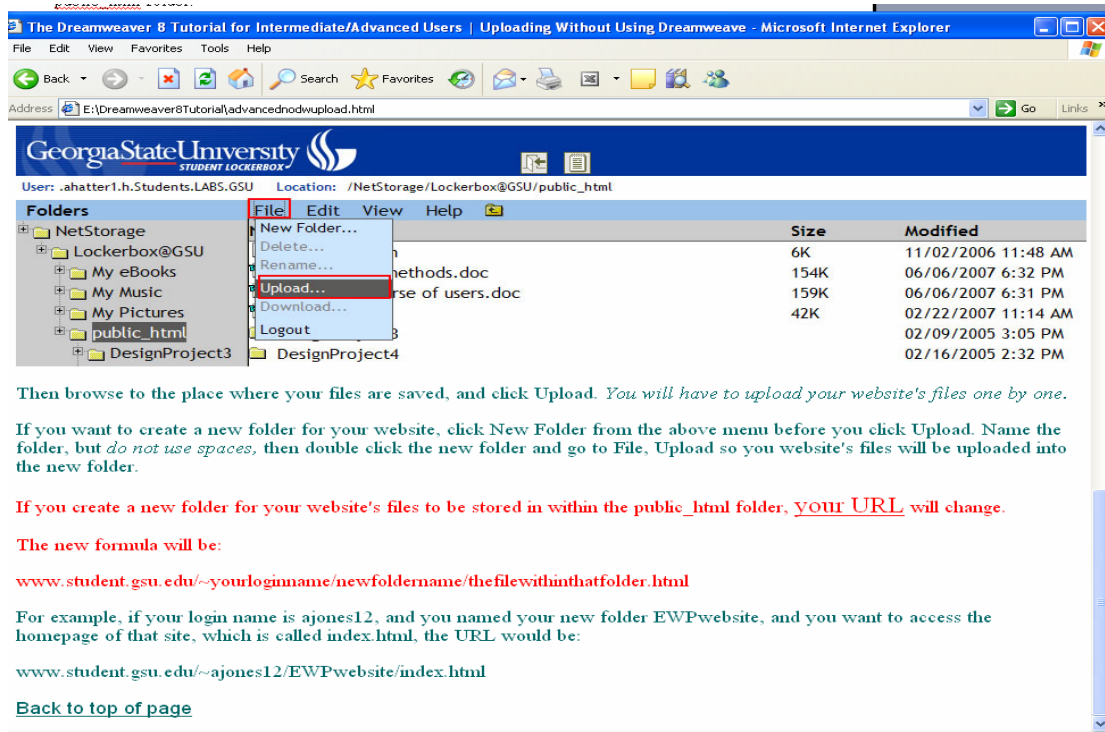
Figure 2.9. Another student URL discussion from the intermediate D8T.

All the above screenshots have been presented as ways of depicting both the style of goal-based documentation that was behind the writing and design of the intermediate D8T and the differences between this interface and the novice one previously described. The information covered by both of these levels of the D8T is contextual in that it is particular to Georgia State students who choose to take the classes heretofore described.

Expert Interface Description

The expert interface of the D8T is strategically minimal, and it conceptually reflects the principles of a quick reference guide. The compositional model for the expert interface is John Carroll's (1990) book, *The Nurnberg Funnel: Designing Minimalist Instruction for Practical Computer Skill*. This resource is cited by Johnson (1998) as one of the first successful efforts supporting user-centered documentation. Further, Barnum (2002) lauds Carroll's work in the area of interface usability heuristics, a research specialty that makes Carroll's minimalist documentation strategy a good model to consult when writing for an audience of experts who need "only enough information to get…started right away on their tasks" (Barnum, 2002, p. 36).

Fittingly, in developing the minimalist documentation style, Carroll and his colleagues employed what seemed to be contextual inquiry methods for data gathering, although they were not stated as such. As Carroll (1990) explains, "A key for us in designing better training was to have immersed ourselves in the world of the new user, observing errors, recoveries, and insights as they occurred" (p. 10). The data collected using this approach led to the conceptualization of a documentation strategy that is anti-system-centered, is "strongly example-based" (Carroll, 1990, p. 11), and, I would argue, inherently user-centered.

Not only does minimalist instruction facilitate learning by doing (Johnson, 1998) by allowing users to begin using a program with little verbal introduction, but it also is truly user-

centered in that it focuses on documenting real, meaningful user tasks that capitalize on already-ingrained user knowledge while accounting for errors due to the learning process (Carroll, 1998). Moreover, the minimalist strategy is ideal for expert users of an application because it builds in the users' propensity to "jump the gun" when it comes to immediately beginning to use a product, whether or not they know what they are doing (Carroll, 1990, p. 26).

The expert level of the D8T encourages the rapidity of learning and doing by assuming a large amount of knowledge on the part of the user. For example, Figure 2.10 shows that the only aid provided to expert Dreamweaver users when defining a site is a screenshot of the FTP information that pertains to Georgia State's remote host address, remote storage folder name (public_html), and students' username and password. The expert interface does account for some user error in judgment, though, by providing standard blue links back to the novice and intermediate interfaces if it turns out users need more detailed instructions. It should be noted, however, that in a real classroom environment, users should be moving through each of the D8T's interfaces in turn, mastering the novice tasks, then picking up the new knowledge presented in the intermediate interface, so as to arrive at the expert level by the middle to end of the semester.
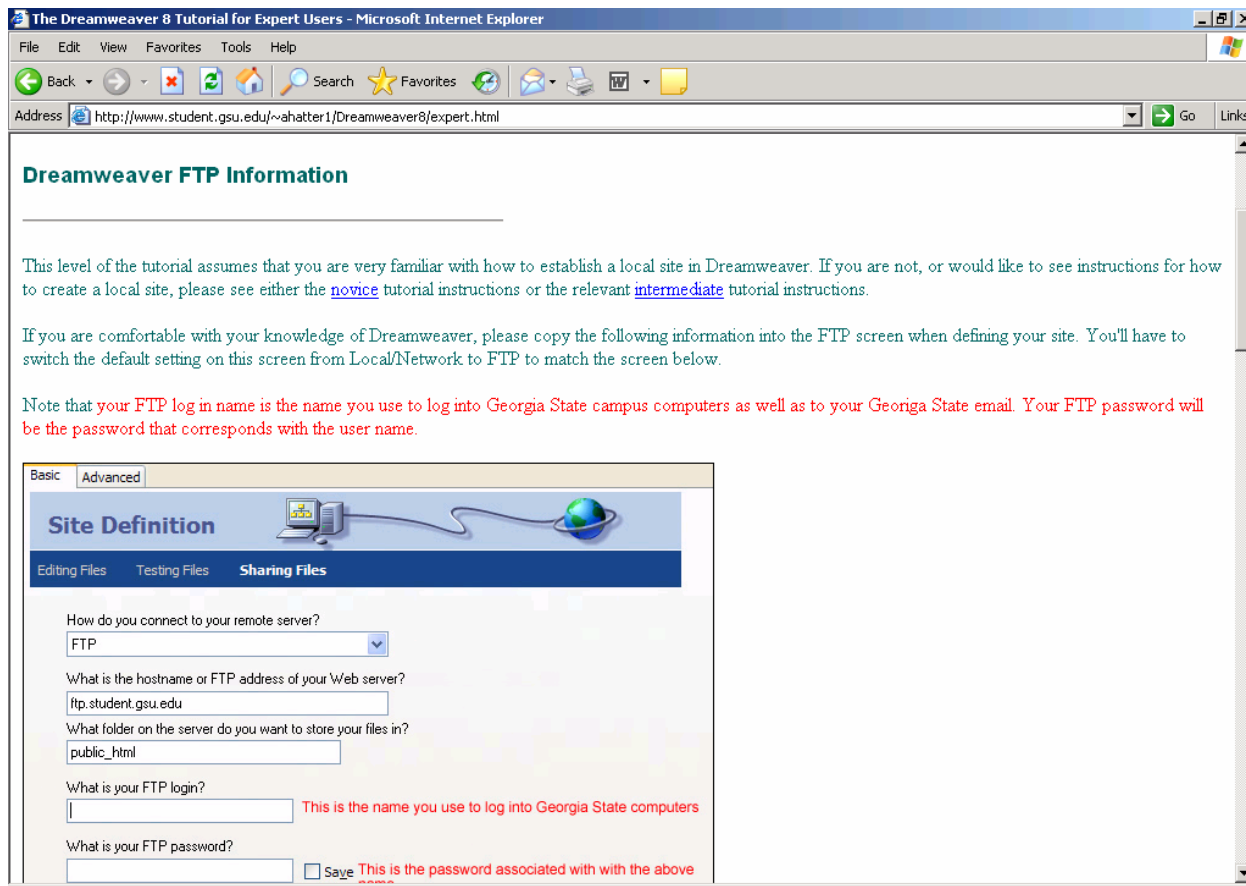
Figure 2.10. FTP information for expert users.

In addition to catalyzing a "learning through doing" (Johnson 1998) experience by

offering little in the way of introductory material, minimalist documentation is inherently

modular. This characteristic made it ideal for incorporating into a hypertext environment

because it allowed for "reading in any order" (Carroll, 1990, p.149). Unlike the novice interface,

for example, which is comparatively linear in its navigational structure and verbal direction, the

expert D8T does not specify which of the four areas it covers users should explore first. Figure

2.11 displays the information contained in the expert interface. The four underlined green links

at the top right of the screen clearly show that at this level, users can quickly see what FTP

information they need to enter into Dreamweaver to connect to Georgia State's server and

thereby upload files; they can see the more detailed process of uploading files without using

Dreamweaver; they can read short descriptions of student URL formulas; and they can explore

the links that direct them to outside Dreamweaver help.
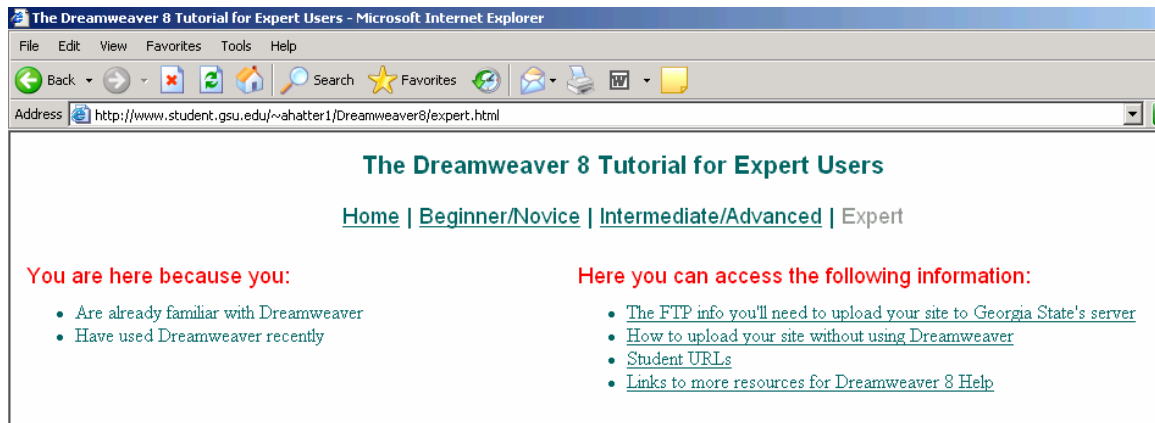
Figure 2.11. The top of the D8T's expert interface.

Compared to both the novice and the intermediate interfaces, the expert D8T's URL

description is the most succinct, as Figure 2.12 illustrates. Two red sub-headings and red body

text quickly point users to key information. An example of each URL described is given for

clarity, but especially unlike the novice interface (see Figure 2.7.A), the expert examples are left

to stand alone.
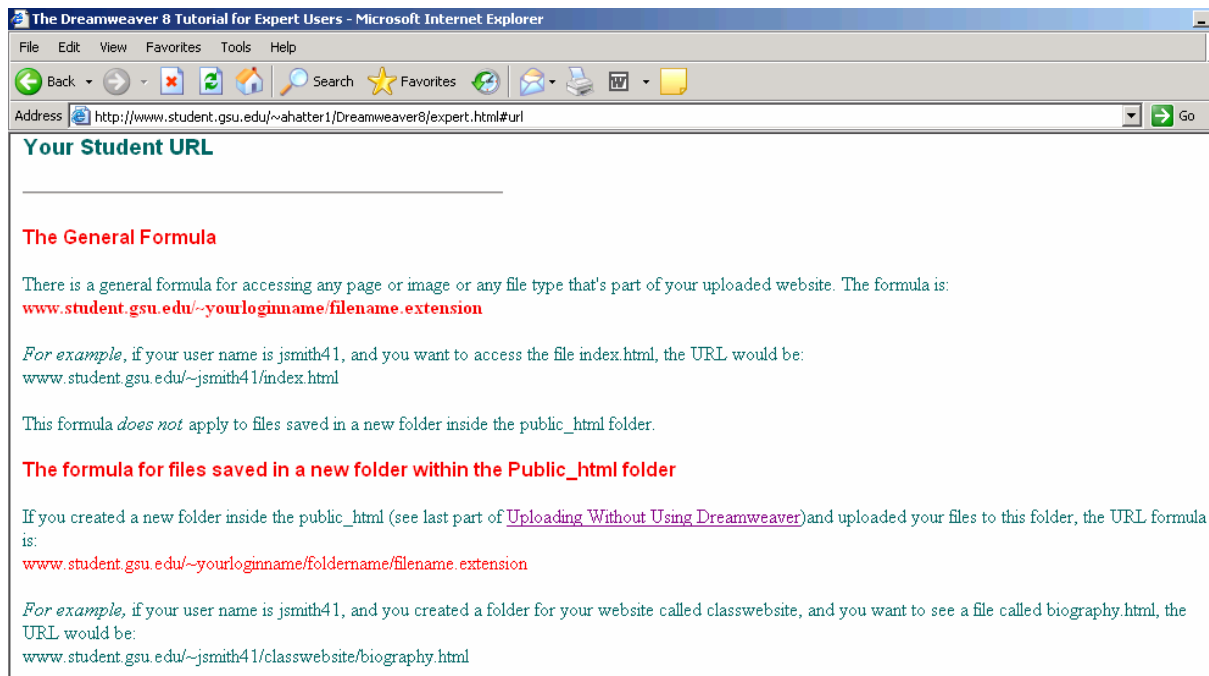
Figure 2.12. Expert discussion of student URLs.

Just as there was some topical overlap between the novice and the intermediate interfaces, so too is there a point of similarity between the expert interface and the intermediate one. Specifically, the expert D8T replicates the step-by-step instructions for uploading files without using Dreamweaver just as they appear in the intermediate interface (see Figure 2.8). I made this particular aspect of the documentation redundant for two reasons: first, even though past course demographic data indicate that many users of the D8T will begin at the novice level (Bowie, personal communication, May 4, 2007), it possible that a student could enter one of the classes as an expert Dreamweaver user; in such an instance, he would most likely not explore any of the D8T's interfaces except the expert one. Secondly, expertise with Dreamweaver does not preclude knowledge of how to independently access Georgia State's student web space (the public_html folder inside the student Lockerbox). Therefore, while the expert Dreamweaver

user will not need the detailed Dreamweaver site definition instructions given in the novice and

intermediate interfaces, he could need the more detailed information pertaining to accessing his

Lockerbox, since this will be new to him.

Finally, Figure 2.13 shows that the expert D8T interface ends with external links to two

Adobe-sponsored destinations for further Dreamweaver help. Although these links are a-

contextual in the sense that they do not address help directed to Georgia State students, they

could nevertheless be useful for the adroit Dreamweaver user who, in the spirit of learning by

doing, can participate in the interactive tutorials that demonstrate Dreamweaver functions that

are not intended to be covered by the D8T.
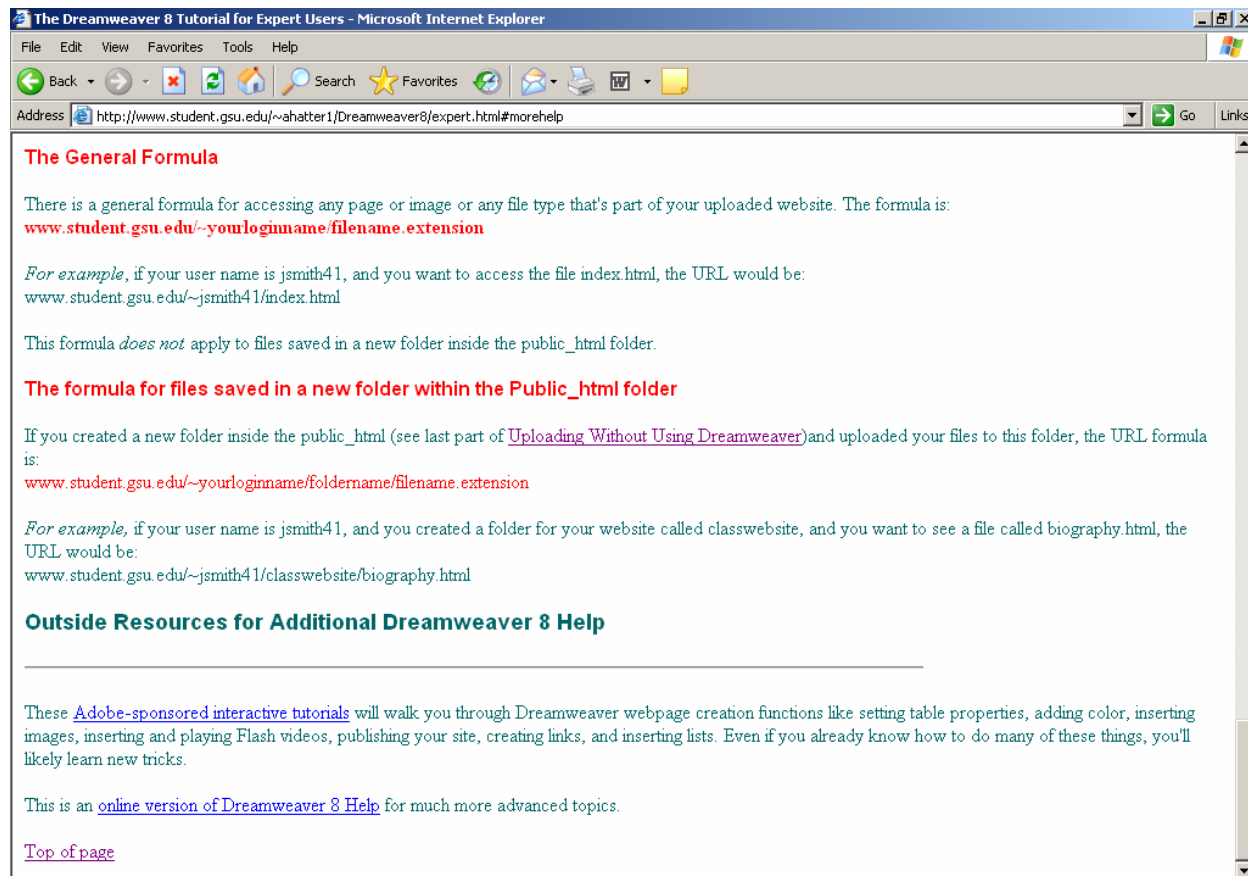
Figure 2.13. The expert D8T's external links to additional Dreamweaver help.

Research Method

The purpose of this project is to evaluate the usability of each of the D8T's interfaces. The method of the research is usability testing. Christi-Anne Postava Davignon and her colleagues (2004) refined the method of usability testing specifically for documentation projects. Not only does these researchers' work focus on online documentation, but it also incorporates the discount form of usability testing that I have adopted (Postava-Davignon, et. al, 2004). Barnum (2002) refers to the work done by Nielson (1994a) to discuss discount usability testing techniques that can be incorporated in testing situations in which few monetary and/or temporal resources are available. As Nielson (1994a) explains, some of the hallmarks of discount usability testing include, but are not limited to, the following:

- Testing with fewer participants

- Testing outside a formal lab without expensive equipment

- Recoding test times and observations manually

- Discussing findings in terms of metrics that do not necessitate statistical analysis

- Using test facilitators who are adequately trained, but who are not necessarily expert usability experimenters

Several truths about this project substantiate my adoption of discount usability testing techniques as the research method. Among these realities are the following:

- The project is not backed by monetary funds of any kind

- The testing occurs during the summer semester, a time when fewer students are present on Georgia State's campus

- The testing and findings analysis must be compiled quickly

These realities explain the value of usability testing as it pertains to this project. Importantly, this thesis could not have been written without the research done by Nielson (1994a) and his colleagues in support of discount methods. The argument that discount usability testing is a less intimidating, cost effective user-centered design method allowed me to investigate how to make the D8T as useful and usable as possible. Additionally, discount usability testing is valuable training for me as a researcher in that it allows me to explore the intricacies of implementing the method's techniques in a real-world research setting.

