

FROM RECOMMENDATIONS TO REALITY: DESIGNING EFFECTIVE ONLINE TUTORIALS

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TEACHING & DESIGN RECOMMENDATIONS

Outlining guidelines for the development of online tutorials is, admittedly, not a new phenomenon (Blummer & Kritskaya, 2009; Dewald, 1999a; Mehlenbacher et al., 2005; Oud, 2009; Plumb, 2010; Smith, 2006; Zhang, 2006). What I hope to add to the conversation in this paper is not just an overview of what the current design considerations for tutorial development are, but a frank discussion about how the librarians at Loyola Marymount University (LMU) interpreted those considerations and recommendations into the construction of our online tutorial, *Lion's Guide to Research and the Library (LGRL)*.

In the fall of 2012, the Reference and Instruction Department at the William H. Hannon Library began a project to build an online tutorial to be embedded in over 70 sections of the Fall 2013's First Year Seminar (FYS) course. The goal of the tutorial within this course is to meet LMU's information literacy learning outcomes for incoming freshman (Loyola Marymount University, 2013). Led by myself, the Head of Reference and Instruction, and the Instruction Coordinator, we determined the initial step of this project was to ask ourselves two research questions: 1) How do you transform traditional face-to-face library instruction to the digital environment? and 2) What are the "best practices" in the design of information literacy tutorials? To answer these questions, we undertook a multidisciplinary review of the literature in the fields of library science, instructional design, web design and development, and human computer interaction and a content analysis of "basic research" online tutorials from the last 10 years within the PRIMO (Peer-Reviewed Instructional Materials Online) database. From this literature review and content analysis, we created two sets of design considerations for the development of online information literacy tutorials. The first set deals with instructional "best practices" including considerations such as planning, pedagogy, incorporating active learning, embedding

communication, and testing (Appendix A). The second set covers the visual and technical elements of tutorial design and includes considerations such as visual clarity, information clarity, clear navigation, user control, technical elements, and accessibility (Appendix B).

Applying the Instructional Recommendations

The first and arguably most important step of designing an online tutorial is planning. The planning stage of the project is the part where many of the instructional strategies, technologies, and campus partners are evaluated and secured. In the development of *LGRL* we adopted the instructional design model ADDIE (Analysis, Design, Development, Implementation, Evaluation) as the foundation for our project plan, but there are a number of other models you could use to structure your project (Smith, 2006). Regardless of which model or framework you adopt for your planning stage, it will include a needs assessment and definition of learning outcomes. Developing clear and measurable learning outcomes based on a needs assessment is the first step in any library instruction whether it takes place in person or online (Grassian & Kaplowitz, 2009). In the case of LMU, the information literacy outcomes for First Year Seminar had already been defined and voted on by LMU Faculty in the core curriculum revision process. Because the process of defining learning outcomes had already taken place, we spent our planning time developing the teaching material and assessment activities that would lead the students to fulfill the predetermined learning outcomes.

During the planning stage, discussions of pedagogy should begin taking place. Based on our literature review, it is generally acknowledged that the best practices for effective in-person instruction can be transferred to an online environment. Some of these best practices include teaching concepts, not mechanics (Dewald, 1999a, 1999b; Grassian & Kaplowitz, 2009; Reece, 2005), using metaphors (Grassian & Kaplowitz, 2009), defining all jargon used (Grassian & Kaplowitz, 2009);

Reece, 2005), and incorporating active learning (Dewald, 1999a; Fink, 2013; Grassian & Kaplowitz, 2009). During our storyboarding process, we attempted to translate the practices of good in-person library instruction into the online environment we were developing. We did this by identifying the terms our learners need to learn, developing metaphors and visualizations to help conceptualize those terms, and incorporating active learning through quizzing, practice, and reflection (Figure 1).

Incorporating interactivity and active learning into online tutorials is a part of effective library instruction (Betrancourt, 2005; Blummer & Kritskaya, 2009; Mehlenbacher et al., 2005; Oud, 2009; Zhang, 2006); so much so that we felt it warranted its own category in our instructional recommendations. Additionally, according to the ACRL Instructional Technologies Committee (2008), “Web tutorials should include interactive exercises such as simulations or quizzes.” To help us select the types of active learning exercises we were going to incorporate into the tutorial, the project team combed through numerous information literacy online tutorials to see what other libraries had been doing and how they approached active learning in an online environment. In order to keep track of what we were discovering, I created a LibGuide that lists all of the active learning activities I saw. The activities in this LibGuide are organized by the current ACRL information literacy standards and can be found at <http://libguides.lmu.edu/onlinetutorialactivities>. I referred back to this LibGuide many times as I was storyboarding *LGRL* for active learning ideas. The final version of our tutorial includes opportunities for learners to gain experience doing the kinds of tasks they need to perform to meet the learning outcomes as well as opportunities for reflection on what they have learned (Figure 2).

The final two considerations in this set are embedding communication and testing. In the literature review, there were numerous mentions of incorporating some kind of communication—be it asynchronous or synchronous (Blummer & Kritskaya, 2009; Zhang, 2006). For our purposes, we characterized embedding communication as including meaningful feedback throughout, providing a way to get immediate help from a librarian, and providing a discussion board for students to offer tips and suggestions for other students taking the tutorial (Figure 3). Finally, we made sure to incorporate the best practices for writing test questions into the development of our assessment pieces. While a number of guidelines proved extremely useful, the guidelines outlining best practices for multiple choice questions proved to be very illuminating. We made sure not to include questions with obvious answers; we avoided using “all of the above” and “none of the above” in our options, and we randomized the placement of the correct answer (Conderman & Koroghlanian, 2002; Dewey, n.d.).

Applying the Visual & Technical Recommendations

Having an intellectual grasp on the visual and technical recommendations before embarking on the actual

construction of an online tutorial puts you in an excellent position to apply them effectively. In this section, I will discuss how we applied the visual and technical recommendations to *LGRL*. We worked very hard to ensure that the tutorial modules aligned with the visual clarity recommendations in our initial version of the tutorial. We mapped out the tutorial layout to create specific zones for