Although the discount method suited this project, it is important to note that some researchers caution that this no-budget testing is not as rigorous as sophisticated usability testing. Even Nielson (1994a), one of the method's most vocal pioneers, claims, "In discount usability engineering, we don't aim at perfection…we just want to find most of the usability problems" (p. 251). Nevertheless, there are straightforward techniques that can be used to argue for the stringency of discount usability test findings. For example, even though it is not discussed in a discount testing context, Dumas and Redish (1999) and Barnum (2002) all point out that triangulation, or examining different types of data, can essentially lead to a confidence interval of sorts in terms of identifying real usability problems. In Dumas' and Redish's words, "A long task time, frequent errors, [and] the participants' comments may all point to the same problem. When you triangulate three types of data, you will feel more confident that there is a problem and that you understand it" (p. 311).

Furthermore, Hughes (1999), who cites the work of other noteworthy researchers like Carroll (1990), Dumas and Redish (1999), Nielson (1993), Rubin (1994), and Shneiderman (1987), has compiled a framework for ensuring usability testing methods remain as scientifically rigorous as possible. With respect to this, I have implemented safeguards regarding usability test

reliability and validity. First, to ensure qualitative internal validity, the usability tests' scenarios reflect users' perspective by being representative of actual tasks they are required to execute in the classroom. I enhance internal validity by building direct observation of users' task completion actions into the test so as to minimize the miscommunications that might arise from indirect data gathering methods like surveys. Finally, I check the conclusions drawn from direct observation during testing by administering a post-test questionnaire and by talking to the participants briefly after testing concluded. To account for both qualitative and quantitative external validity, I selected usability test participants based on how closely they represent the user population. Even though I limited participant recruitment to those who met certain criteria, participants were nevertheless screened by the pre-test questionnaire, which captured specific user demographics to validate that participants were part of the representative population. In addition, the testing apparatus (a computer connected to the Internet and equipped with Dreamweaver) was representative of what users were accustomed to, since testing occurred in the actual classroom environment using only the technology that was naturally present in the room. Finally, Hughes (1999) states that quantitative reliability can be achieved by running the data through statistical analyses; however, Nielson's (1994a) discount usability testing research corroborates the argument that reliable results can be expressed without using statistical measures of significance. Thus, for this thesis, reliability is accounted for by the qualitative "canon" Hughes (1999) presents, which is to have outside experts examine the method for logical flaws or methodological inadequacies. I have a committee of three experts in place to review this project in its entirety.

Research Methodology

The methodology for this project is user-centered design. While it is important to note that not all researchers in the field believe user-centered design to be a methodology, and that there are arguments that usability testing is actually the antithesis of user-centered design (see Spinuzzi, 2005, for example), I apply a user-centered design methodology to this project in several key ways:

- I used *contextual inquiry techniques* (Beyer and Holtzblatt, 1996) in the early data gathering stages of the project. It is beyond the scope of this project to detail the contextual inquiry methods that contributed to the redesign of the tutorial; however, I will note that I used the methods to ascertain the specific problem areas within the DMXT as a starting point for redesign.

- I conducted discount *pilot usability testing* on the DMXT as an additional safeguard to ensure that what I discovered using the contextual inquiry methods would contribute to a user-centered redesign. The triangulation of findings from both the contextual inquiry methods and the pilot usability test contributed to the user-centered design of the D8T.

- I researched *user-centered documentation* strategies, and, from this research, selected relevant models for each of the D8T's interfaces (Barker, 1998; Mirel, 1998; Johnson, 1998; Shneiderman 2003; Carroll, 1990). Although researching user-centered documentation does not inherently produce a user-centered documentation artifact, the above descriptions of the D8T's three interfaces and the explanations of the models underlying their design and composition provided insight into how I used the documentation strategies to appeal to the three user groups in a user-centered manner.

- I conducted *usability testing in a non-laboratory setting*. User-centered design

  researchers decided early on that studying artifacts in their context of use was one of the

  best ways to ultimately improve usability (See, for example, Bodker, 1991). Barnum

  (2002) not only mentions that usability testing can be done outside a lab, but says this

  type of testing is ideal for already-implemented products or for products at the end of the

  development cycle. She goes on to note that the major advantage of a non-laboratory

  testing approach is that use conditions are not as simulated as they would be in a lab

  environment (Barnum, 2002). The type of testing I conducted actually was along the

  lines of the structured observation Barnum (2002) discusses. She says, "With this type of

  testing, the user is asked to perform the kinds of tasks that might also be done in a lab.

  This technique is excellent for learning about how the user will use the product in his or

  her actual environment, as the influence of environment is often a critical factor in the

  usability of a product" (Barnum, 2002, p. 20-21). Although my testing was not strictly

  field testing in that it did not occur in the artifact's actual use environment (defined, in

  this case, as occurring during class time in the presence of both peers and the instructor),

  it approximated such conditions by being conducted in the typical classroom of use, and

  was thus done in the physical use environment as opposed to a totally simulated lab

  setting.

Study Design

In this section, I explain the goals of each usability test and describe the tools I utilized

during each test.

Goals of the Tests

Rubin (1994), Dumas and Redish (1999), and Barnum (2002) all stress that usability test tasks should be directly related to the tests' goals, which are themselves linked to concerns usability examiners have about the product. Each test has somewhat of a different set of goals, which corresponds with the different sets of tasks for each interface. Here, I present the goals for each of the D8T's interface usability tests.

Novice Testing Goals

The novice usability test has the following goals:

- To see if users can use the task-oriented directions presented in the D8T to successfully create a site in Dreamweaver

- To see if users can upload a test HTML page by using the steps given in the D8T to configure and enable Dreamweaver's FTP function

- To see if users can use the information in the D8T to ascertain the URL of an uploaded site

The first two goals are based on two vital Dreamweaver functions that students must execute in order to complete assignments utilizing Dreamweaver. Further, they are the most basic functions that can be performed using Dreamweaver while still satisfying assignment requirements, and are thus appropriately relegated to the novice interface. The third test goal is also related to satisfying course assignments, since students are required to email the URL of their sites to the instructor for evaluation.

Intermediate Testing Goals

The intermediate usability test has the following goals:

- To see if users can successfully create a site in Dreamweaver using the goal-based instructions utilized in the intermediate D8T interface

- To see if users can upload two test HTML pages, one using Dreamweaver's FTP function, and the other using direct access to the student Lockerbox

- To see if users can enter the correct URL to access the uploaded pages

- To see if users can understand the information presented in the intermediate D8T to determine the URL of a website saved in a folder within the public_html folder

Creating a site in Dreamweaver and uploading a page using the program are consistent with the goals of the novice test; however, since the information was presented in a different way, since these tasks directly pertain to classroom assignments, and since some students may not ever access the novice D8T in a real world situation, it is necessary to similar tasks into the intermediate test. The URL-based goals also directly pertain to assignments and are accordingly also vital to the test.

Although not entirely necessary, uploading directly to the student Lockerbox is a useful skill that intermediate users may find handy. For example, some students might discover they need to upload all or part of their website to complete an assignment, but are in a location where Dreamweaver is not available. The intermediate D8T accounts for such a dilemma by showing students how to circumvent Dreamweaver and upload a website using only a simple internet address that connects them directly to their public_html folder, the place where Dreamweaver sends uploaded files. This function is not included in the novice D8T primarily because it is not totally necessary to know to complete assignments; it is really a handy skill that allows students to access a certain amount of online space where they can save not only the files that comprise their websites, but also other file types they may need for other classes.

Expert Testing Goals

The expert interface has the following goals:

- To see if users can successfully establish an FTP connection in Dreamweaver using the minimalist instruction in the expert D8T

- To see if users can use the expert D8T to upload two files without using Dreamweaver— one directly into their public_html folder, and the other to a new folder within the public_html folder

- To see if users can read the minimal URL verbiage and successfully type the URLs of both uploaded files into a web browser

These goals are similar to the objectives of the intermediate interface, but the minimal documentation style that is unique to the expert interface demands to be separately evaluated for understandability as well as ease of use. Essentially, I want to be sure that the expert interface does not assume either too much or not enough knowledge on the part of the user viewing the expert D8T interface for the first time.

Participants

As discussed, there are no technological prerequisites for any level of Electronic Writing and Publishing, Digital Rhetoric, or Technical Communication. Therefore, it can be argued that any student at any level of undergraduate or graduate study is an inherently representative user of the D8T. However, I identified English students or students enrolled in English computing classes, as opposed to the general population of Georgia State students, as primary testing candidates given that past EW&P and Digital Rhetoric course demographics indicate English majors are more likely to enroll in these courses than students with other majors (Bowie,

personal communication, May 4, 2007). Below, I describe the actual participants using

demographic information collected in the pre-test questionnaire.

<u>Novice Testing Participants</u>

Five Georgia State students from the 2007 Maymester session of the undergraduate

Business Writing course were chosen to participate in the novice usability test. All five certified

that they were novice Dreamweaver users by stating that they had neither used nor encountered

the program before. Of the five, four were undergraduates, and one was a graduate student.

Since the D8T is designed for students in any level of EW&P, Digital Rhetoric, Technical

Communication, or English special topics courses, this sample was representative of the target

audience. Figure 2.14 summarizes a selection of the participant demographic information

generated by the pre-test questionnaire. The participants represent a wide range of disciplines

within Georgia State. Although those who enroll in EW&P and Digital Rhetoric are more likely

to be English students, Georgia State has a significant number students studying business and

communication related majors. These students may enroll (as is seen from the five user sample

above) in courses like the ones described to supplement their verbal skills in preparation for

work in industry.

Table 2.1. Collated novice participant demographic information.

Participant	Age	Sex	Ethnicity	College rank and major
U1	31	Female	Black	Senior – English
U2	24	Male	Caucasian	1st year graduate student – Sports Administration
U3	38	Female	Black	Senior – Business/Human Resources
U4	23	Female	Caucasian	Senior – Economics
U5	25	Female	Caucasian	Sophomore – Art Education

Intermediate Testing Participants

The five participants for the intermediate test were three former Electronic Writing and

Publishing undergraduate students from the Spring 2006 undergraduate section of the course,

one former EW&P graduate student from the Fall 2007 section of the course, and one MFA

student who was familiar with the program from using the program in a professional web

development capacity prior to beginning her graduate studies at Georgia State. It was important

that all participants had used Dreamweaver before, although it was not necessary for them to be

current in their knowledge of the program, as the currency of Dreamweaver knowledge separates

intermediate users from experts. Figure 2.15 summarizes the intermediate participants' profiles.

It is interesting to note that all of the participants for this test were female, and that the novice

and intermediate test participants in general have been in a distinct age range—mid-20s to mid-

30s. This is consistent with the average age range of the Georgia State student body.

Table 2.2. Collated intermediate participant demographic information.

Participant	Age	Sex	Ethnicity	College rank and major
U1	24	Female	Caucasian	Senior – Computer Information Systems
U2	22	Female	Caucasian	Senior – Business Administration
U3	29	Female	Caucasian	1st year graduate student – Communication
U4	34	Female	Caucasian	2nd year graduate student – Creative Writing
U5	30	Female	Caucasian	2nd year PhD student – Rhetoric and Composition

Expert Testing Participants

Three Georgia State students tested the expert interface of the D8T. Of these, two were undergraduates, and one was a graduate student at the PhD level who had taken both EW&P and Digital Rhetoric. Three users as opposed to five tested this interface primarily because it was extremely difficult to find students who were truly expert Dreamweaver users during the summer when, at Georgia State (as is typical of most universities), the student presence significantly attenuates. However, the method of usability testing I used does allow for testing with between three to five participants (Nielson, 2000). As Table 2.16 demonstrates, the participant pool for this test closely matched that of the intermediate test (see Table 2.2), which makes for an interesting question as to how the overall student demographic must change during summer sessions, since the Georgia State student population is normally quite diverse in terms of race and age, and is almost equally divided between male and female students.

Table 2.3. Collated expert participant demographic information.

Participant	Age	Sex	Ethnicity	College rank and major
U1	53	Female	Caucasian	2nd year PhD student – Rhetoric and Composition
U2	24	Female	Caucasian	Senior – Psychology
U3	23	Male	Black	Junior – Film

Setting

Conveniently, the undergraduate and graduate levels of all the classes described (with the exception of the User-Centered Design special topics course) that either require Dreamweaver or otherwise make use of the program for certain assignments, typically meet in the same

classroom. True good usability testing practice, I conducted all thirteen of the usability tests in this room using the technology that is normally present therein. Not only do the classes meet in this room, but much of the students' Dreamweaver usage also occurs therein during designated class workshop times.

The room is on the third floor of a six-floor building called Classroom South. The building is centrally located on the Georgia State campus, and the room that was used for the testing is designated as an English rhetoric and composition classroom. The room is equipped with 24 PCs. These flat-screen computers are lined up on long desk areas that seat four people to a row, broken by a center aisle, across which another long table seats four more students at four additional computers. Thus, the room seats eight people across, and is three rows deep. Three windows line the back wall of the room, but the shades are usually drawn, meaning that the majority of the lighting comes from the fluorescent overhead lights. Placed in the front of the classroom in the middle is a separate desk for the instructor. This desk has its own PC, and faces the students. Behind the teacher's desk is a large white board that is used instead of a traditional chalkboard. The room is further equipped with a projector for displaying what appears on the instructor's computer onto a large white pull-down screen, as well as a printer for instructor use. The only occupants in the room during testing were the test participant and I. In a normal use situation, the room would be full of other students, and would be quite a bit noisier than the near silence we enjoyed while testing. Thus, while the usability testing did not occur in a lab, it was not turly contextual in the sense that it did not occur during class time, the period when students' actual use of the D8T would occur. Nonetheless, I thought this testing situation to be more contextual than an artificial lab, especially given that a large number of the participants

(including all five novices) were familiar with the classroom either from a current or past class taken therein using the technology described.

Testing Method

Each of the tests followed the same procedure. I began the test session by briefing the participant as to the purpose behind the test, the artifact being examined, and my expectations during testing. I told participants the test would be timed, and that I would be making notes as to their action sequences for each task. Participants were encouraged to vocalize problems, puzzlements, or other germane thoughts as they worked. Before testing, they filled out the informed consent document and the pre-test demographic questionnaire (Appendix A). During testing, I handed each task to them on a separate slip of paper, so they would not get ahead of themselves (or me), as some of the tasks easily led into one another. Once they completed all eight tasks, they filled out the post-test questionnaire that corresponded to their testing level (Appendices B, C, and D), and we spent a few minutes discussing their impressions of the experience as well as some specific issues that arose during the test. At that point, I debriefed them, expressed thanks, and the session concluded.

Study Design and Response to Research Questions

Each of the three usability tests was comprised of three main parts—a pre-test demographic questionnaire (Appendix A), the testing itself, and a post-test usability questionnaire (Appendices B, C, and D). Again, the research question is: How usable is a contextual Dreamweaver 8 Tutorial for the separate user groups it addresses—novices, intermediates, and experts? The three usability tests were designed to evaluate the D8T's usability. However, usability evaluation cannot be achieved without establishing parameters for analysis. Therefore, in response to the sub-question—How efficient, error tolerant, and easy to

use is the DT8?—I have operationally defined the three usability attributes that serve as

benchmarks for discussing the D8T's usability:

- Efficiency - The time (measured in minutes and seconds) at which a user interacted with the interface to successfully read and complete a task

- Error tolerance - The nature, number, and severity of errors participants made

- Ease of Use - The participants' subjective reflective responses to the experience of using the D8T

The testing data collected were in terms of task completion time, error frequency, error severity,

participant comments, and participant ease of use ratings. The task completion time data address

the *efficiency* attribute. I used the error occurrence notes I recorded during the tests regarding

user task completion sequences combined with the error severity scale I adopted with a few

changes from Dumas and Redish (1999) to measure the *error tolerance* attribute of usability.

Participants' answers to the post-test questionnaire inquiries (Appendices B, C, and D),

combined with their comments during testing and my own observations of problems, address the

usability attribute of measure *ease of use.* I discuss my adoption of these attributes in more depth

in Chapter 3.

The study design also addresses the "separate user groups" aspect of the research

question. The test tasks and, accordingly, the post-test questionnaires are different for each of

the three user groups (see Appendices B, C and D for specific differences). Since the interfaces

describe different functions in Dreamweaver as well as actions that can be carried out within the

student web space, I developed tasks that would test the goals behind the writing of those actions

into the D8T. Participants were screened for appropriateness before they were asked to test any

interface. This ensured that only true novices tested the novice interface, those classified as

intermediates tested the intermediate interface, and those who fit the expert profile tested the expert D8T interface.

Usability Testing Tools

The discount field usability testing method used for this project required the tools of a computer equipped with both Dreamweaver 8 and the Internet, a pen and paper for note-taking, and a stopwatch for timing tasks. Participants were instructed to click back and forth between the D8T and Dreamweaver to carry out the test tasks just as they might to fulfill the requirements of an actual course assignment. The data-gathering tools I developed for the study were the pre-test questionnaires (Appendix A), the test tasks themselves for all levels of the D8T, and the corresponding post-test questionnaires (Appendices B, C, and D). Because the pre-test questionnaires were largely the same for each test, I do not separate the discussion of that tool into disparate sub-sections; however, since the test tasks and, consequently, the post-test questionnaires are different from one another, I discuss those test tools in terms of the test level in which they were used.

Pre-Test Demographics Questionnaire

For all test levels, I used written pre-test user demographics questionnaires (Appendix A) as a means of describing the test's participant pool. In the first part of the questionnaire for all testing levels, I asked participants to give their age, ethnicity, college class, and college major. In the second half of the novice demographics questionnaire, I asked about users' level of comfort when using a computer. I asked intermediate and expert participants to rate their level of comfort when using Dreamweaver. In all of the pre-test questionnaires, I included the general computing level of comfort question as a method of triangulation to corroborate particularly slow and/or rapid task completion times, as well as to attempt to explain why certain errors were

committed. I referred to the questions directed to intermediate and expert participants regarding

comfort when using Dreamweaver in the evaluation of results stage for the same reasons. For

example, if an intermediate user had trouble completing a task that all other users in the same

category carried out with relative ease, the pre-test question regarding that user's past difficulties

with Dreamweaver might illuminate the cause of the delay.

Testing Tasks

The three usability tests of the D8T each contained different task lists that reflect the

goals specific to each interface. Here, I describe the tasks for all three tests, and discuss the

usability attributes they were written to measure. The tasks are organized thematically with

respect to tests' goals.

Novice Testing Tasks

Eight tasks comprised the totality of the novice usability test. These tasks address the

three test goals in that I asked participants to use the D8T to help them execute the site definition

and site upload functions in Dreamweaver. I also used the tasks to ask users to use the D8T to

become familiar with student URL formulas. All of the eight novice tasks had definitive

beginning and ending points. Specifically, every task began with the user reading the task

instructions, but ended at a different stage of interaction with Dreamweaver.

- *Task 1 – Follow the directions on the tutorial's homepage*.

The first task was written to evaluate the wording of the novice category description on

the D8T's homepage. With the first task, I wanted to see if the novice definition accurately

described those who have never used Dreamweaver before. This task ended when the user

clicked into the main novice interface of the D8T.

- *Task 2 – Please write down what the page you're on will help you learn.*

The second test task examined user orientation on the first screen of the D8T's novice interface. I asked the user to repeat the two bulleted tasks that apply to the novice interface as a whole, and that appear prominently under a red heading at the top of the screen. When users find a website's navigation system to be intuitive, they are more likely to be satisfied; further, if they are told up front how they will benefit from the site, they are more likely to judge it effective in terms of their needs. This task ended when users finished copying, either verbatim or in accurate shorthand, the bulleted lit of novice D8T objectives on the task paper.

- *Task 3 – Follow the steps outlined in "Creating a Site in Dreamweaver" to set up a website in Dreamweaver. Please save files to the Desktop and create a new folder on the Desktop to save the files in*

This task was the most involved of the test, as it required users to go through the steps of creating a site in Dreamweaver. I wrote this task to evaluate both the quality of the written directions on the D8T and the screenshots that supplemented those instructions. This task was the first one that required the user to "learn through doing" (Johnson, 1998, p. 142), and so tested the ease of switching back and forth between the D8T screen and that of Dreamweaver. The task ended when users reached the summary screen of Dreamweaver's site definition wizard and verified that they selected to save local files to a new folder on the Desktop.

- *Task 4 – You should now have a site created in Dreamweaver. Now, you need to see if you can upload the site to the Internet. First, click on the Create New HTML option on Dreamweaver's main screen. Then, type "Hello world!" inside the blank white space. Go to the top of the screen and click File, Save, and save the file as "index.html". Then, use the Tutorial to find the three steps that are involved in uploading your site. Please write the steps here.*

This task had two parts. The first part walked users through creating and saving a very simple HTML page that said "Hello world!" This aspect of the task examined whether the user could move from the end of the D8T's site definition instructions seamlessly into the creation of an HTML document, as described by the D8T. After users saved the page, the task examined whether they could use the D8T's internal navigation to find the page that discussed the steps involved in uploading the site. Evaluating navigation measures the ease with which users interact with the site in a global sense. This task ended when users clicked into the secondary page of the novice interface and copied the steps involved in uploading a site from the top of the D8T page onto the task paper.

- *Task 5 – Use the tutorial to follow the steps outlined in "Establishing a Connection between Dreamweaver and Georgia State's Remote Server".*

- *Task 6 – Follow the steps outlined in "Uploading Your Website to Your Public_html Folder" to put your website online.*

These tasks, like Task 3, required users to learn by doing. Task 5 was the most contextually relevant of the test (followed by the tasks dealing with student URLs), and was designed to see how understandable users found the FTP screen information to be, and if they could use the information to establish a successful connection to Georgia State's server. Task 5 ended when the user clicked the "Test Connection" button on Dreamweaver's FTP screen and received an alertbox saying Dreamweaver successfully connected to the remote host.

Task 6 required the user to actually upload the site using Dreamweaver, which is less involved than it may sound, since it involves only a few mouse clicks once the connection to the remote server is established. Again, both tasks examined the verbiage and graphics on the D8T as conduits for task completion. Task 6 ended when users clicked the up arrow icon in

Dreamweaver and selected "Yes" when Dreamweaver asked if they were sure they wanted to put the entire site online.

- *Task 7 – What is the URL of the site you just uploaded? Please type it into a web browser and press Enter.*

- *Task 8 – What would be the full URL of a file you uploaded that's called "test.html"? Please write it here.*

These tasks examined users' comprehension of the D8T's URL discussion by having them extrapolate the generic formula given in the tutorial and applying it to both the site they uploaded during the test, and to a hypothetical site with a different name. Successful completion of these tasks measured the novice D8T's effectiveness in terms of the tutorial's goals, and overall ease of use. Task 7 ended when users input their student URL into a web browser's address bar and were greeted with the index.html file's output of "Hello World!" on the screen. Similarly, Task 8 ended when users wrote the correct student URL of a hypothetical web page on the task paper.

Intermediate Testing Tasks

As with the novice test, the intermediate usability test consisted of eight tasks written in response to the test's goals. In this section, I describe each task individually with respect to how the task is designed to evaluate the intermediate D8T interface in terms of efficiency, error tolerance, and ease of use (Quenesbery, 2003; Nielson, 2003). Again, each task began with the user reading the task, but ended differently in each instance.

- *Task 1 – Follow the directions on the homepage of the tutorial.*

This task is exactly the same for this interface as it was for the novice test. It was written to determine whether the definition of "intermediate" as the D8T established it was relevant

and/or comprehensible to the participants. This task ended when users clicked into the intermediate interface of the D8T.

- *Task 2 – Use the tutorial to define a site in Dreamweaver. Please save files to the Desktop and create a new folder on the Desktop to save the files in.*

In this task I not only asked users to follow the steps to creating a site in Dreamweaver, but I also asked them to navigate the main interface of the intermediate D8T to find the situation that best described an actual work situation in which a Dreamweaver site would need to be established. The site definition aspect of the task was designed to measure error tolerance, while the main page navigation was designed to measure ease of use in terms of speaking to users actual work needs and realistic scenarios. This task ended at the same place the novices' Task 3 did—when users reached the summary screen of Dreamweaver's site definition wizard and verified that they selected to save local files to a new folder on the Desktop

- *Task 3 – You should now have a site created in Dreamweaver. Now, you need to see if you can upload the site to the Internet. First, click on the Create New HTML option on Dreamweaver's main screen. Then, type "Hello world!" inside the blank white space. Go to the top of the screen and click File, Save, and save the file as "index.html".*

- *Task 4 – Use the tutorial and Dreamweaver to upload your site.*

With these tasks, I asked users to create a very simple HTML page and use Dreamweaver to upload the page. Since these tasks were action-intensive, their results measured error tolerance and overall ease of use in terms of users being able to complete the tasks with little difficulty. Task 3 ended after the user saved the page she created in Dreamweaver, and Task 4 ended just as the novice Task 5 did—when the user clicked the "Test Connection" button on

Dreamweaver's FTP screen and received an alert box saying Dreamweaver successfully

connected to the remote host.

- *Task 5 – In Dreamweaver, go to File, New, and choose to create a new HTML document.*

  Type "Test" inside the new page. Save the file as "test.html."

- *Task 6 – Please use the tutorial to upload the file "test.html." Do not use Dreamweaver*

  for this task.

These tasks were similar to the previous two tasks in that they began with the user

creating another simple HTML page, and ended with the user uploading the page. For these

tasks, however, the user was instructed to not use Dreamweaver for the upload process. Thus,

these tasks again were designed to see whether the user could return to the main intermediate

D8T page and locate the work-based scenario that described the situation inherent to the task and

navigate to the relevant page that would show them how to complete the task. The tasks were

also designed to see if the steps that described uploading to the Georgia State Lockerbox were

understandable. Overall, since the tasks dealt with navigation and following directions, the

resulting findings were used to evaluate this part of the intermediate D8T's error tolerance and

ease of use.

- *Task 7 – What is the URL of the site you just uploaded? Please type it into a web*

  browser and see if the page you created appears.

- *Task 8 – What would be the URL of a file you uploaded that's called "resume.html" and*

  is saved in a folder you created called "JobSearch" in your public_html folder? Please

  write it here.

The final two testing tasks dealt with the intermediate D8T's discussion of student URLs.

In Task 7, I asked participants to find and type the URL of the page they uploaded without using

Dreamweaver into a browser. Successful completion of this task meant that the page appeared when the URL was typed into the address bar of the browser. In Task 8, I asked users to read further into the intermediate D8T to find the formula for a URL that would provide access to a file saved in a folder inside the public_html folder. Completing this task successfully meant that users had to navigate the intermediate tutorial to find the URL discussion that was located in a different section of the intermediate D8T. I used the results from these tasks to measure users' satisfaction with the D8T not only in terms of navigational structure, but also in terms of the verbal descriptions of the URL formulas.

<u>Expert Testing Tasks</u>

To complete the parallelism of the previous two tests, expert test participants completed eight tasks. All of the tasks were action-oriented and contained less direction within them than similar tasks for the previous two tests, as they assumed that expert users would not need to be told, for example, how to create a very basic HTML page. As with the other tests and tasks, the expert tasks were written to produce results that could be used to evaluate the usability of the tutorial.

- *Task 1 – Follow the directions on the tutorial's homepage*.

Again, I wrote this task to see how participants would respond to the characteristics of an expert that the tutorial defined on its homepage. This task was worded the same for the experts as it was for both the novices and the intermediates. As with the other two levels, this task ended when the user clicked into the expert interface of the D8T.

- *Task 2 – Use the tutorial to enter the FTP information that's part of defining a*
  Dreamweaver site.

Unlike the novice and intermediate tutorials, the expert D8T only provides users with the

screenshot of how to enter the Georgia State student FTP information that allows users to access

the university's remote server. I wrote the task to see if the expert interface assumed too much

knowledge on the part of the expert user, or if the screenshot and very brief verbal instruction

preceding it were just enough minimalist direction for users to successfully complete the task.

As with the other user levels, this task ended when users reached Dreamweaver's site definition

summary screen and clicked "Done."

- *Task 3 – Create a new HTML page that says "Hello world!" Save the file as "index.html."*

- *Task 4 – Create another HTML page that says, "This is only a test." Save this file as "test.html."*

- *Task 5 – Use the tutorial to upload the file "index.html" without using Dreamweaver.*

- *Task 6 – Use the tutorial to upload the file "test.html" to a new folder inside your public_html folder.*

I wrote Tasks 3 and 4 as means to an end for Tasks 5 and 6. Tasks 3 and 4 accordingly

ended when users saved the files in Dreamweaver as the task specified. Unlike the previous two

tests, the expert test did not include a task for uploading a file using Dreamweaver. At the expert

level, users do not need instructions for how to perform this action for two reasons: first, it is

quite straightforward, and second, it would have been executed dozens of times by a user

familiar with the program. On the other hand, even an expert Dreamweaver user might not know

how to upload a file without using the program; thus, I wrote Tasks 5 and 6 to see if users could

follow the relevant instructions on the D8T. Results from these latter two tasks measured

the expert D8T's error tolerance and ease of use in terms of successful task completion. Tasks 5

and 6 ended when the user verbally confirmed seeing the files appear in her public_html folder.

- *Task 7 – What is the full URL of the file "index.html"? Please type it into a web browser and see the page you created appears.*

- *Task 8 – What is the full URL of the file "test.html"? Please type it into a web browser.*

I wrote these tasks to observe whether users could grasp the minimal information

regarding different student URL formulas. In the expert interface, the URL discussion appears

as a single chunk of text toward the bottom of the page. In the intermediate interface, the URL

discussions appear on two separate pages. Thus, I also wrote these final expert tasks as a means

for evaluating by comparison the navigation on the expert interface for optimum efficiency and

user satisfaction. These tasks ended when users typed the correct URLs into a web browser and

were greeted with web pages saying "Hello World!" and "Test," respectively.

Post-test Questionnaires

I used the findings from the post-test questionnaires (Appendices B, C, and D) to

supplement data gathered during the tests. The most important measure that comments from

these questionnaires were used to corroborate was participant satisfaction both overall and for

each task. I asked users to rate how easy each task was to complete on a scale of 1-5, 1 being

very difficult and 5 being very easy. I also provided space for commentary on each of the tasks

as well as for overall remarks about the D8T in general. Thus, while the wording of the post-test

questionnaires was different due to the necessity of reflecting the actual test's tasks, the purpose

behind this test tool was the same for all levels.

Conclusion

In this chapter, I presented the main research question and sub-question, as well as the rationale behind them, in terms of the D8T's history and evolution as a product of user-centered design methods. I described each of the tutorial's three interfaces separately, and used screenshots for added clarity. I discussed in more detail my implementation of discount usability field testing, the participants involved, the test method and environment, and I extrapolated on why the form of usability testing used was guided by a user-centered design methodology. I also supplied evidence for how the design of the project supports an investigation of the research question. The chapter ended by identifying the tools I used to conduct the usability tests, including an in-depth account of each interface's test tasks, and what these tools were designed to evaluate in terms of the D8T's usability. In the next chapter, I summarize and evaluate the findings from testing the three user groups in order to answer this study's research questions.

CHAPTER 3

Introduction

In this chapter, I discuss each of the three usability tests' findings and analyses separately

by level—novice, intermediate, and, lastly, expert. I categorically organize the findings and

analyses from the usability tests based on three quality usability attributes I adopted from

Quenesbery (2003) and Nielson (2003). I define the three usability attributes in the same manner

for all three of the usability tests, and I use the same testing tools to generate results in terms of

the usability attributes. At all levels of testing, data measuring *efficiency* came from participants'

task completion times. I derived the *error tolerance* measures of error frequency and error

severity from my observations during testing and from my adaptation of Dumas and Redish's

(1999) error severity scale, respectively. I take measures of *ease of use* from answers to the post-

test questionnaire and from my conversations with participants following the testing.

Usability Tests' Findings and Analyses

Before presenting the findings, it is necessary to define each of the three usability

attributes as I have applied them to this study. Note that the denotations remain the same for all

levels of testing.

- *Efficiency* – The time (measured in minutes and seconds) at which a user interacted with

  the interface to successfully read and complete a task. I measure effectiveness by

  comparing both the actual average completion times per task and the average overall

  testing time to the corresponding expected times. Throughout the testing, I began

  timing with a stopwatch when I handed the participant the task and stopped timing when

he or she verbally indicated, and I visually confirmed, the task was successfully complete.

- *Error tolerance* – The nature, number, and severity of errors participants made. I categorize errors by cause and address each with a corresponding redesign suggestion in the analysis sections of this chapter. The redesign suggestions are in service of preventing the same or similar errors in the future. In the context of error discussion, "tolerant" describes whether or not participants were able to use the screenshots and verbal descriptions in the D8T to identify and correct their own mistakes. I judge the D8T to be error tolerant if there are few total errors and if the identified errors are generally of low severity. I captured errors during all testing levels using a pen and paper. I recorded action sequences and noted as errors all instances in which participants were not able to complete any aspect of a task without an assist.

- *Ease of use* – The participants' subjective reflective responses regarding how easy to use the D8T was from their perspective. Participants at all testing levels rated the D8T on a Likert scale of 1-5 (1 being the low measure of usage difficulty, and 5 being the highest rating of ease of use) both in terms of its overall usability and in terms of the ease or difficulty they encountered during each task.

Novice Testing Findings and Analyses

As discussed in Chapter 2, novice participants are classified as those who have never used Dreamweaver before. In the novice D8T, I employed a task-oriented style of documentation that yielded a highly detailed verbal and visual interface. This systematic level of instruction was designed to guide users through every step of how to establish a site in Dreamweaver, connect to Georgia State University's server, and upload web pages to the

Internet. I now present the findings and analyses from the novice testing in terms of efficiency, error tolerance, and ease of use, respectively.

Novice Efficiency

Efficiency is a key aspect of the D8T's usability at all testing levels because, as a supplementary classroom resource, the artifact is designed to be a means to an end—students should spend as little time as possible within the D8T because both classroom workshop and homework time are better spent composing and coding the actual websites. Especially at higher levels of familiarity with Dreamweaver, the D8T should function as a conduit to either rapidly beginning a Dreamweaver assignment by guiding students through site set-up and FTP configuration, or by allowing students to quickly finish an assignment by explaining the upload process(es) and URL formula(s).

Novice Efficiency Findings

Here, I detail the efficiency findings from the novice testing. Table 3.1 relates the novice users' average and per-task completion times in terms of minutes and seconds. The average time it took the five participants to complete all eight tasks was 26:38. This average time reflects the range of Novice User 2's (NU2) shortest overall time of 16:13 to Novice User 1's (NU1) longest total time of 42:18. The shortest average task completion times were for Tasks 1 and 8 (0:19 and 0:57, respectively), followed by Tasks 2 and 6 (1:06 and 1:02, respectively). Task completion times were fairly consistent across participants for Tasks 1, 2, 6 and 8. The ranges for these tasks were all less than 1:00, with the exception of Task 6, where the range was 2:07 (0:47 to 2:54). However, for Tasks 3, 4, 5 and 7, which took participants much more time, there was a great amount of temporal variation between participants. For example, the greatest range between participants is seen in Task 5 (1:18 to 12:04), followed closely by Task 7 (1:02 to

12:07). The ranges for these tasks topped 11:00. Also, Tasks 3 and 4 showed a substantial range between completion times. The range for Task 3 was 4:07 (4:24 to 10:12) and the range for Task 4 was 5:36 (2:07 to 7:43). Despite the often striking instances of variance in task completion time among participants, average task completion times for five of the eight tasks were less than 5:00.

For NU1 and NU3, the participants who took the longest to complete testing, it does not appear that any single task contributed to these users' exceptionally long times. However, both users logged above average times for Tasks 3 – 7, the set of tasks involving all FTP processes as well as determining the URL of the webpage that was uploaded during the testing. On the opposite side of the spectrum, NU2 and NU4, the participants who finished testing the fastest, completed virtually every task in under the average amount of time. In fact, for many tasks, either NU2 or NU4 usually logged the fastest time of all. This is true, for example, in Tasks 3 and 4, where the fastest times of 4:24 and 2:07, respectively, were recorded by NU2. Lastly, for the novice participant pool, NU5 seems to represent the median user—this user's times were neither exceptionally fast nor remarkably slow.

Table 3.1. Individual and average task completion times* for the five novice participants.

Participant	U1	U2	U3	U4	U5	Average	Range
Task							
1. Follow directions on D8T homepage	0:10	0:16	0:26	0:13	0:31	0:19	0:21
2. Write what novices will learn	1:00	0:46	0:58	1:23	1:23	1:06	0:37
3. Establish a site in Dreamweaver	8:46	4:24	10:12	5:55	6:07	7:04	4:07
4. Create new HTML file in Dreamweaver; find 3 uploading steps in D8T	4:44	2:07	7:43	3:59	4:19	4:34	5:36
5. Establish FTP connection	12:04	3:43	7:28	1:18	6:28	6:12	11:16
6. Use Dreamweaver to put site online	1:54	2:16	2:21	2:54	0:47	1:02	2:07
7. Determine URL of uploaded site	12:07	1:02	9:52	1:36	1:08	5:09	11:08
8. Determine URL of hypothetical site	0:32	1:34	0:43	0:34	1:22	0:57	1:02
Total time for each user, all tasks	42:18	16:13	40:12	18:27	22:08	26:38	26:08

*Times are shown in minutes and seconds

Novice Efficiency Analysis

Analysis of how efficiently participants interacted with the novice D8T to successfully complete tasks begins by examining the actual times participants logged against the times an instructor of some of the English rhetoric and composition classes for which the artifact was designed deems acceptable. Working from extensive past experience teaching Georgia State students Dreamweaver, Bowie (2007, personal communication) established the expected completion times. Table 3.2 illustrates the expected times for each task, the average actual time

participants completed each task, and a declaration of efficiency based upon the differences

between expected and actual time testing overall. The novice D8T exhibited a high level of

efficiency insomuch as five of the eight tasks (Tasks 1, 2, 3, 6, and 8) clearly took less time for

the participants to complete on average than was expected. Two of the remaining three tasks

(Tasks 5 and 7) took participants several minutes longer than was expected, thus showing them

to be clearly inefficient. However, Task 4 presents an interesting quandary. The fact that

participants completed this task only 0:34 seconds longer than was expected, shows that the

actual average completion time falls within the "acceptably efficient" range, which is defined as

an actual task completion time that is only between 30-45 seconds beyond the expected time. If

we allow for this small amount of leeway for novice users, efficiency for the interface jumps

from 63% to 75%, thus reflecting that participants were either efficient or acceptably efficient at

completing six of the eight tasks, and their average overall testing time was acceptably efficient

(since this time was 0:08 slower than expected). Even if we do not wish to allow the novices any

movement within the expected times, the fact that six of the eight tasks were completed faster (in

some cases several minutes faster) than expected is a positive indication that the novice D8T is at

least 63% efficient.

The D8T seemed to be especially efficient in aiding in the creation of a site in

Dreamweaver (Task 3), which is one of the most involved and crucial functions to perform when

first using the program. An example of the efficient use of the D8T to establish a site in

Dreamweaver can be seen through the actions of NU4 during testing. NU4 was methodical

about moving back and forth between Dreamweaver and the D8T when entering site definition

information. NU4 did not record the fastest time for this Task (she actually had the second

fastest time), but, unlike NU2 who was the fastest at finishing the Task, NU4 did not commit any

errors during the completion of the Task. Thus, NU4's actions were representative of how the novice D8T was designed to be efficiently used—carefully going back and forth between screens, comparing information to ensure accuracy. Even moving at a cautious pace through the important steps of defining a site in Dreamweaver can, as NU4's time illustrates, can take students less than 6:00, which is 4:00 faster than the expected time.

In addition to a majority of the participants efficiently completing tasks, the sharp drop in actual completion time between Tasks 7 and 8 (determining actual and hypothetical URLs, respectively) suggests that real learning occurred just from participants reading the D8T's URL discussion. This is evidenced by the fact that they were able to move from knowing nothing about student URLs before testing to successfully writing down hypothetical website addresses based solely on the information provided by the tutorial.

Participants were only slower than was expected when completing two tasks. Task 4 took participants 0:34 seconds longer on average than expected to complete. In fact, most of the time users spent on this Task was not in locating the steps involved in establishing a connection with the remote server (the most important aspect of the Task), but in writing the steps down. Thus, given the acceptably efficient time ranges, it is permissible to say that the participants efficiently completed the most important part of this Task. On the other hand, participants took just over 2:00 longer than was expected on average on Task 5. In fact, only two of the five participants were able to complete this task faster than the expected time. NU1 took three times as long to complete the task than the 4:00 expected, and NU3 took almost twice as long as expected. Both of these users had difficulty understanding the FTP user name and password information provided in the D8T. Unlike these users, NU5 understood the user name and password explanations to connect to the remote server, but became confused as to how to

proceed after successfully connecting to Georgia State's server since no explicit directions in the D8T existed for that situation. These user difficulties associated with Task 5 demonstrate user inefficiency with the current version of the D8T, while illuminating possible routes for error prevention in a future redesign of the tutorial.

However, the numbers are encouraging for the efficiency aspect of the novice D8T's usability, and it may be concluded that even though the step-by-step task-oriented instruction was lengthy, it was nonetheless an efficient mode of communicating instructions for those who have never encountered Dreamweaver's interface before. As users progress into higher levels of the tutorial, expected task completion times will be faster for the same tasks, since users are assumed to already be familiar with some basic functions in Dreamweaver at the intermediate and expert levels. Based on the fact that participants completed five of the eight tasks (63%) in well under the expected times, and that they completed six of the eight tasks (75%) in an acceptably efficient range above the expected time, it is appropriate to conclude that the novice D8T is an efficient resource for its purposes.

Table 3.2. Novice testing expected task completion times versus actual average completion

times* and indication of efficiency**

Task number	Expected completion time	Actual average completion time	Acceptably efficient?
1	0:30	0:19	Yes
2	2:00	1:06	Yes
3	10:00	7:04	Yes
4	4:00	4:34	Yes
5	4:00	6:12	No
6	2:00	1:02	Yes
7	2:00	5:09	No
8	2:00	0:57	Yes
Overall testing	26:30	26:38	Yes

*Times shown are in minutes and seconds

**Times were deemed "acceptably efficient" if the actual average completion time was within 30-45

seconds of the expected completion time

Novice Error tolerance

Often in usability analysis, success rate measures are included with error severity

measures. I do not include task success rate measures for any testing level because, ultimately,

tasks were all completed successfully by virtue of necessity. In other words, if the user entered

incorrect FTP information during Task 5, he or she would not be able to complete Task 6, which was to upload the basic HTML page she created as part of Task 4. When users mistakenly believed a task to be completed successfully, I would intervene and show them the origin(s) of their error(s) and show them how to correct their mistakes. Before assisting, though, I noted the places in which participants erred, and then drew from the information I had to provide when helping them fix the problem(s) to arrive at design change recommendations for all levels of the D8T.

Although being tolerant to errors is a major aspect of usability, the D8T as a whole is not designed to be a comprehensive Dreamweaver Help tool. It is intended to get Georgia State students started using the program by describing information particular to their use situation (such as their FTP information and their student URL). While it is important to be thorough, it is outside the scope of the D8T to repeat information that is covered in course texts that explain Dreamweaver. In real use situations, instructors would be more likely to direct students to a textbook than to the D8T, unless the problem dealt with an issue the textbook could not cover (like particular FTP information or URLs for sites on Georgia State's server). The design change recommendations I discuss later mainly center around making what is already part of the D8T more comprehensible, rather than adding much more about how to use certain Dreamweaver functions. Ultimately, the design change recommendations are intended to address prevention of users making the same or similar errors that were identified during testing.

To analyze the scope of errors and their impact on the D8T's usability at all levels, I adopted the error severity scale established by Dumas and Redish (1999), and extended it to more accurately fit the types of errors I observed during testing. In Dumas and Redish's (1999) scale, there are four levels of usability problems:

- *Level 1* – User difficulty with the interface prevents task completion

- *Level 2* – User difficulty with the interface contributes to "significant delay and frustration" (p. 324)

- *Level 3* – User difficulty with the interface only slightly affects his or her ability to complete a task

- *Level 4* – User difficulty with the interface points to a very minor design change

As discussed in Chapter 2, I have added two types of errors for the purposes of more accurately describing findings at all testing levels. *Deviation errors* are those that users made, but that are not covered by the D8T. In some instances, this type of error reflects courses users took to accomplish a task which differed from the instructions on the D8T. In other instances, deviation errors refer to users either skipping steps in the D8T or forgetting to refer to it for help when they encountered trouble. *Computing errors* reflect functions that are outside the purview of the tutorial or attention errors related to executing a task. For example, if users had trouble creating a new folder on the desktop (part of task 3), I classified it as a computing error. Additionally, mistyping a URL into the browser counted as a computing error. Deviation and computing errors are not assigned a corresponding level (5 or 6, e.g.) because these error types are not inherently hierarchical, as Dumas and Redish's errors are.

Novice Error Tolerance Findings

In this section, I discuss error tolerance by describing the errors participants committed during testing, and by showing which errors were the most frequently made. Table 3.3 comprehensively describes each error, and Table 3.4 illustrates error frequency by showing how many times each participant erred and which instances of error occurred most often. Only one

user was responsible for 3 of the 12 instances of error (errors 1, 5, and 7). Of the remaining nine

errors, five were committed by three or more users (errors 3, 4, 6, 11, and 12). Four of the five

users committed error 11, thus making it the most frequently made error. Additionally, NU1 and

NU3 made the most errors during testing; one or both of these users appears in 10 of the 12 error

instances. In fact, NU1 and NU3 were the only participants who made errors 8 and 9. That NU1

and NU3 made the most errors corroborates the efficiency finding presented above—these users

took the longest of all to finish testing. Conversely, NU2, NU4 and NU5 committed the fewest

errors overall. NU2 and NU4 erred in four instances. NU5 erred in only two instances, and is

associated with errors 1 and 6. By dividing the total number of errors made during testing by the

total number of participants, the average number of errors each novice user made was 2.4.

Table 3.3. Participant errors for the novice usability test.

Error
1. After successfully connecting to the remote server, the plug icon does not change to match D8T. Also, user is not taken "directly" to Dreamweaver's main editing screen. He/she must click through to a new summary screen and select "Done" to be taken back to the main interface.
2. When "Local/Network" is selected on the File Sharing screen, user confuses the folder icon on this screen with the one on the Editing Files screen.
3. "Yes to all" screenshot does not appear in Dreamweaver before site is uploaded, but is included in the tutorial.
4. Users have trouble locating the "unplugged" icon when attempting to upload the site.
5. Despite looking at the relevant screenshot in the D8T, user inputs incorrect FTP information and does not realize his/her mistake.
6. Users are unsure that upload completed successfully.
7. User does not read screenshot of Dreamweaver site setup summary screen to identify his/her mistakes configuring the site.

Error
8. Users ignore direction to switch default "Local/Network" setting on Sharing Files screen, and try to continue site set up despite the fact that no screenshots match.
9. Steps in the D8T consistently skipped. Users must be told to go back and fix mistakes as they do not realize them on their own.
10. 404 Error appears when users mistype URL of uploaded site into web browser.
11. Users have trouble creating a new folder on the Desktop to save local files in.
12. Trouble correcting one's own mistakes when creating a site in Dreamweaver.

Table 3.4. Novice users' error frequency during testing

Participant	NU1	NU2	NU3	NU4	NU5	
Error #						Error frequency
1					X	1
2		X	X			2
3	X	X	X			3
4	X	X		X		3
5			X			1
6		X		X	X	3
7			X			1
8	X		X			2
9	X		X			2
10	X		X			2
11	X	X	X	X		4
12	X		X	X		3
Participant error totals	7	5	9	4	2	

Novice Error Tolerance Analysis

In the previous section, I illustrated error frequency both by describing the errors made and the participants that committed each error. Notably, error frequency is not necessarily a measure of severity, as I show in this section. In Table 3.5, I assign a recommended design change and a severity level to each error. The error severity level is designed to quantify the error's effect on usability. In the case of novice testing, error frequency was not as much as a determiner of error severity as was the scope of the error identified. For this testing level, there were three Level 2 errors, one Level 3 error, and four Level 4 errors. Although there were many errors, most of them were either of the lowest severity level, or were classified as deviation or computing errors that the D8T was not designed to address. The fact that the majority of errors identified during testing were either of the lowest severity level or were classified as deviation or computing errors bodes well for the novice D8T's error tolerance.

The observations I noted during testing showed that participants committed errors in three instances: when they skipped steps in the tutorial or were otherwise not giving their full attention to the task; when screenshots in the D8T did not match their actions in Dreamweaver; or when they had trouble understanding what a task was asking of them. When participants did initially err, the D8T was often tolerant. In many cases, a user would initially input incorrect information, but, upon further concentration on the D8T's verbiage and screenshots, would recognize the mistake and, if possible, go back and fix it. Importantly, when users were able to locate and fix mistakes on their own while still working on a task, it did not count as an error, but rather was an indication of the 'tolerance' to errors supported by the D8T. However, Dreamweaver would, in some instances, not cooperate with a user's correct intention to reevaluate some of her action sequences by allowing her to click the "Back" button to override

previously entered information during site definition. Since the D8T did not cover how to edit

sites, this posed a significant quandary to those who knew they needed to change what they had

entered, but were clueless as to how to execute that function. Because the tasks built on one

another (for example, a participant would not be able to successfully upload the site if she did not

enter the right FTP information), failure on a task was, so to speak, not an option. In the case

described above, it is now apparent that the D8T needs to provide directions, even at the novice

level, for how to edit a site (see recommended change 3).

It is encouraging to note that most of the recommended changes are minor in nature, and

involve adding only small pieces of information to the D8T in the form of more detailed verbal

instructions or editing certain screenshots to more pointedly convey directions. Specifically, the

level 2 errors have as their recommended change adding information, while level 3 and 4 errors

require the editing of existing information in the D8T for clarity, with the exception of error 7,

which does suggest the need to include instructions for previewing a page in Dreamweaver using

the F12 function. Even though there are nearly a dozen errors to address when redesigning the

novice interface, all are relatively easy to incorporate, and none suggest the interface to be

fundamentally unusable in any aspect. Thus, because of the minor nature of many of the errors

and because I observed users actively using the D8T to identify and correct their own mistakes in

many cases, I conclude that, given the D8T's scope, it is usable in terms of it tolerance to errors.

Table 3.5. Errors, error severity levels, and recommended change from the novice testing.

Error	Error severity level/type	Recommended change
1. After successfully connecting to the remote server, the plug icon does not change to match D8T. Also, user is not taken "directly" to Dreamweaver's main editing screen. He/she must click through to a new summary screen and select "Done" to be taken back to the main interface.	2	**1.** Edit the part of the "Uploading Files" section of the D8T that addresses these steps. Mention the need to click through the site editing process that enables users to connect to the remote host.
2. When "Local/Network" is selected on the File Sharing screen, user confuses the folder icon on this screen with the one on the Editing Files screen.	2	**2.** On the "Local/Network" screen, note in red that the folder icon should not be clicked on.
3. Trouble correcting one's own mistakes when creating a site in Dreamweaver.	2	**3.** Include steps that show users that they can edit sites by clicking the "manage site" button on the file management panel.
4. "Yes to all" screenshot does not appear in Dreamweaver before site is uploaded, but is included in the tutorial.	3	**4.** Remove this screenshot, but add a note that when 1+ file is being uploaded, the message will appear.
5. Users have trouble locating the "unplugged" icon when attempting to upload the site.	4	**5.** Enlarge the screenshot with the icon in it so the totality of Dreamweaver's interface is shown. Add arrows to direct users to the File Management Panel where the icon is located.
6. Despite looking at the relevant screenshot in the D8T, user inputs incorrect FTP information and does not realize his/her mistake.	4	**6.** Highlight the text above the FTP information screenshot that directs users as to which information to change and which to leave as it appears in the picture.
7. Users are unsure that upload completed successfully.	4	**7.** Include instructions to "Preview" the uploaded page in a web browser (the F12 function in Dreamweaver).
8. User does not read screenshot of Dreamweaver site setup summary screen to identify his/her mistakes configuring the site.	4	**8.** Reword information that appears in red on the summary screen to help user ascertain possible errors.
9. Users ignore direction to switch default "Local/Network" setting on Sharing Files screen, and try to continue site set up despite the fact that no screenshots match.	Deviation	**9.** Highlight the information that addresses the switch in the D8T in an effort to draw the eye to it more.
10. Steps in the D8T consistently skipped. Users must be told to go back and fix mistakes as they do not realize them on their own.	Deviation	**10.** Include notes at the top of the D8T's homepage and the first page of the novice interface with information in red instructing users to read carefully and take their time.

Error	Error severity level/type	Recommended change
11. 404 Error appears when users mistype URL of uploaded site into web browser.	Computing	**11.** Include a section about "Page not Found" causes in the URL discussion. Suggest checking for typos, re-uploading the site, then typing the entire URL into a new browser window. Mention asking the professor if all else fails. Follow U4's suggestion of changing the text color of the part of the URL formula that must be changed to reflect the student's individual user name and the unique file name.
12. Users have trouble creating a new folder on the Desktop to save local files in.	Computing	**12.** This was actually a problem with the wording of the task. It was also a computing function not covered by the D8T. Users do not have to create new folders to save files in for class; therefore, no change will be made to the D8T.

Novice Ease of Use

Ease of use is a vital aspect of the D8T's usability on all levels because the D8T is a supplementary classroom resource. If students are not satisfied with the clarity or presentation of information on the D8T, they are likely to avoid accessing it and turn to the instructor for help with Dreamweaver functions that are covered by the tutorial. In such cases, the instructor would again be forced to spend class time assisting students with problems that should have been adequately addressed by the D8T, thereby negating the pedagogical usefulness of the artifact. I present ease of use as the final usability attribute under study because these ratings quite possibly were affected by the previously discussed measures of efficiency and error tolerance.

Novice Ease of Use Findings

The ease of use measures are arranged according a Likert scale where the low measure of 1 indicated that the D8T was "totally difficult to use," while the high measure of 5 meant the tutorial was "extremely easy to use." Table 3.5 presents the ease of use results, which are grouped by participant and task, and include average ratings for each task and for the overall experience. I took these ratings from participants' responses to the post-test questionnaire. Average ease of use measures for each task and overall ranged from 3.2 – 5, meaning that none of the tasks or the interface as a whole was given either of the 1 – 2 "difficult" ratings on average. Across participants, ratings per task were quite varied; 5 was actually the most frequent rating given by all participants collectively since it appears 15 times in the table. Participants gave the lowest average ease of use rating of 3.2 to the overall experience of using the D8T, while they all rated the task of determining the URL of a hypothetical website (Task 8) at 5. In fact, the average ease of use score for identifying the URL of the page they uploaded during the test (Task 7) was also high at 4. Other tasks that received average satisfaction ratings of 4 were finding the steps involved in uploading a site (Task 4), and connecting to the remote host (Task 5). The most involved Task, site setup (Task 3), received a median satisfaction rating of 3.4.

Table 3.6. Novice participants' ease of use ratings* overall and per task from the post-test questionnaire.

Participant	Overall level of satisfaction with the D8T	Homepage categories	Locating novice tutorial goals	Site setup	Steps involved in uploading	Connecting to the remote host	Site upload	URL for uploaded page	URL for hypothetical site
U1	3	3	3	2	3	3	3	2	5
U2	4	4	4	4	5	5	2	5	5
U3	2	2	3	4	4	4	4	3	5
U4	3	3	3	2	3	5	4	5	5
U5	4	5	5	5	5	3	5	5	5
Average	3.2	3.4	3.6	3.4	4	4	3.6	4	5
User comment	"It wasn't a bad experience." –U1	"I had to read carefully, but it was clear for the most part." –U3	None	"Where to save the site locally could have been better explained" – U4	None	"There weren't any directions for what to do after testing the connection. I got confused." – U5	"There's no way of knowing the file uploaded right." – U2	I had a typo in my URL. Tutorial did not help with this." – U1	None

*Results are based on the following scale: 1= Totally difficult to use; 2= Somewhat difficult to use; 3= Fairly easy to use; 4= Easy to use; 5= Extremely easy to use.

Novice Ease of Use Analysis

      With the importance of ease of use to the overall purpose and usability of the novice D8T in mind, I set the minimum desired rating across tasks and overall at 3.5 for this testing level. Of all the D8T's levels, the novice level contains the most new information for users. Indeed, given that their unfamiliarity with Dreamweaver qualifies them as novices, and that the novice interface deals exclusively with Dreamweaver functions, *all* of the D8T's information is

new for this group of users. Thus, I believe a slightly higher than median ease of use rating (3.5)

to be an acceptable minimum average rating to aim for in terms of usability.

Of the eight tasks, users rated only Tasks 1 and 3 below the desired score, and then only

by a tenth of a point (3.4 as opposed to 3.5 for both Tasks). Users rated the remaining six tasks

either just above the desired score (Task 2 had a satisfaction rating of 3.6, for example), or

solidly above the minimum expected, with ratings of 4 and 5. Finally, the overall ease of use

rating of the novice D8T (3.2) fell 0.3 short of meeting the minimum desired rating of 3.5.

Low ratings from participants do appear on tasks in which they committed errors while

attempting to complete, thus signaling a possible correlation between errors committed and ease

of use rating. For example, the only rating of 2 that NU2 gave the D8T was for the site upload

task (Task 6). Looking back at Table 3.3 reveals that NU2 was associated with two site upload

errors. Also, the lowest rating for any task NU5 gave was a 3 on connecting to the remote host

(Task 5); NU5 was the lone participant associated with the error she committed during this task.

In addition, NU3, who committed the most errors, rated the tutorial a 2 for overall ease of use

(the lowest of all participants). Interestingly, NU1, who took longer than NU3 to finish testing

and made about the same amount of errors, rated the D8T "fairly easy to use" for five of the

eight tasks, as well as overall.

Based on triangulation of findings from the novice interface's efficiency and error

tolerance attributes, I believe all three of the usability attributes to be interrelated. For example,

Task 3, which took participants the longest on average and was the task in which participants

erred most frequently, was also given the second lowest ease of use rating of 3.4. NU4, who

gave the task the lowest satisfaction rating of all the participants, explained in the post-test

questionnaire her frustration when she noted, "Where to save the site locally could have been

better explained." Conversely, Task 8, which took participants under a minute to complete on average and was not associated with a single error received a perfect satisfaction rating of 5. U3 noted from her perspective, she had to "read carefully," but the D8T's discussion of URLs was "clear for the most part." Regarding the D8T's attention to URLs, it is pleasing to observe that participants seemed to learn quite a bit in the interim between Tasks 7 and 8. Their average time to complete the two very much related tasks fell from over 5:00 for Task 7, to under 1:00 for Task 8. Additionally, several errors occurred due to users incorrectly typing their URL into a web browser during Task 7, but users did not err at all when they wrote down the URL of a hypothetical site for Task 8. These numbers corroborate the entire ease of use point jump (4 to 5) that was seen from Task 7 to Task 8.

User comments often explain the low ease of use ratings. For example, NU1, who gave Task 7 (URL for uploaded page) a low rating of 2 explained her frustration by saying that the D8T did not address typos in student URLs. In addition, NU5, who gave the site upload task a rating of 3, said that she was unsure of how to proceed with the task after she followed the steps to establish a connection to the remote host. Because users were instructed to justify by explanation a rating below 2, these remarks serve to make the self-reported ease of use levels seem less arbitrary and more grounded in the participants' experience with using the D8T. In addition, I took all user comments into account to arrive at the design change recommendations shown in Table 3.5.

Overall, I am pleased with the ease of use results from the novice testing. That the overall ease of use rating (3.2) was only 0.3 lower than the minimum desired rating of 3.5 suggests that with the implementation of the changes proposed, it is very possible for the rating to ascend to the desired level. The design changes will also contribute to the prevention of

identifiable errors in the future. Thus, because we can conclude that across tasks, the ease of use

measure was acceptable at 63% (five of the eight tasks were rated above the minimum desired

score on average) it follows that the D8T is just as easy to use as it is efficient.

Discussion of Novice Testing

In this section, I consider the analyses of the novice D8T in terms of the interface's

overall usability. That users consistently became frustrated when the D8T did not perfectly

mimic Dreamweaver's actions on several occasions suggests that the detailed task-oriented

documentation style was perfectly suited to these novice users. In fact, the novice users wanted

even more detail than the D8T provided when it left out a screenshot or did not otherwise fully

direct them through the minutia of task completion. I am pleased with the usability of the novice

D8T because, despite the fact that I did have to help every user in at least one instance during the

test, the tutorial did enable them to perform highly meaningful, complex tasks using a program

that none had ever encountered before. This evaluation speaks strongly in favor of the novice

interface meeting its goal of aiding users in the completion of tasks specifically pertaining to

Georgia State students. Therefore, based on the facts that the novice D8T is between 63% and

75% efficient, that a relatively small number of minor errors were discovered (2.4 on average per

user) or went unrecorded entirely due to users' ability to use the D8T to recognize and correct

their own mistakes, thus illustrating the artifact's tolerance to errors, and that the ease of use

rating was an acceptable 63%, I conclude that the novice interface is a usable facet of the D8T.

Intermediate Testing Findings and Analyses

As discussed in Chapter 2, the D8T defines intermediate participants as those who have

some HTML or web design knowledge but who have not used Dreamweaver before. In the

intermediate D8T, I drew from Mirel's (1998) ideas on "contextual" or "goal-based"

documentation. Unlike the novice interface's two long pages, the design for intermediate users

utilized many short pages connected to one another by a main page with conversational links

such as "I'm ready to upload my website, but I don't have access to Dreamweaver. What do I

do?" Also, in keeping with a less-directive style, the navigation on the intermediate interface

changed from including the large, vertical navigation bar leading back to all parts of the D8T that

was used in the novice interface to a smaller, breadcrumb style of navigation that only led users

around the intermediate interface. I present the findings and analyses from the intermediate

testing in terms of efficiency, error tolerance, and ease of use, respectively.

Intermediate Efficiency

Efficiency is a major usability attribute for this level of testing given the intermediate

D8T's comparative brevity of style as compared to the novice interface. At this level, users

should be able to more rapidly and successfully move through site definition in Dreamweaver

with fewer instructions because they bring more *a priori* knowledge to the testing situation. On

the other hand, since uploading a web page via the student Lockerbox may still be new to

intermediate users, they will of course not be expected to be as efficient in completing the set of

tasks dealing with this function. Nevertheless, overall efficiency is still important for the same

reasons that were presented for the novice testing.

Intermediate Efficiency Findings

In this section, I present the efficiency findings from the intermediate testing. Table 3.6

shows the intermediate users' average and per-task completion times, expressed in minutes and

seconds. Of the intermediate users, Intermediate User 4 (IU4) took the longest to complete the

testing, with a time of 29:32, and Intermediate User 5 (IU5) rapidly completed all test tasks in

14:47. The other three users' times were within several minutes of each other, centering around the 20:00 point.

Across participants, task completion ranges varied widely. For example, due to IU4's exceptionally long completion time, the range for Task 4 was 17:01 (0:37 to 18:02). The ranges for Tasks 1, 3, and 5, on the other hand, were all under 1:00 (0:10 to 1:02; 1:25 to 1:55; 0:31 to 1:00, respectively). Among the remaining four tasks, completion time ranges were 4:02 for Task 2 (3:40 to 7:42), 4:33 for Task 6 (2:38 to 7:11), and 2:43 for Task 8 (0:15 to 2:59). The range for testing completion times was also extensive at nearly 15:00 (14:47 to 29:32).

It appears that a few isolated long task completion times contributed to the addition of large amounts of time to participants' overall testing times. For instance, IU4's lengthy time on Task 4 accounted for over half the time it took this user to finish all seven of the other tasks. Indeed, but for Task 4, IU4's times were all under the average time per task. Finally, IU2 logged the longest times of all participants for Tasks 7 and 8. IU2 spent just over one fourth of her total testing time completing Task 7—a Task which every other user except IU3 finished in about 1:00. IU2 also recorded a time of 2:59 on Task 8, a Task which every other participant finished in under 1:00.

Table 3.7. Individual and average task completion times for intermediate participants

Participant	U1	U2	U3	U4	U5	Average	Range
Task							
1. Follow directions on D8T homepage	0:49	0:44	1:02	0:24	0:10	0:38	0:52
2. Create a site in Dreamweaver	7:42	3:40	5:21	4:23	6:45	5:34	4:02
3. Create an HTML file named "index.html"	1:33	1:55	1:27	1:25	1:29	1:34	0:30
4. Use Dreamweaver to upload the file "index.html"	3:00	0:37	2:05	18:02	1:01	4:57	17:01
5. Create an HTML file named "test.html"	1:00	0:31	0:31	0:37	0:35	0:39	0:59
6. Upload "test.html" without using Dreamweaver	7:11	3:32	4:07	3:29	2:38	4:11	4:33
7. Type the full URL of "test.html" into a web browser	0:40	5:44	4:05	0:44	1:07	2:22	4:55
8. Determine URL of hypothetical site	0:59	2:59	0:35	0:15	0:43	0:57	2:43
Total time for each user, all tasks	23.00	20:00	19:22	29:32	14.47	21:33	15:53

Intermediate Efficiency Analysis

As with the analysis of novice efficiency, I examine intermediate users' average task completion times against the expected completion times established before testing. Table 3.8 displays the actual average completion times per task and the expected times for each task. If the participants' average time was lower than the expected time or was within the "acceptably efficient" range, the D8T efficiently allowed to complete the task, and vice versa. Necessarily, expected times for this testing level were lower for the same tasks than they were for the novice testing level. For example, intermediate participants were expected to complete the actions

associated with defining a site in Dreamweaver 6:30 faster than their novice counterparts (3:30 compared to 10:00) because this is a task that should already be familiar to them in some way. Intermediate users were also expected to access their uploaded webpage using their student URL 1:00 faster than novices (1:00 expected time compared to 2:00) for the same reason, hence their classification as intermediates as opposed to novices or experts. Intermediates ultimately were expected to finish testing in half the time it was supposed to take novices (13:30 compared to 26:30).

The findings show that intermediate users completed only three tasks faster than was expected (Tasks 3, 5, and 8), yielding an efficiency rate of 37%. Adding in the acceptably efficient margin only adds Task 1 to the list of efficient tasks, and increases the efficiency measure to 50%. However, although intermediate participants' performance was between 50% - 63% inefficient (depending on whether the acceptably efficient margin is considered valid) relative to the expected task completion times, a comparison of three of the intermediate times deemed inefficient with the corollary novice times leads to an interesting discovery. Even though intermediate participants did not meet the temporal expectation set by an instructor, they were nevertheless able to establish a site in Dreamweaver (Task 2) and determine the URL of their uploaded web page (Task 7) much faster than the novice users. Average completion time for Dreamweaver site definition fell by approximately 1:30 from the novice to the intermediate level (7:04 to 5:34), and the average time to determine the URL for an uploaded site fell nearly 2:30 from the novice to the intermediate level (5:09 to 2:22). Thus, even though they fell short of meeting expected task completion times, intermediate users did complete two key tasks faster than novices, indicating that the information relevant to these tasks was presented in an efficient manner.

On the other hand, intermediate users fell short of the expected completion time on Task 6, uploading a web page without using Dreamweaver, by an average of 1:11. In Task 6, participants were introduced to an action sequence only IU5 was familiar with prior to testing (which explains her low completion time of 2:38), that required them to read through the only methodical step-by-step instruction set in the interface. Thus, though they did not meet the temporal expectation on average, three of the five users *did* complete the task faster than expected, and IU3 only missed the target time by 0:37, a span which would qualify her time as acceptably efficient. IU1 was solely responsible for driving the average completion time for this task above what was expected due to her slow time of 7:11. IU1 added minutes to her score when, after following the D8T's instructions for uploading via her student Lockerbox, she could not visually confirm that the file "test.html" was uploaded into her public_html folder. She proceeded to upload the same file using Dreamweaver to make sure it made it online. Despite IU1's time, and even including IU3's slightly long time, it seems intermediate users efficiently used the D8T's instructions to successfully complete a task four out of five previously knew nothing about.

Overall, testing showed the intermediate D8T to have an efficiency rate of 37%, which is low given that the novice D8T had an efficiency rate almost double that figure, and given that the style of documentation used was specifically employed to be unobtrusive and efficient in its comparative brevity. Even though the overall efficiency rate was low, intermediate users completed the test tasks on average about 5:00 faster than novices, were able to execute two key Tasks faster on average than novices (Tasks 2 and 7), and were able to, for the most part, complete a new Task (Task 6) only 1:11 longer on average than expected. Despite these findings, I hesitate to pronounce the intermediate D8T efficient as it stands. Substantial changes

need to be made to the interface, and testing needs to occur again with new intermediate participants.

Table 3.8. Intermediate testing expected task completion times* versus actual average task completion times and indication of efficiency**

Task number	Expected completion time	Actual average completion time	Acceptably efficient?**
1	0:30	0:38	Yes
2	3:30	5:34	No
3	2:00	1:34	Yes
4	1:00	4:57	No
5	1:30	0:39	Yes
6	3:00	4:11	No
7	1:00	2:22	No
8	1:00	0:57	Yes
Overall testing	13:30	21:33	No

*Times shown are in minutes and seconds

**Times were deemed "acceptably efficient" if the actual average completion time was within 30-45 seconds of the expected completion time

Intermediate Error Tolerance

In the following section, I discuss error tolerance for the intermediate D8T in the same terms as for the novice D8T. As with the novice testing previously discussed, I used an error scale consisting of four levels—level 4 errors affect overall usability the least, and level 1 errors are the most damaging to usability overall (Dumas and Redish, 1999). I again use the added error types of deviation and computing errors to more completely describe what I observed during testing. Error tolerance is a critical usability attribute to study at the intermediate level because authorities in the field remain uncertain as to how to tailor documentation to effectively address the needs to advanced users. By examining the types, frequency, and severity of errors these intermediate users make, accurate design change recommendations can be made that will lead to an interface that is both more error tolerant and, with even more testing, redesign(s), and research, error preventative.

Intermediate Error Tolerance Findings

In this section, I discuss error tolerance by describing the errors participants committed during testing, and by showing which errors were the most frequently made. Table 3.9 comprehensively describes each error, and Table 3.10 illustrates error frequency by showing how many times each participant erred and which instances of error were the most often made. Intermediate users identified seven total errors, and at least two intermediate participants committed each error. In fact, three or more users committed four of the seven errors, and the remaining three errors were committed by two users each. In addition, all five intermediate users committed error 4. IU1 made the most errors (five of the seven); IU2 was the next most error prone, as she committed four of the seven errors; IU3 and IU4 committed three of the seven errors each; and IU5 made the least amount of errors of all (two of the seven). Interestingly

though, IU4, the slowest of all participants, was unremarkable in the scheme of committing

errors since she committed only three errors overall. By dividing the total number of errors

made by the number of participants, we can see that the average number of errors committed per

intermediate user was 1.4.

Table 3.9. Participant errors for the intermediate usability test.

Error
1. Homepage description of "Intermediate User" is not encompassing enough.
2. Links on the main page of the intermediate interface are too long, and can confuse users as to where they lead.
3. Users have trouble differentiating between the discussion of URLs that appears as a direct link on the main intermediate page, and the one that is embedded in the Uploading without Dreamweaver page.
4. Navigation between intermediate pages is difficult to locate in places
5. Users have trouble correcting their own mistakes when creating a site in Dreamweaver.
6. 404 Error appears when user types URL of uploaded site(s) into a web browser.
7. Steps detailed in D8T skipped.

Table 3.10. Intermediate users' error frequency during testing.

Participant Error #	IU1	IU2	IU3	IU4	IU5	Error frequency
1	X	X	X			3
2	X	X				2
3	X	X	X			3
4	X	X		X	X	4
5				X	X	2
6		X	X	X		3
7	X			X		2
Participant error totals	5	5	3	4	2	

Intermediate Error Tolerance Analysis

Just as with the novice testing, error severity levels are designed to quantify errors'

effects on usability. In Table 3.9, I assign a severity level and a recommended design change to

each error. At this level of testing, there were four Level 2 errors, one Level 3 error, one Level 4

error, and one deviation error. Also, average errors committed per user for this testing level was

a full point below that of the novices (2.4 errors/user compared to 1.4). Although fewer in total

number, many more severe errors were identified during the intermediate testing than were found

during the novice testing.

The two most immediately clear usability problems that surfaced during testing

concerned 1) the definition of "intermediate" on the D8T's homepage, and 2) the navigational

system within the interface, which includes both the links on the main page of the interface and

navigation between the interface's many pages. Testing showed that the categorization of what

constitutes an intermediate user needs to be extended on the D8T's homepage, such that it allows

students who are familiar with Dreamweaver's interface but have not used the program recently

to be classified as intermediates as opposed to novices (which they certainly are not, by the

D8T's definition) or experts (which they are not at testing time but may perhaps rapidly advance

to become after using Dreamweaver again for a short time). Intermediate Users 1, 2, and 3 (IU1,

IU2, and IU3) articulated their hesitation to call themselves intermediates by virtue of the D8Ts

definition thereof, but were adamant that they did not feel comfortable calling themselves either

novices or experts.

While it is simple to augment the definition of "intermediate" on the D8T's homepage,

user difficulty adapting to work-scenario links as the only form of navigation on the intermediate

interface's main page presents a more difficult quandary in terms of changing the interface to be

more error tolerant. Although the scenario-based links on the main page of the intermediate D8T

were reflective of Mirel's (1998) discussion of how contextual documentation should be

organized, intermediate users found the links to be both too long and too cumbersome to match

their task situations. In fact, a close examination of the errors shows that over half are related to

navigation (errors 1-4). I classified all of these navigation problems as severe level 2 errors to

convey the pressing importance of changing the scheme to not only still adhere to Mirel's (1998)

advanced documentation principles, but to make it easier for users to orient themselves within

the interface.   It appears that in my gusto to apply documentation to intermediate users, I

neglected to keep in mind basic web design principles and was flagged for this by IU1, who

registered her frustration with the long, arbitrarily listed links on the main page of the

intermediate D8T. After completing the test, IU1 suggested making only part of each scenario

an actual link, while allowing the rest of the verbiage to act as description, and/or to organize the

links categorically. This latter suggestion would mean placing all scenarios dealing with

uploading a website (with or without Dreamweaver) under a short conversational heading such

as "Problems Uploading?" or "Advice for Uploading Your Website." I agree that thematic

organization of scenarios on the main page of the intermediate D8T would be advantageous both

in terms of the interface's error tolerance and to its ultimate effectiveness.

Furthermore, the breadcrumb navigation at the top of each page of the intermediate D8T

was insufficient as it is quite small and is not supplemented with anchored links within pages.

After testing both the intermediate and the novice interface, I would recommend that the

intermediate D8T's navigation be changed entirely to match that of the novice interface. This

would mean eliminating the breadcrumb navigation and adding the same large navigation bar

that appears in the novice D8T to the top of every intermediate page. This change would not

only streamline the D8T as a whole, but would also prevent users from becoming disoriented inside the intermediate interface, since the novice users were able to easily navigate both between and within pages of their interface.

In addition to navigation issues, trouble with URLs constituted another instance in which the intermediate D8T was not error tolerant. In this test, IU2 encountered a 404 error when she typed the correct URL into a browser after uploading a file called "test.html" without using Dreamweaver. Even though the file did display inside her public_html folder as it should have, the 404 error persisted. As IU2 later explained, she was clueless as to how to handle this problem except to go into Dreamweaver and re-upload the same file. After performing this action, the URL worked, and the page displayed. For the other two users affected by this level 4 usability problem, more careful attention to the D8T was sufficient to fix the problem and get the page to display properly, but only after an assist. Thus, it follows that a section on the intermediate D8T interfaces should be added to speak to URL troubleshooting, even if the instructions therein are as simple as "Try re-uploading the page using Dreamweaver" or "Be sure to check your URL for typos. Did you remember the ~ before your username?" Even suggestions as minor as those may save the instructor time in terms of addressing these issues, thereby making them a helpful addition to the D8T.

Overall, I was not very pleased with how my rendering of Mirel's (1998) documentation strategy was received. Though I still believe her theory of presenting tasks as goal-based scenarios is sound, I wonder if it is not better suited to more interactive tutorials than the D8T was designed to be. Upon closer examination, I see where the intermediate D8T could be enhanced with a more dynamic programming language like JavaScript. Perhaps complicating the programming syntax of the interface to make it more dynamic and interactive while

simultaneously streamlining the navigation would result in a deeper learning experience for

intermediate users. On the other hand, if the D8T is optimally useful when it is continually

updated, more difficult programming might pose as a hindrance to editing, especially if it is done

by different people. Ideally, the D8T as a whole should remain low-tech so that updates are easy

to integrate, while maintaining the major navigational, design, and content elements that have

already been tested for usability. Whatever the future enhancements may be, I cannot say that

the current version of the intermediate D8T is usable in terms of error tolerance because the

flaws in its navigational scheme are too serious, both in terms of users affected and severity level

of the navigational errors made.

Table 3.11. Errors, error severity levels, and recommended change from the intermediate testing.

Error	Error severity level/type	Recommended change
1. Homepage description of "Intermediate User" not encompassing enough	2	**1.** Include experience with using the student Lockerbox. Also state that category is applicable to those who have used Dreamweaver before, but not recently.
2. Links on main page of intermediate interface are too long, and can confuse users as to where they lead	2	**2.** Organize links thematically, and make only a short part of the description a link.
3. Users have trouble differentiating between the discussion of URLs that appears as a direct link on the main intermediate page, and the one that's embedded in the Uploading without Dreamweaver page.	2	**3.** Reorganize the Uploading Without Dreamweaver page. Include headings and subheadings. Make the link back to the main URL page more distinct within the Uploading Without Dreamweaver page. Add context for creating a new folder within the public_html folder, as no user will do it on her own without being told why it's important.

Error	Error severity level/type	Recommended change
4. Navigation between intermediate pages was difficult to locate in places	2	**4.** Make the look of the intermediate interface more like the novice one, with large navigation at the top of each page, and anchor links within pages. Either eliminate breadcrumb navigation scheme or restrict it to the bottom of every page.
5. Trouble correcting one's own mistakes when creating a site in Dreamweaver	3	**5.** Include steps that show users that they can edit sites by clicking the "manage site" button on Dreamweaver's file management panel.
6. 404 Error appears when user types URL of uploaded site(s) into web browser	4	**6.** Include a section about "Page not Found" causes in the URL discussion. Suggest checking for typos, re-uploading the site, then typing the entire URL into a new browser window. Also suggest user go into edit site to make sure FTP information was entered correctly and that user successfully tested the connection between Dreamweaver and Georgia State's remote hose. Mention asking the professor if all else fails.
7. Steps detailed in D8T skipped	Deviation	**7.** Include a note at the top of both the homepage and the first intermediate page with the information in red for users to read carefully and take their time.

Intermediate Ease of Use

At all testing levels, ease of use is a crucial usability attribute. Since students are not required to access the D8T, they will likely not consider it a viable resource unless it presents the information they seek in a straightforward, easily comprehensible fashion. As users move into the two higher testing levels, ease of use only becomes increasingly important. Intermediate and expert users bring a certain amount of prior knowledge into the testing and classroom situations, and thus are more equipped view the D8T through a more critical lens. In the next sections, I present and evaluate intermediate participants' ease of use ratings.

Intermediate Ease of Use Findings

The ease of use results in this section are grouped by participant and task, and include average ratings for each task and for the overall experience. I took ease of use ratings from participants' responses to the post-test questionnaire, which included the same Likert scale of ratings as the novice questionnaire. Table 3.12 shows that average ease of use measures for each task and overall ranged from 3 – 4.6; none of the tasks or the interface as a whole were given either of the 1 – 2 "difficult" ratings on average. Within tasks, participants gave the highest average rating of 4.6 to uploading a page using Dreamweaver. In fact, the intermediate interface received favorable ease of use ratings on average for every task except navigating the homepage (Task 1), which was given a fair rating of 3.

Table 3.12. Intermediate participants' ease of use ratings* overall and per task.

Participant	D8T's overall ease of use rating	Homepage categories	Defining a Dreamweaver site	Uploading site using Dreamweaver	Uploading site without Dreamweaver	D8T's URL discussions
U1	4	2	4	5	5	3
U2	3	2	3	4	2	5
U3	4	1	4	4	3	3
U4	5	5	5	5	5	5
U5	5	5	5	5	5	5
Average	4.2	3	4.2	4.6	4	4.2
User comment	"I should have had both applications [the D8T and Dreamweaver] open at once, so I could look back and forth more easily to line the information up." – U4	"The wording of the intermediate definition included HTML knowledge, which I don't know, but nothing about not having used Dreamweaver in a while, which is true for me." – U3	"The tutorial really helped me remember the steps to defining a site. Once my memory was refreshed, I felt confident." – U3	"This was a tad confusing because I thought I had to open a whole new page [in Dreamweaver], but once I typed what the task said to type, I had no trouble uploading it." – U5	"When I went to check the browser to see if my file uploaded, it didn't work. I didn't know what else to do other than to use Dreamweaver to upload the file." – U2	"The explanations were accurate and thorough, but I wanted them to be briefer." – U1

*Results are based on the following scale: 1=Totally difficult to use; 2=Somewhat difficult to use; 3=Fairly easy to use; 4=Easy to use; 5=Extremely easy to use.

<u>*Intermediate Ease of Use Analysis*</u>

With the importance of ease of use to the overall purpose and usability of the intermediate D8T in mind, I set the expected ratings across tasks and overall at 4 for this testing level. This 0.5 increase as compared to the novice level reflects the different documentation style and incorporates the *a priori* knowledge users brought to the testing situation.

Across tasks and overall, only the Task of uploading a webpage using Dreamweaver (Task 4) exceeded the expected ease of use rating, and only by 0.1 at that. Since only one of the five ease of use categories exceeded the expected rating, the intermediate D8T can be said to have a low ease of use rating of 20%. Participants rated two tasks (defining a site in Dreamweaver and understanding the D8T's URL discussion) 0.3 below the minimum desired measure, and the overall rating fell short of what I expected by the same amount. The D8T's homepage definition (Task 1) and uploading a webpage without using Dreamweaver (Task 6) were rated below the minimum desired ease of use rating by a full point and half a point, respectively.

Unlike the novice users, intermediate users' ease of use ratings do not appear to be as impacted by task completion times. Indeed, IU4's very long task completion time for uploading a web page using Dreamweaver seemingly had no bearing on the ease of use rating since she recorded a 5 for the task. Instead, the low ratings that stand out seem to be more related to participants erring while attempting to complete tasks. For example, the overall ease of use

rating for the D8T's discussion of URLs (Tasks 7 and 8) was the second lowest at 4.2. Three of the five participants encountered errors during this task, and two of the three (IU1 and IU3) rated the ease of use pertaining to the task comparatively low at 3. Interestingly, IU4, who was reticent when it came to using the tutorial to complete tasks, gave perfect 5 satisfaction ratings across tasks.

As discussed in the error tolerance analysis section for this testing level, I believe the ease of use ratings were less than what I expected mainly due to the myriad frustrations users encountered when navigating the interface. That the ratings were higher for this level than they were for the novice level seem to indicate that the information itself in the intermediate D8T is appropriate and, for the most part, clearly conveyed (indeed, IU4 drastically reduced her task completion times when she settled in and paced herself through the tutorial's instructions), but that the arrangement of the information both within some pages and across the intermediate interface globally was poor. Additionally, IU1's insistence on briefer explanations hints at the fact that more of the task-oriented documentation style than I had intended may have carried over into the intermediate interface.

Ultimately, I surmise that the navigation system (which includes the long link names on the interface's main page that may not necessarily have semantically corresponded to the wording of the testing tasks) and the disorganized page relating to uploading without using Dreamweaver largely are responsible for task completion times that could be shorter, errors that could be avoided, and ease of use ratings that could be higher. Global navigation and organization changes need to be incorporated and testing needs to occur again before I can confidently say the intermediate D8T is easy to use.

Discussion of Intermediate Testing

The intermediate interface of the D8T was the most experimental of the three levels. The guiding documentation principle reflected my understanding of Mirel's (1998) documentation strategies for advanced users. On the whole, intermediate users finished testing faster and committed fewer errors than novice participants did. Yet, though there were fewer errors to contend with at the intermediate level, most of the errors were classified as Level 2 errors, and thus are considered far more severe than the many Level 4 errors that peppered the novices' testing. Moreover, the severity of errors within the interface did not allow for the observable degree of error tolerance that was seen in the novice testing. Finally, the 20% ease of use rating, which accounts for the errors users committed when attempting to complete tasks, persuasively argues for the sweeping revisions that need to be made to the intermediate interface before it can be pronounced usable on any level except, perhaps, in terms of its efficiency.

Expert Testing Findings and Analyses

In Chapter 2, I described the expert D8T interface in detail. To briefly reiterate, this most advanced level of the tutorial defines an expert as someone who has used Dreamweaver before and who is current in his or her knowledge of the program. Since users should need very little information at this level to complete tasks relevant to classroom assignments, I used a minimalist style of documentation to describe functions both internal and external to Dreamweaver that Georgia State students would need to complete assignments. Three users as opposed to five tested this interface, for reasons discussed in Chapter 2. As with the previous two testing levels, I present the findings and analyses from the expert testing in terms of efficiency, error tolerance, and ease of use, respectively.

Expert Efficiency

Of all testing levels, efficiency is arguably most important for the expert users. At this level, users are accustomed to Dreamweaver's interface and to performing functions therein. For these users to consider the D8T usable in terms of its efficiency, they must be able to very rapidly access it, locate answers to their questions, and incorporate these answers into Dreamweaver in order to continue working with relatively little time lost. Thus, expected times pertaining to completing functions within Dreamweaver are fastest for this level. However, it has already been discussed that familiarity with Dreamweaver does not preclude knowledge of FTP processes not associated with the program, such as uploading directly into the Georgia State student Lockerbox. Accordingly, the same set of instructions for accomplishing this and related actions reappear in the expert interface exactly as they were shown in the intermediate D8T interface. Expected completion times related to these tasks are only slightly faster at the expert level than they were at the intermediate level.

Expert Efficiency Findings

In this first section of expert testing findings, I present data pertaining to efficiency. Table 3.13 illustrates the individual and average task completion times for the three expert users. The expert participants logged the fastest average testing time of all user levels. Experts' average testing time was 15:06 compared to the intermediates' average testing time of 21:33 and the novices' average time of 26:38. These numbers show that testing times fell on average by approximately 5:00 between levels. Expert User 2 (EU2) logged the fastest overall testing time of 13:48, while Expert User 1 (EU1) had the slowest overall testing time of 16:58.

Expert users were fastest of users of all levels at defining a site in Dreamweaver. The average time it took experts to complete this task (Task 2) was 4:15. EU1, the slowest expert

tester, recorded the slowest task completion time of 6:03 for this task. This time was actually the longest it took any user to complete any task during testing. EU1's time to complete Task 2 was double the other two users' times, and was likely responsible for increasing the average completion time for the Task. EU2, the user who completed testing fastest, actually logged the longest time for Task 7 of 2:13.

Table 3.13. Individual and average task completion times for the three expert participants

Participant	EU1	EU2	EU3	Average	Range
Task					
1. Follow directions on D8T homepage	0:16	0:18	0:29	0:21	0:13
2. Define a site in Dreamweaver and enter FTP information from D8T screenshot	6:03	3:25	3:00	4:15	3:03
3. Create an HTML page and save it as "index.html"	1:10	1:22	1:45	1:26	0:35
4. Create another HTML page and save it as "test.html"	0:30	0:40	0:54	0:41	0:24
5. Upload index.html without using Dreamweaver	3:37	2:40	2:44	3:00	0:57
6. Upload test.html to a new folder inside the public_html, also without using Dreamweaver	1:09	1:25	1:42	1:42	0:33
7. Determine the full URL for index.html	0:40	2:13	2:01	1:38	1:33
8. Determine the full URL for test.html	3:10	1:26	1:16	1:57	0:54
Total time for each user, all tasks	16:58	13:48	14:25	15:06	3:10

Expert Efficiency Analysis

As with the analysis of novice and intermediate efficiency analyses, I examine expert users' average task completion times against the expected completion times established before testing. Table 3.14 displays the actual average completion times per task and the expected times for each task. Since the expert interface of the D8T is the most verbally and visually succinct of all the tutorial's levels, and since this group of users should by definition have the most knowledge of Dreamweaver going into the testing of all user groups previously discussed, expected completion times for this level are the fastest of all.

When compared to the expected completion times, expert participants were efficient at completing only three of the eight of the tasks, yielding a 37% efficiency rate. Even including the acceptably efficient margin, which in effect can subtract 30-45 seconds from the actual average completion times, does not increase the efficiency percentage for this testing level. Thus, in terms of percentages and the juxtaposition of the actual average task completion times against the expected completion times, the expert level was the least efficient of all.

However, it is important to point out that while the 37% efficiency rating for this interface appears detrimental in terms of usability, the more telling finding that arises from a comparison of the same tasks that were given to users of all levels is the correlation between the user level and task completion time—as users of higher levels were tested, average times for performing the same tasks fell. In other words, the more experienced the user, the faster the task completion time, and thus the more efficient the interface. This correlation holds true for every task that remained the same despite the level. For example, expert users were the fastest of all users at defining a site in Dreamweaver. Expert users' average time for performing all actions related to site definition was 4:15, compared to the intermediates' average completion time of

5:34 and novices' average time of 7:04. Likewise, findings from all three testing levels show

that as the testing level increased, the average time it took users to determine their student URL

fell incrementally, from 5:09 for novices to 2:22 for intermediates and finally to 1:38 for experts.

In keeping with the premise of the correlation between higher user level and faster average task

completion time, experts were 1:11 on average than intermediates at uploading a web page

without using Dreamweaver (novices were not required to perform this task). Finally, overall

average testing times follow the same pattern of becoming faster as the testing level increases.

The average testing completion time for expert users was 15:06, compared to the intermediates'

average overall testing time of 21:33 and the novices' average overall testing time of 26:08.

Thus, while the expected task completion times both provide a good measure for

maximizing the efficiency of the D8T in future design iterations and offer a way to evaluate the

efficiency of each interface in isolation, a key result of testing was discovering the data that

conclusively show the D8T to be more efficient at higher levels, a finding which substantiates

the appropriateness of each interface's documentation style and overall design.

Table 3.14. Expert testing expected task completion times* versus actual average task

completion times and indication of efficiency**

Task number	Expected completion time	Actual average completion time	Acceptably efficient?**
1	0:30	0:21	Yes
2	1:15	4:15	No
3	0:30	1:26	No
4	0:30	0:41	Yes
5	2:00	3:00	No
6	2:00	1:42	Yes
7	0:30	1:38	No
8	0:30	1:57	No
Overall testing	5:45	15:06	No

*Times shown are in minutes and seconds

**Times were deemed "acceptably efficient" if the actual average completion time was within 30-45

seconds of the expected completion time

Expert Error Tolerance

In the following section, I discuss error tolerance in the same terms as for the novice and

intermediate D8T. As before, I use an error scale consisting of four levels—level 4 errors affect

overall usability the least, and level 1 errors are the most damaging to usability overall (Dumas

and Redish, 1999). I again use the added error types of deviation and computing errors to more accurately describe what occurred during testing. Error tolerance remains a critical usability attribute to examine at this highest testing level because expert users likely will bring a higher set of expectations to the testing situation, and, indeed, to the D8T in a real-world setting. Since this interface contains the least amount of information that is presented in a traditionally accepted way, it is feasible to aim for error prevention at this level. However, to achieve this goal, it is necessary to examine the errors users did make, and consider how to correct them in future design iterations.

Expert Error Tolerance Findings

In this section, I discuss error tolerance by describing the errors participants committed during testing, and by showing which errors were the most frequently made. Table 3.15 comprehensively describes each error, and Table 3.16 illustrates error frequency by showing how many times each participant erred and which instances of error were the most often made. Expert users committed four errors during testing. The distribution of errors expert participants committed was rather consistent; EU2 committed three of the four errors, and both EU1 and EU3 made two errors each. Error 2 was only made by one user (EU3), but the other three errors (errors 1, 3, and 4) were made by two of the three participants. EU1 and EU2, for instance, both erred when attempting to define a site in Dreamweaver and establish a connection to Georgia State's remote host (Task 2). These same users both committed errors when keying in the URL to access the file "test.html" (Task 8), and had to be shown what they did wrong before the web page would display properly. In fact, EU2 erred when attempting to access the file "index.html" (Task 7) by typing the file's URL into the web browser. EU3 erred during the same task, thus

suggesting that the few errors that were identified were prominent enough to affect almost every user in every instance (except in the instance of error 2).

Table 3.15. Participant errors during the expert usability test.

Error
1. Users were not clear on how to edit a site in Dreamweaver when a mistake was made during site definition
2. Participant uses spaces when naming a new folder within the public_html folder
3. Users do not differentiate between the two different student URL formulas
4. Page Not Found error appears when user types URL of uploaded site into web browser

Table 3.16. Expert users' error frequency during testing.

Participant	EU1	EU2	EU3	
Error #				Error frequency
1	X	X		2
2			X	1
3		X	X	2
4	X	X		2
Participant error totals	2	3	2	

Expert Error Tolerance Analysis

Just as with the novice and intermediate testing, error severity levels are used to quantify errors' effects on usability. In Table 3.17, I assign a severity level and a recommended design change to address each error and to work toward future error prevention. At this level of testing, there was one Level 3 error, two Level 4 errors, and one computing error. These error levels demonstrate that not only did expert participants identify the fewest errors during testing of all, but the severity of the errors is much more akin to the levels seen from the novice testing (see Table 3.5). Both the expert and novice errors were relatively mild in the aggregate compared to the more profusely severe errors intermediate users identified (see Table 3.11). A comparison of the error tables shows that total number of errors made decreases as the testing level increases. Accordingly, novices committed 12 total errors, intermediates made seven total errors, and experts identified four errors in all. The fact that errors per user are associated with increased task completion time is also evident by comparison—novices committed the most total errors and had the longest average testing time; intermediates committed fewer errors than novices and had a faster average testing time than that group of users; and experts made the fewest errors per user of all and also had the fastest average testing time of all. Furthermore, fewer errors committed per user suggests a greater error tolerance. Of all the user groups studied, expert users were the most adept at recognizing and correcting mistakes as they worked to complete tasks.

While the recommended design changes for the novice interface mainly require slight modifications related to document design such as altering certain chunks of text to make them more prominent (see Table 3.5), and the design change recommendations for the intermediate interface are mainly related to navigation (see Table 3.11), the design change recommendations

for the expert D8T involve incorporating a greater amount of contextualization to the documentation. Although Carroll (1990) and his colleagues believe contextualizing information at the novice level leads to a deeper encoding of new knowledge into memory, the user experiences I observed during testing at different levels lead me to believe the opposite may be true in this situation. The deviation errors users made suggests a connection between the volume of new information presented in a given interface and the tendency of users to deviate from the D8T's instructions when attempting to complete tasks. For example, 40% of both novice and intermediate users committed deviatory errors during testing (see Table 3.4, error numbers 9 and 10 and Table 3.10, error number 7). If this percentage were extrapolated to all novice users in a classroom setting, it follows that nearly half of students in both user groups (potentially a substantial number) would make the same type of error when presented with the vast amount of new information contained in the tutorial. Additional information, especially additional verbal as opposed to visual information, might only perpetuate the problem of deviation errors, which is why most of the design change recommendations do not specify including much more than what already exists.

The expert users, on the other hand, did not commit any deviatory errors. Expert users were also presented with the least amount of new information of all user groups; their status as experts required the conveyance of a minimal amount of documentation to allow them to successfully complete tasks. However, expert errors 2 and 3 suggests this group of users may benefit from the addition of information pertaining to file management external to Dreamweaver. At the expert level, users should already be familiar with the concepts of URL formulas (although not necessarily Georgia State student URL formulas) and file management via new folder creation. Including information pertinent to why these concepts are important to

successful website development and maintenance could potentially be advantageous to this group of users who is equipped to meaningfully encode such information by virtue of the prior knowledge they bring to the classroom situation. Adding context to the expert D8T in these areas would address the errors 67% of users made during testing, and so could prevent the same errors from occurring in the future either by allowing to users to more readily recognize and correct errors before they would require assistance or by facilitating a deep understanding such that an error would be avoided completely.

As it stands, the expert D8T is the most error tolerant of all since users made only four total errors of comparatively low severity. The fact that experts identified the fewest errors of all user groups and committed the fewest errors per user is a strong indication that the D8T functions as it was designed to in terms of error tolerance increasing as the levels increase. However, it is very possible for the interface to be even more error tolerant, and, at best error preventative, if the changes discussed above are incorporated.

Table 3.17. Errors, error severity levels, and recommended change from the expert testing.

Error	Error severity level/type	Recommended change
1. Users were not clear on how to edit a site in Dreamweaver when a mistake was made during site definition	3	**1.** Include brief instructions for editing a site in Dreamweaver. Create a link to this information at the top of the expert page
2. Participant uses spaces when naming a new folder within the public_html folder	4	**2.** Make information stating not to use spaces in folder name more prominent by contextualizing it and stating users will inevitably get a 404 (Page not Found) error if the try to enter a URL with spaces in it into a web browser
3. Users do not differentiate between the two different student URL formulas	4	**3.** Supply more context for why file management is important
4. 404 (Page Not Found) error appears when user types URL of uploaded site into web browser	Computing	**4.** Include brief URL troubleshooting tips at the end of the URL discussion

Expert Ease of Use

As discussed in the introduction to the intermediate ease of use findings and analysis, this

usability attribute becomes more critical at higher user levels. In theory, experts bring the

highest preset standards to the testing or classroom situation and so expect to interact with an

interface that allows them to easily access the information they need to proceed with their work.

In the following sections, I present and analyze the expert ease of use ratings.

Expert Ease of Use Findings

The ease of use results in this section are grouped by participant and task, and include

average ratings for each task and for the overall experience of using the D8T. As with the other

two testing levels, I took ease of use ratings from participants' responses to the post-test

questionnaire, which included the same Likert scale of ratings as the novice and intermediate

questionnaires. Table 3.18 shows that average ease of use measures for each task and overall

ranged from 4.3 – 5; none of the tasks or the interface as a whole were given either of the 1 – 2

"difficult" ratings on average. The lowest average ease of use ratings of 4.3 were given for the

overall experience of interacting with the expert D8T and to the Task of defining a site in

Dreamweaver, which included establishing the FTP connection to Georgia State's sever (Task

2). Within tasks, participants gave the highest average rating of 5 to uploading a page without

using Dreamweaver (Task 5) and to the D8T's URL discussion (Tasks 7 and 8). In fact, the

expert interface received the most favorable ease of use ratings on average of all the D8T's

interfaces; no task at the expert level was rated below a 4 in terms of ease of use. As with errors

committed, expert participants were consistent in their ease of use ratings. All of these users

rated every task at either a 4 or a 5. Additionally, each user gave two 4 ratings and four 5

ratings.

Table 3.18. Expert participants' ease of use ratings* overall and per task.

User	Overall level of satisfaction with the D8T	Definition of "expert"	D8T's FTP screen for Dreamweaver site definition	Uploading a file without Dreamweaver	Creating a new folder within the public_html folder	D8T's URL discussion
U1	4	5	4	5	5	5
U2	5	4	4	5	5	5
U3	4	5	5	5	4	5
Average	4.3	4.7	4.3	5	4.7	5
User remark	"Good color contrast for important info." – U1	"I don't see how else an expert can be defined for the purposes of this tutorial." – U3	"I could have used some help with what to do when I forgot to click Test Connection." – U2	"Neat steps. I didn't know about this before." – U2	"What the tutorial said about file manage-ment is useful." – U1	"I had prior know-ledge of URLs from other classes, but the tutorial's discussion was thorough." – U1

*Results are based on the following scale: 1= Totally difficult to use; 2= Somewhat difficult to use; 3= Fairly easy to use; 4= Easy to use; 5= Extremely easy to use.

Expert Ease of Use Analysis

I set the minimum acceptable rating for ease of use across tasks and overall at 4.5 for this testing level. This 0.5 increase as compared to the intermediate level incorporates the higher expectations expert users may bring to bear when accessing documentation. Additionally, ease of use should ratings should be higher for the expert interface since it is less complex than the intermediate D8T in terms of navigation and overall volume of information.

Of the six areas pertaining to ease of use, four were rated above the minimum acceptable 4.5, yielding an average ease of use measure across tasks of 67%, the highest of all the D8T's interfaces. The two areas that were below the minimum acceptable ease of use rating missed the mark by only 0.2 each, meaning that, as a whole, the expert D8T was remarkably close to meeting the minimum acceptable ease of use rating. It is encouraging to note that for the Task of uploading a file without using Dreamweaver which appeared in both the expert and intermediate testing, the expert ease of use rating was a perfect 5 on average, compared to the intermediates' average rating of 4.

Among users and within tasks, ratings of 4 as opposed to 5 for certain tasks correspond almost exactly to the errors users committed during testing. For example, EU3 rated the Task of creating a new folder within the public_html folder (Task 6) at 4 while the other two users gave ease of use ratings of 5 for that Task; EU3 was the only user to commit an error during the completion of that Task. Likewise, EU1 and EU2 rated Dreamweaver site definition (Task 2) at 4 in terms of ease of use, while EU3 gave the same Task a 5. EU1 and EU2 committed errors during the completion of this Task (see Tables 3.15 and 3.16, error number 1). Interestingly, all three users thought the D8Ts URL discussion was extremely easy to use—they all rated that area of the interface at 5, despite the fact that each erred when attempting to complete a task that dealt in some way with URLs (see Tables 3.15 and 3.16, errors 3 and 4). The high ease of use ratings for the URL discussion corroborate the low severity ratings assigned to these errors, and may also substantiate the connection between high ease of use ratings and low task completion time that was observed in the other two testing levels. For example, errors at the expert level only set users back a few minutes at the most (see Table 3.13, EU1's Task 2 completion time), compared to a quarter of an hour as was seen in the case of IU4's exceptional task completion time (see

Table 3.7, Task 4), and NU1's and NU3's long overall testing times of nearly an hour (see Table 3.1).

Overall, the data show the expert D8T interface to be the easiest to use of all. On the whole, the interface had a 67% efficiency rating, and was extremely close (0.2 points in two areas) to achieving a 100% rating based on the minimum acceptable average task and overall rating of 4.5. Thus, it is sufficient to say that the expert interface acceptably met the requirements for the usability attribute of ease of use.

Discussion of Expert Testing

In this final analytical section, I reiterate the key data points regarding the three usability attributes under study and answer the main research question of whether the expert D8T is usable for its target audience. The expert interface had a 37% efficiency rate based on the comparison of actual average task completion times and overall testing time to the expected times. The 37% efficiency rate accurately describes the efficiency measure for the expert interface when viewed in isolation; however, a comparison of average task and testing completion times reveals that, when viewed as a cohesive artifact, users do become more efficient at higher testing levels, thus suggesting that the expert interface fulfills its purpose of being *the most* efficient facet of the D8T.

Just as testing times decreased as testing level increased, so too did total errors and error frequency. The expert users made only four total errors, ranging in severity from one Level 3 error to one computing error. Additionally, the average number of errors per expert user was only 1.3. To prevent these errors from being made, the design change recommendations suggest adding a level of contextualization to the interface's instructions, thereby potentially catalyzing the deep encoding of key concepts in users' minds. The few and relatively mild errors and the

ability of the participants to effectively use the interface to recognize and correct errors before requiring assistance shows the interface to be error tolerant.

Finally, the 67% ease of use rating the interface received coupled with the finding that two ease of use areas were only 0.2 away from meeting the minimum acceptable ease of use rating demonstrate that the interface is sufficiently easy to use. The implementation of the design change recommendations could potentially yield a substantial increase in ease of use ratings per task and overall, given that most of the changes address the two areas that did not meet the minimum acceptable score.

Analysis of All Testing Levels

In this section, I reiterate the conclusions drawn from each testing level in order to answer the main research question of whether each of the D8T's interfaces is usable. This chapter has shown that the answer to the sub-research question is the following: the D8T's usability can be evaluated by examining three usability attributes—1) whether users can efficiently use the D8T to successfully complete tasks, 2) by observing whether they can complete tasks either by avoiding errors due to their diligent attention to the tutorial, or, if they cannot complete tasks without assistance, by noting places of error as starting points for future design enhancement, and 3) by allowing them to subjectively rate the ease with which they used the D8T to complete tasks.

This chapter was devoted to presenting the data specifically pertaining to these usability attributes of efficiency, error tolerance, and ease of use. In sum, from testing and analysis I draw the following conclusions regarding the overall usability of each of the D8T's interfaces:

- Based on the fact that the novice D8T is between 63% and 75% efficient, that a relatively small number of minor errors were discovered (2.4 errors on average per user) or went

unrecorded entirely due to users' ability to use the D8T to recognize and correct their own mistakes, thus illustrating the artifact's tolerance to errors, and that the ease of use rating was an acceptable 63%, I conclude that the novice interface is a usable facet of the D8T.

- Even though intermediate users finished testing faster than novices, the severity of errors within the former interface did not allow for the observable degree of error tolerance that was seen in the novice testing. Moreover, the 20% ease of use rating, which accounts for the errors users committed when attempting to complete tasks, is a persuasive argument for the sweeping revisions that need to be made to the intermediate interface before it can be pronounced usable on any level except, perhaps, in terms of its efficiency.

- The 37% efficiency rate accurately describes the efficiency measure for the expert interface when viewed in isolation; however, when viewed cohesively, expert users did complete tasks and testing faster than their intermediate and novice cohorts, which suggests that the expert interface fulfills its purpose of being *the most* efficient facet of the D8T. Just as testing times decreased as testing level increased, so too did total errors and error frequency. In fact, the average number of errors per expert user was only 1.3, compared to the intermediates' 1.4 errors per user and novices' 2.4 errors per user. Finally, the 67% ease of use rating the interface received coupled with the finding that two ease of use areas were only 0.2 away from meeting the minimum acceptable ease of use rating demonstrate that the interface is sufficiently not only easy to use, but is usable in a general sense.

Taken together, these conclusions demonstrate that the D8T is a valuable teaching

supplement insomuch as it allows users of the three levels of familiarity with Dreamweaver to accomplish contextual tasks that cannot be addressed in traditional course textbooks.

Conclusion

In this chapter, I presented and analyzed the data from the novice, intermediate, and expert usability tests of the D8T. I reported results from three categories of usability—efficiency, error tolerance, and ease of use—in order to examine the usability of the interfaces of the D8T with respect to these areas as well as overall. The novice and expert interfaces were shown to be adequately usable for their target audiences, but the intermediate interface, the most experimental of the three, was shown to be deficient in terms of usability, particularly in the area of error tolerance.

Nevertheless, an examination of efficiency, error tolerance, and ease of use findings at the three testing levels reveals the interrelatedness of these usability attributes and the relationships that exist among them. A pattern emerges based on observations from testing that describes the relationship of the usability attributes to one another as well as to the testing levels: as testing level increases, average testing times and total errors made decreases, which leads to an increase in average ease of use ratings. Ultimately, this pattern describes how the D8T was designed to be used, especially since in a real classroom setting the same person should move through each level as the semester progresses and his or her familiarity with Dreamweaver deepens by virtue of repeated use. Thus, although changes do need to be incorporated into the D8T to address prevention of the already-identified usability problems, testing showed the D8T to be usable for its purposes and audiences. In the next chapter, I will conclude the thesis by pointing out limitations of the study and suggesting areas for future research and development. I will also discuss the global implications this research has to the field.

CHAPTER 4

Introduction

In this final chapter, I supply summative and analytical remarks. Here, I reiterate the

main points from each of the previous chapters, and discuss the study's direction. I also explain

the implications this project has for the fields to which it relates and address the project's

limitations. I offer recommendations for redesigning the D8T based on an analysis of the

findings from the three usability tests, and go on to suggest alternate study designs to be

undertaken in the future by those interested. I conclude with some global remarks regarding the

importance of this genre of research for the discipline.

Summary of Chapters

I began the thesis began by presenting the research aim and providing general context for

the major concepts of usability, user-centered design, and usability testing that I discussed in

ascending levels of depth as the thesis progressed. I situated usability as an overarching term

that encompasses the methodology of user-centered design and the method of usability testing. I

offered my study as a contribution of knowledge to the field insomuch as it was a user-centered

application of discount usability testing. Chapter 1 ended with a list of the purposes of usability

testing as they pertained to the D8T. In Chapter 2, I examined in detail the method and

methodology underlying the project. I presented the two research questions under study:

- How usable is a contextual Dreamweaver 8 tutorial for the three separate user groups it

  addresses—novices, intermediates, and experts?

- How efficient, error tolerant, and easy to use is the D8T?

After justifying the usefulness of a contextual Dreamweaver tutorial in terms of teaching time saved, I described each of the D8T's three interfaces. Each interface had a rhetorical foundation rooted in the needs of the audience for whom it was written and designed. I followed the artifact descriptions with the details of the application of discount usability testing to the D8T, and explained that several characteristics of the project allowed me to classify the methodology underlying it as user-centered. Specifically, I utilized all of the following user-centered design methods in different aspects of the project:

- Contextual inquiry techniques

- Pilot usability testing

- Research into user-centered documentation techniques

- Non-laboratory usability testing

I concluded the chapter by discussing the goals of each usability test, the participant pools, and the testing tools.

In chapter 3, I presented and analyzed the findings from each of the three usability tests in order to answer the primary and secondary research questions. I discussed the data in terms of the usability attributes of efficiency, error tolerance, and ease of use for each of the three testing levels (Quenesbery, 2003; Nielson, 2003). I relied on participants' task completion times, my observations of their action sequences during the test, as well as participants' answers to the post-test questionnaire to supply the raw data for these attributes. I used the data analysis technique of triangulation (Dumas and Redish, 1999; Barnum, 2002) to draw conclusions based on a commingling of the qualitative and quantitative results pertaining to each usability attribute under study. In brief, the answers to the research questions are summarized in the following points:

- *Usability of the novice interface* - The novice D8T was found to be between 63% and 75% efficient, which is an acceptable range for usability. Additionally, although participants erred in a dozen instances, these errors were of relatively low severity on the whole; furthermore, I did observe the interface to be error tolerant during testing insomuch as users were able to use the D8T to recognize and correct their own mistakes. Finally, these findings coupled with the fact that the ease of use rating was an acceptable 63%, lead to the conclusion that the novice interface is a usable facet of the D8T.

- *Usability of the intermediate interface* - Intermediate users finished testing faster on average and committed fewer total errors than novice participants did. Yet, though there were fewer errors at the intermediate level, most were classified as far more severe than the many minor Level 4 errors that peppered the novices' testing. Moreover, the severity of errors within the interface did not allow for the observable degree of error tolerance that was seen in the novice testing. Finally, the 20% ease of use rating, which could have been affected by the errors users committed when attempting to complete tasks, is a persuasive argument for the sweeping revisions that need to be made to the intermediate interface before it can be pronounced usable on any level except, perhaps, in terms of its efficiency.

- *Usability of the expert interface* - The expert interface had a 37% efficiency rate based on the comparison of actual average task completion times and overall testing time to the expected times. However, a comparison of average task and testing completion times reveals that, when viewed as a cohesive artifact and when based only on task completion time, users become more efficient at higher testing levels, thus suggesting that the expert interface fulfills its purpose of being *the most* efficient facet of the D8T. Also, expert

users made only four total errors, ranging in severity from one Level 3 error to one

computing error. The few and relatively mild errors and the ability of the participants to

effectively use the interface to recognize and correct errors before requiring assistance

shows the interface to be error tolerant. Finally, the 67% ease of use rating the interface

received coupled with the finding that two ease of use areas were only 0.2 away from

meeting the minimum acceptable ease of use rating demonstrate that the interface is

sufficiently easy to use.

Study Directions and Implications

Directions

 In this study, I investigated the usability of an online, multi-level instructional user

interface. Shneiderman's (2003) work in the area of tiered GUIs provided the foundational

grounding for the construction of the D8T. To examine the D8T's usability in a fairly

comprehensive way, I selected three usability attributes from those discussed by Quenesbery

(2003) and Nielson (2003). Drawing from the principles of usability testing presented by Rubin

(1994), Dumas and Redish (1999), and Barnum (2002) and the method of discount testing

substantiated by Nielson (1994), I designed three tests to evaluate the D8T's usability in terms of

efficiency, error tolerance, and ease of use. The methodology underlying the composition of all

the D8T's interfaces was user-centered design, which draws its scholastic ethos from experts

who represent spheres of influence in a variety of cutting-edge disciplines (see, for example, the

Method and Methodological Context section of Chapter 2).

Results from the tests provided insight as to whether the documentation models selected

for each interface—Barker (1998) for the novice level, Mirel (1998) for the intermediate level,

and Carroll (1990) for the expert level—were appropriate in terms of their rhetorical attention to

audience and purpose. Findings from this study suggest task-oriented documentation is appropriate for novices, minimalist documentation successfully addresses experts' needs, but more research needs to be done in the area of designing and composting contextual or goal-based documentation for intermediate users such that it sufficiently addresses their needs in an online environment. More specifically, this study's findings indicate that the intricate level of detail supported by task-oriented documentation is suited for novice users who need much direction. Likewise, testing showed the comparatively non-directive expert documentation to successfully meet the minimal needs of expert users, though more context could be added to some parts of the documentation that would allow users to more deeply and meaningfully encode the instruction. Finally, testing of the intermediate interface highlighted the dearth of information pertaining to visually designing online documentation for advanced users, since many of the usability problems identified were related to navigation and organization of links on the interface's main page.

Implications

The implications of the research involved in completing this project stretch into the related fields of web design, technical communication, user-centered design, usability testing, and rhetoric and composition pedagogy. Most apparently, this study adds to the body of knowledge currently in circulation regarding web-based tutorials and similar online instruction. The D8T was an attempt to fuse the basic elements of web design popularized by notable usability experts like Nielson (1999) with the concept of a functional multi-level GUI as described by Shneiderman (2003). Based on the positive usability findings from the novice and expert usability tests, the layout and design of those interfaces of the D8T could serve as templates for future projects of the same ilk, while the intermediate interface, the least usable of

the interface according to this study's results, offers a rich ground for future experiments in user-centered advanced online documentation design (see, for example, the Recommendations section of this chapter).

In addition to the web design implications of the D8T, the project highlights trends in user-centered documentation research. As has been discussed throughout the thesis, different models of documentation were used to construct each level of the D8T, with differing degrees of success in terms of usability. At all levels of the tutorial, though, the project does illuminate the fact that HTML coding (and even more complex web development languages) is a good medium for writing effective multi-level documentation. The vast amount of space afforded by a virtual environment does not artificially lock users into a single, static aptitude category or force them to proceed linearly through the documentation. Rather, the online setting of multi-level documentation offers freedom for users to grow in their knowledge while simultaneously supporting what they have yet to learn or what they may need additional clarification on.

One important reason why the D8T was found to be largely usable could be because of the user-centered methodology that underscored the design and writing of each interface. Indeed, this project has implications for user-centered design research insomuch as it is a no-budget case study in the complex implementation of the method of discount usability testing in a non-laboratory setting. It is certainly not uncommon for user-centered design research to be presented as case studies (see Blythe, 2001; Brown, 1996; Corry, 1997; Levi and Conrad, 2002; Pagulayan, et. al. 2007, for example), and I am honored to add this work to the tradition of researchers who conduct usability testing and academically report results for the purposes of artifact enhancement and the furthering of methodological knowledge.

Due in part to their close attention to localized contexts, user-centered design methods are excellent instances of sophisticated audience analysis. For instance, Johnson (1998) concludes his landmark theoretical text by demonstrating how he brings the principles of user-centered design into the classroom. In the context of incorporating the user-centered D8T into the Georgia State University classes for which it was designed, my research design offers the following ways of integrating complex technologies like web development software into the rhetoric and composition classroom as seamlessly as possible for both students and teachers alike:

- The pre-test demographic survey I distributed prior to testing was often helpful in determining why participants erred in certain instances. Teachers who work with technology or who use technological artifacts for the purposes of instruction should consider using surveys similar to the pre-test demographics survey used in this study in their classes. Parts of the pre-test survey I distributed to participants could be adapted for instructor use as a way of gauging the technological aptitude of their entering students. Information from the pre-test survey could give teachers an idea of which students are fluent in their computer usage, which students are more uncertain and uncomfortable, and which students are familiar particularly with Dreamweaver for the purposes of lesson planning when Dreamweaver is introduced as a course component. Such knowledge could enable teachers to configure groups of students with complementary sources of knowledge, and thereby facilitate more productive web development work

- Working from the premise that aptitude with one aspect of technology does not necessarily guarantee proficiency in another area of technology—one of this study's beginning points—the D8T's homepage definitions of the user groups could be used to

illustrate the difficulty documentation writers and technical communicators face when

attempting to effectively interface with today's technological audiences, a group as

diverse as the technologies it uses and as nuanced as the imperfect definitions and

categories (novice, intermediate, expert, e.g.) used to describe them are

- The findings from this study show that the multi-level user interface was an effective way

   to approach the construction of a technological artifact for pedagogical purposes. If

   teachers or technical communicators determine that an artifact like the D8T would be

   useful in their situations, they should note that the data presented in this study show the

   task-oriented novice interface and the minimalist expert interface to be well suited for

   their audiences' needs. Future developers of online pedagogical artifacts should be

   aware, too, that more research still needs to be done in the area of documentation for

   intermediate users. The findings from this study substantiate the need for more clearly

   defined design objectives for advanced online documentation

- The D8T itself could be used as a meta-instructional tool of sorts in terms of students

   having an artifact to conduct usability testing on, to use for prototyping projects that

   could lead to future design enhancement, or for contextual inquiry studies that could

   make the D8T increasingly contextual, increasingly collaborative, and, ultimately,

   increasingly useful and usable

Study Limitations

In this section, I address the limitations associated with this project. To begin, it could

perhaps be argued that discount usability testing is a study limitation. Yet, I believe I have not

only argued for the viability of discount usability testing in the context of this research situation,

but that I have also made the case for its value as a user-centered design method as it was applied in this study (see the Research Method section of Chapter 2).

The limitations surrounding this study partially are related to the relatively short amount of time allotted for usability testing occurred within. The testing timetable did not allow for two key elements that might have strengthened the test findings: namely, there was not enough time to make the formal testing iterative; and, secondly, due to the fact that testing occurred during the summer semester, there were fewer students present on campus from which to draw a truly representative participant sample both in terms of the sex of the participant pool and the fact that many of the participants were taken from an English class in which Dreamweaver is not used. While these limitations are valid, I have attempted to address two of them in important ways.

First, although the three formal usability tests were only conducted once each, it can be argued that the pilot testing I performed with the original Dreamweaver MX Tutorial constituted one iteration of testing, which would mean that the D8T testing was actually the second iteration of testing since the findings from the DMXT test contributed, in part, to the design of the current D8T. Although I recommend iterative testing as a viable model for usability evaluation, it is beyond the scope of this project to conduct further testing.

Secondly, even though there are fewer students present on campus during the summer months, I was nevertheless able to ensure that the usability test participants were representative in terms of technological aptitude and familiarity with Dreamweaver of the audiences the D8T addresses. Ideally, I would have drawn participants from an EW&P, Digital Rhetoric or Technical Communication class, but since those courses were not offered during the summer in which this research was conducted, I instead gathered users from the Maymester section of the English Business Writing class.

Another area of limitation related to this study is the sex of the participants who tested the D8T. Interestingly, of the 13 total participants across tests, 11 were female. These numbers equate to a participant pool that was 82% female and 18% male. While this may seem like a quite uneven gender divide, recent class enrollment demographics indicate that the courses in which the D8T is likely to be used are comprised of a very similar sex breakdown. For example, the Spring 2006 undergraduate section of Technical Communication was comprised of 17 females and four males, yielding a class comprised of 77% females and 23% males (Lopez, 2007, personal communication). More recently, enrollment was slightly closer to a more equal proportion of male and female students. For examine, in the Spring 2007 undergraduate section of EW&P, 14 females and seven males enrolled—a 66% to 33% ratio of females to males (Bowie, 2007, personal communication). These numbers indicate that it sometimes happens that classes are less equally represented. As an additional example, the sex breakdown of students who took the Fall 2006 graduate section of Technical Communication was 67% female and only 33% male (Lopez, 2007, personal communication). Ideally, an equal number of males and females would have tested the D8T. In future testing situations pertaining to this type of artifact, it will be important to devote as much attention to ensuring the participants are representative of the target audience(s) both in terms of technological aptitude and sex.

A further limitation is related to the fact that testing occurred during the less-populous summer semester, I would have liked to find two more people to test the expert interface. This would have likely been a more easily surmountable task had testing occurred during either the fall or spring semesters. However, rather than compromise either the study design or the data by settling for less-than-expert participants, I lowered the threshold participant number for the expert testing to three. I did not fall below three because it is the absolute minimum number of

participants that can be used to test an artifact with any real amount of credibility (Nielson, 2000).

An additional limitation concerns the degree to which parts of the usability testing method I utilized was user-centered in nature. As discussed in Chapter 2, I did conduct the testing outside of a simulated lab environment, but I did not fully contextualize the testing by conducing it during class time and at points during the semester in which a single group of users would have tested the entire breadth of the D8T as they naturally ascended levels—such testing would truly have been in the artifact's use context. Nevertheless, given the related limitations described above, in particular the fact that none of the classes in which the D8T will most likely be employed were held during the summer in which I performed the testing, I instantiated a user-centered methodology as closely as possible.

The final limitation related to this study regards the analysis of the usability attribute of efficiency that was presented for each testing level in Chapter 3. In that chapter, participants efficiently used the D8T if they completed tasks faster on average than the expected time. Despite the fact that expected task and testing completion times became faster as testing levels ascended, the "acceptably efficient" range of 30-45 seconds remained static. While this range is perhaps passable for the novice testing level in which expected completion times were the longest, it affords less and less rigor as expected task completion times become faster with higher testing level. Indeed, a 30-45 second margin does not signify as great a difference when applied to an expected task completion time of 10:00 as it does when affixed to an expected completion time of 2:00. Therefore, rather than using a set temporal range to account for acceptably efficient task completion times, this range should have been expressed in terms of a percentage. A range such as 10% for acceptable efficiency would both account for the varying expected

completion times for each testing level and would add a degree of customarily satisfactory

significance to the data analysis since a 10% range is similar to the $p < 0.1$ measure of statistical

significance.

While it is crucial to acknowledge the validity of using a percentage rather than a

temporal range for the measure of what constitutes an acceptably efficient average task

completion time, incorporating the former measure into the existing data set does not

meaningfully alter the usability conclusions drawn for each of the D8T's interfaces. In fact,

using the 10% range as opposed to the 30-45 second range decreases the efficiency across testing

levels by only one task each. In other words, six of the eight novice tasks were completed within

the acceptably efficient range on average; using the 10% range decreases the ratio to five out of

eight tasks completed efficiently on average, a difference of only 12%. The same holds true for

both the intermediate and expert levels—there is a one task difference in efficiency that would

change as a result of using the different efficiency measure. Nonetheless, the patterns within the

data that largely determined usability that were discussed in Chapter 3 remain unaltered

regardless of which acceptable efficiency measure is used.

Recommendations for Artifact Redesign

Chapter 3 showed the multi-level interface concept was a largely advantageous approach

to take for this artifact's purposes from a usability standpoint. Nevertheless, changes need to be

made to the D8T at all levels, some more serious than others. Based on the findings from the

three usability tests, I recommend the following design changes to each level of the D8T:

Novice Interface

- Mention the need to click all the way through the site editing process that enables users to

    connect to the remote host in the "Uploading Files" section, instead of stopping the

instructions at the test connection stage. In the same section, remove the "Yes to All" screenshot as it does not appear when only one file is uploaded. Also, enlarge the plug icon screenshot so the totality of Dreamweaver's interface is shown; add arrows directing users' eyes to the location of the icon within the totality of Dreamweaver's interface. Additionally, highlight the text above the FTP information screenshot that directs users as to which information to change and which to leave as it appears in the picture.

- Note in red that the only the folder icon pertaining to saving files locally should be clicked on in the "Creating a site in Dreamweaver" section. Users should not click on the identical icon that pertains to the remote host. In the same section, highlight the information that addresses the need for users to switch the FTP setting from the default "Local/Network" to "None" in an effort to draw the eye to it more. Also, reword information that appears in red on the summary screen at the end of site definition to help user ascertain possible errors

- Include steps that show users that they can edit sites by clicking the "Manage Site" button on the file management panel

- Include instructions to "Preview" the uploaded page in a web browser—the F12 function in Dreamweaver

- Include notes at the top of the D8T's homepage and the first page of the novice interface with information in red instructing users to read carefully and take their time

- Include a section about "Page Not Found" causes in the URL discussion. Suggest users check for typos, re-upload the site, and then type the entire URL into a new browser window. Mention asking the professor if all else fails. Change the text color of the part of

the URL formula that must be changed to reflect the student's individual user name and the unique file name

Intermediate Interface

- State that the intermediate category is applicable to those who have used Dreamweaver before, but not recently, on the D8T's homepage

- Organize links thematically on the main intermediate page, and make only a short part of the description a link

- Reorganize the "Uploading Without Dreamweaver" page. Include headings and subheadings. Make the link back to the main URL page more distinct. Add context for creating a new folder within the public_html folder, as no user will do it on his or her own without being told why it is important

- Make the look of the intermediate interface more like the novice one, with large navigation at the top of each page, and anchor links within pages. Either eliminate breadcrumb navigation scheme or restrict it to the bottom of every page

- Include steps that show users that they can edit sites by clicking the "manage site" button on Dreamweaver's file management panel

- Include a section about "Page Not Found" errors in the URL discussion. Suggest checking for typos, re-uploading the site, and then typing the entire URL into a new browser window. Also suggest users go into Dreamweaver to make sure FTP information was entered correctly and that a successful connection has been established between Dreamweaver and Georgia State's host

- Include a note at the top of both the homepage and the first intermediate page with the information in red and or in bold for users to read carefully and take their time

Expert Interface

- Include brief instructions for editing a site in Dreamweaver. Create a link to this

  information at the top of the expert page

- Make information stating not to use spaces in folder name more relevant by

  contextualizing it and stating users will inevitably get a 404 (Page not Found) error if the

  try to enter a URL with spaces in it into a web browser

- Include more context for why file management is important

- Include brief URL troubleshooting tips at the end of the URL discussion

Future Research

From what I have learned, I propose the following studies to be taken up either by myself

or by those who may take a similar interest in the direction of this project:

- *Conduct contextual usability testing of the D8T in its use environment with actual, rather

  than representative, users* – Use an entire EW&P, Digital Rhetoric, Technical

  Communication, or technology special topics class as usability test participants for the

  D8T. Have every person test every level of the tutorial as he or she naturally moves into

  it as a result of becoming more familiar with Dreamweaver after using it repeatedly in

  class. Conduct field testing during class workshop times using the discount method, and

  begin testing as soon as the first assignment utilizing Dreamweaver is introduced.

  Compare findings from this study proposed design to what was discovered from the test

  design utilized for this thesis to see if the same relationships and patterns emerge.

- *Conduct usability testing of different intermediate interface designs and documentation

  strategies* - Since the intermediate interface was the most experimental of all the D8T's

  levels, research other advanced documentation strategies and compose two new

intermediate interfaces. Perform comparative, rather than iterative, usability testing on all. Results from this testing could lead to the beginnings of a new theory for intermediate documentation.

- *Examine additional usability attributes during testing* – For this study, I chose to evaluate the D8T in terms of efficiency, error tolerance, and ease of use. However, usability can be examined using more attributes than these, according to both Quenesbery (2003) and Nielson (2003). I selected these because they were the most relevant to the tests' goals, tools, and tasks, and participants. If, though, an entire class were to test all levels of the D8T, *effectiveness*, *engaging* (Quenesbery, 2003) and *learnability* (Nielson, 2003) should be added to the usability attributes examined by usability testing. I actually did collect data pertaining to effectiveness during testing, but the time and space limitations surrounding the scope of the project prevented me from fully examining the attribute. Also, engaging aspects of the D8T were often commented on by participants at different levels after testing, but I did not capture that data systematically for inclusion in this study. In fact, the comments IU1 made often when reflecting on the use experience of the tutorial did focus on how the intermediate interface was not as streamlined or "clean" in its design as the other two interfaces. Learnability in particular can only be investigated if the test participants for each interface are the same; likewise, people who have interacted with every level of the D8T (as opposed to just one interface) are more equipped to make valid and comparative assessments of the D8T both as a whole and as the sum of its parts.

- *Compare a single-level D8T to the multi-level D8T* – Design a new D8T that is primarily for novice users, but that contains intermediate and expert tasks or instructions as links

rather than wholly separate interfaces. Test three different groups of users on both

artifacts to determine whether three separate interfaces are truly necessary, or if it is

enough for the D8T to only contain intermediate and expert tasks on the main page of a

single interface.

Conclusion

Increasingly, user-centered design is being given rhetorical attention, as audience has

been aligned with user, text with artifact, and situation with context (Johnson, 1998). Applying

user-centered techniques to the rhetoric and composition classroom situation is an important

leap. Further, since user-centered design is constructivist in nature, introducing artifacts that are

not only representative of this methodology but that simultaneously address different user groups

into the classroom works to destabilize the discipline's Cartesian status quo, and signals the

power of a "new pragmatism" in which knowledge creation and dissemination are primarily

social acts, and in which the privileging of theory over practice is challenged through dialogic

criticism (Bruffee, 1986; Salvo 2001). Indeed, Michael Salvo (2001) convincingly argues that

the real value of user-centered design research is not in the localized results the studies produce,

but in how the fluid methodology of user-centered design is applied to produce the findings. To

Salvo (2001), the relationship between researcher and participant in a user-centered design

environment is dialogic. As he goes on to artfully explain,

> Dialogic interaction does not yield universal principles
>
> nor does it provide widely applicable design principles.
>
> However, it provides a means to respond to specific conditions
>
> particular to the design situation at hand. It is a situated knowledge, depending on
>
> the ability of the technical communicator…to flexibly

adapt good rhetorical practice with knowledge, understanding,

and respect for local conditions (pp. 280-81).

Thus, rhetorical principles can be seen in the user-centered design research sphere in the symbiotic interplay between use-context and audience analysis. It is vital that all those who participate in the construction of knowledge through pedagogy and its increasing alignment with technologies continue striving to reach all audiences as effectively as possible and to continue shaping the fluid methodology of user-centered design to meet the nuanced needs of those who use those technologies to prosper.

References

Barker, T. T. (1998). *Writing software documentation: A task-oriented approach*. Needham Heights, MA: Allyn and Bacon.

Barnum, C. (2002). *Usability testing and research*. New York: Longman.

Beyer, H. & Holtzblatt, K. (1996). *Contextual design: Defining customer-centered systems.* San Francisco, CA: Morgan Kaufmann.

Bias, R. G. & Karat, C. M. (2005). Justifying cost-justifying usability. In R.G. Bias & D. J. Mayhew (Eds.), *Cost-justifying usability: An update for the internet age* (pp.1-16). San Francisco, CA: Morgan Kaufmann.

Blomberg, J. (1993). Ethnographic field methods and their relation to design. In D. Schuler & A. H. Namioka (Eds.), *Participatory design: Principles and practices* (pp. 123-54). Hillsdale, NJ: Lawrence Erlbaum.

Blythe, S. (2001) Designing online courses: User-centered practices. *Computers and Composition, 18.4,* 329-46.

Bodker, S. (1991). *Through the interface: A human activity approach to user interface design*. Hillsdale, NJ: Lawrence Erlbaum.

Bowie, J. L. (2007). *Spring 2007 electronic writing and publishing syllabus*. Retrieved March 28, 2007 from http://www.rhetcomp.gsu.edu/~jbowie/3120_S07/syllabus.htm.

Bowie, J. L. (2006). Exploring user/webtext interactions: An examination of gender and sex differences in Web use. *Dissertation Abstracts International, 67 (4).* (UMI No. AAT 3215625)

Bowie, J. L. (2003). *Beyond the universal user: How to design for the universe of users*. Retrieved August 17, 2007 from http://www.stc.org/ConfProceed/2003/PDFs/STC50-065.pdf

Bravo, E. (1993). The hazards of leaving users out. In D. Schuler & A. H. Namioka (Eds.), *Participatory design: Principles and practices* (pp. 3-11). Hillsdale, NJ: Lawrence Erlbaum.

Brown, D. S. (1996). The challenges of user-based design in a medical equipment market. In D. Wixon & J. Ramey (Eds.), *Field methods casebook for software design* (pp. 157-76). New York: Wiley.

Bruffee, K. (1986). Social construction, language, and the authority of knowledge: A bibliographic essay. *College English, 48.8,* 773-90.

Carroll, J. (1990). *The nurnberg funnel: Designing minimalist instruction for practical computer skill*. Cambridge, MA: MIT Press.

Cooper, A. (1999). *The inmates are running the asylum: why high-tech products drive us crazy and how to restore the sanity*. Indianapolis, IN: Sams.

Corry, M. D., et al. (1997). User-centered design and usability testing of a web site: An illustrative case study. *Educational Testing and Research Development, 45.4,* 65-76.

Dumas, Joseph S. & Redish, J. C. (1999). *A practical guide to usability testing.* New York: Intellect.

Ehn, P. (1993). Scandinavian design: On participation and skill. In D. Schuler & A. H. Namioka (Eds.), *Participatory design: Principles and practices* (pp. 41-77). Hillsdale, NJ: Lawrence Erlbaum.

Gould, J. D. & Lewis, C. (1985). Designing for usability: Key principles and what designers think. *Communications of the ACM, 28.3,* 300-311.

Hix, D. & Harston, H. R. (1993). *Developing user interfaces: Ensuring usability through product and process*. New York: John Wiley and Sons.

Holtzblatt, K. & Jones, S. (1993). Contextual inquiry: A participatory technique for system design. In D. Schuler & A. H. Namioka (Eds.), *Participatory design: Principles and practices* (pp. 177-210). Hillsdale, NJ: Lawrence Erlbaum.

Horton, W. (1993). Let's do away with manuals…before they do away with us. *Technical Communication, 40.1,* 26-34.

Hughes, M. (1999). Rigor in usability testing. *Technical Communication, 46.4,* 488-495.

Johnson, R. R. (1998). *User-centered technology: A rhetorical theory for computers and other mundane artifacts.* Albany, NY: SUNY Press.

Karat, C. M. & Lund, A. (2005). The return on investment in usability of web Applications. In R.G. Bias & D. J. Mayhew (Eds.), *Cost-justifying usability: An update for the internet age* (pp.297-315). San Francisco, CA: Morgan Kaufmann.

Katz, S. B. (2004). The ethic of expediency: Classical rhetoric, technology, and the holocaust." In J. J. Eiola & S.A. Selber (Eds.), *Central works in technical communication* (pp. 195-210). New York: Oxford UP.

Kearsley, G. (1985). Embedded training: The new look of computer-based instruction. *Machine-Mediated Learning, 1.3,* 279-296.

Levi, M. D. & Conrad, F.G. (2002). Usability testing of world wide web sites. Retrieved May 26, 2007 from http://stats.bls.gov/ore/htm_papers/st960150.htm.

McGovern, H. (2007). Training teachers and serving students: Applying usability testing in writing programs. *Journal of Technical Writing and Communication, 37.3,* 323-346.

Mirel, B. (1998). 'Applied constructivism' for user documentation. *Journal of Business and Technical Communication, 12.1,* 7-49.

Mirel, B. (2003). Dynamic usability: Designing usefulness into systems for complex tasks. In M.J Albers & B. Mazur (Eds.), *Content and complexity: Information design in technical communication* (pp. 233-261). Mahwah, NJ: Erlbaum.

Namioka, A. H & Rao, C. (1996). Introduction to participatory design. In D. Wixon & J. Ramey (Eds.), *Field methods casebook for software design* (pp. 283-297). New York: John Wiley and Sons.

Nielson, J. (2003). Usability 101: Introduction to usability. Retrieved March, 17 2007 from http://www.useit.com/alertbox/20030825.html.

Nielson, J. (2000). Why you only need to test with 5 users. Retrieved March 19, 2007 from http://www.useit.com/alertbox/20000319.html.

Nielson, J. (1999). *Designing web usability*. Berkley, CA: Peachpit.

Nielson, J. (1994a). Guerrilla HCI: Using discount usability testing to penetrate the intimidation barrier. In R. G. Bias & D.J. Mayhew (Eds.), *Cost-justifying usability* (pp. 242-272). Boston: Academic Press.

Nielson, J. (1994b). Heuristic evaluation. In J. Nielson & R. L. Mack (Eds.), *Usability inspection methods* (pp. 30-45). New York: John Wiley and Sons.

Norman, D. (2002). *The design of everyday things.* Reprint ed. New York: Basic Books.

Pagulayan, Randy, et al. (2007). User-centered design in games. Retrieved March 20, 2007 from http://www.cs.virginia.edu/~horton/cs305/info/HFinGameDesign.pdf.

Postava-Davignon, Christi-Anne, et al. (2004). Incorporating usability testing into the documentation process. *Technical Communication, 51,* 36-44.

Pratt, J. A. (1998). Where is the instruction in online help systems? *Technical Communication, 45.1,* 33-37.

Pullman, George. "Digital Rhetoric Syllabus." Year and web address.

Raven, M. E. & Flanders, A. (1996). Using contextual inquiry to learn about

your audiences. *Asterisk Journal of Computer Documentation, 20,* 1-13.

Ray, D. S. & Ray, E. J. (2001). Embedded help: Background and applications for technical communicators. *Technical Communication, 48.1,* 105-115.

Rubin, J. (1994). *Handbook of usability testing: How to plan, design, and conduct effective tests*. New York: John Wiley and Sons.

Salvo, M. J. (2001). Ethics of engagement: User-centered design and rhetorical methodology. *Technical Communication Quarterly, 10.3,* 273-290.

Shneiderman, B. (2003). Promoting universal usability with multi-layer interface design. In *Proceedings of the 2003 conference on universal usability* (pp. 1-8). Vancouver, British Columbia: ACM.

Shneiderman, B. (2000). Universal usability. *Communications of the ACM, 43.5,* 84-91.

Shneiderman, B. (1987). *Designing the user interface: Strategies for effective human-computer interaction.* New York: John Wiley and Sons.

Soderston, C. & Rauch, T. L. (1996). *The case for user-centered design.* Retrieved May 14, 2007 from http://www.stc.org/confproceed/1996/PDFs/PG337340.PDF.

Spinuzzi, C. (2005). The methodology of participatory design. *Technical Communication, 52.2,* 163-174.

Spinuzzi, C. (2002). Documentation, participatory citizenship and the web: The potential of open systems. Retrieved April 12, 2007 from http://portal.acm.org/citation.cfm?id=584955.584984

Wood, L. E. (1996). The ethnographic interview in user-centered work/task analysis. In D. Wixon & J. Ramey (Eds.), *Field methods casebook for software design* (pp. 35-56). New York: John Wiley and Sons.

Zurko, M. E. & Simon, R. T. (1996). User-centered security." Retrieved May 6, 2007 from http://portal.acm.org/citation.cfm?id=304859&dl=ACM&coll=portal.

APPENDIX A

User Demographics Questionnaire
Please answer these questions before beginning the test.

Age:

Sex:

Ethnicity (Circle one):
Caucasian
Asian
Indian
Black
Latino
Other – Please specify

College class (Circle one):
Freshman
Sophomore
Junior
Senior
Graduate student - Please indicate year of study

College major:

Please rate your level of comfort when using a computer (Circle one):
1=Very Uncomfortable
2=Slightly Uncomfortable
3= Fairly Comfortable
4=Comfortable
5=Very Comfortable

Have you ever created a website before?   Yes   No

Have you ever used Dreamweaver before?   Yes   No

If yes, what version did you use?

If yes, please rate your level of comfort when using Dreamweaver (refer to the scale above):

1   2   3   4   5

What have you found to be challenging within Dreamweaver? Please list as many issues as you can think of.

Have you, or do you plan to, take either Electronic Writing and Publishing (ENGL 3120 / ENGL 8123) or Digital Rhetoric (ENGL 8123)?   Please circle one.

I have taken one or more of those classes – please specify which

I would like to take _____ (fill in the blank)

I am not interested in enrolling in either class

APPENDIX B

Post-Test Survey- Novice Interface
Thank you for taking the time to test the Dreamweaver 8 Tutorial. The following questions regard your impressions of the Tutorial's usability.

1. Please rate the overall usability of the Dreamweaver Tutorial: (Circle one)
1=Totally difficult to use
2=Somewhat difficult to use
3=Fairly easy to use
4=Easy to use
5=Extremely easy to use

2. Were you able to understand the categories described (novice, intermediate, expert) on the Tutorial's homepage? If not, what gave you trouble?

3. How easy was it to find out what you would learn in the novice tutorial? (Refer to the scale above, and circle one)

1   2   3   4   5

If you circled 2 or 1, please explain what was difficult:

4. How easy did the Tutorial make setting up a site in Dreamweaver?

1   2   3   4   5

If you circled 2 or 1, please explain what was difficult:

5. How easy was it to find the three steps involved in uploading a site?

1   2   3   4   5

If you circled 2 or 1, please explain what was difficult:

6. How easy was it to use the Tutorial to establish a connection between Dreamweaver and Georgia State's remote server?

1   2   3   4   5

If you circled 2 or 1, please explain what was difficult:

7. How easy was it for you to use the Tutorial to upload your website?

1   2   3   4   5

If you circled 2 or 1, please explain what was difficult:

Please explain what problems you encountered when using the Tutorial.

What suggestions do you have for making the tutorial easier to use?

APPENDIX C

Post-Test Survey – Intermediate Interface

Thank you for taking the time to test the Dreamweaver 8 Tutorial. The following questions regard your impressions of the Tutorial's usability.

1. Please rate the overall usability of the Dreamweaver Tutorial: (Circle one)
1=Totally difficult to use
2=Somewhat difficult to use
3=Fairly easy to use
4=Easy to use
5=Extremely easy to use

2. Were you able to understand the categories described (novice, intermediate, expert) on the Tutorial's homepage? If not, what gave you trouble?

3. How easy was it to use the Tutorial to define a site in Dreamweaver? (Refer to the scale above, and circle one)

1   2   3   4   5

If you circled 2 or 1, please explain what was difficult:

4. How easy did the Tutorial make uploading a site using Dreamweaver?

1   2   3   4   5

If you circled 2 or 1, please explain what was difficult:

5. How easy did the Tutorial make uploading a site *without* using Dreamweaver?

1   2   3   4   5

If you circled 2 or 1, please explain what was difficult:

6. How easy to understand was the Tutorial's discussion of URLs?

1   2   3   4   5

If you circled 2 or 1, please explain what was difficult:

Please explain what problems you encountered when using the Tutorial.

What suggestions do you have for making the tutorial easier to use?

APPENDIX D

Post-Test Survey
Thank you for taking the time to test the Dreamweaver 8 Tutorial. The following questions regard your impressions of the Tutorial's usability.

1. Please rate the overall usability of the Dreamweaver Tutorial: (Circle one)
1=Totally difficult to use
2=Somewhat difficult to use
3=Fairly easy to use
4=Easy to use
5=Extremely easy to use

2. Were you able to understand the categories described (novice, intermediate, expert) on the Tutorial's homepage? If not, what gave you trouble?

3. How easy was it to use the Tutorial to enter the FTP information when defining your site? (Refer to the scale above, and circle one)

1   2   3   4   5

If you circled 2 or 1, please explain what was difficult:

4. How easy did the Tutorial make uploading a site without using Dreamweaver?

1   2   3   4   5

If you circled 2 or 1, please explain what was difficult:

5. How easy did the Tutorial explain creating a new folder within the public_html folder?

1   2   3   4   5

If you circled 2 or 1, please explain what was difficult:

6. How easy to understand was the Tutorial's discussion of URLs?

1   2   3   4   5

If you circled 2 or 1, please explain what was difficult:

Please explain what problems you encountered when using the Tutorial.

What suggestions do you have for making the tutorial easier to use?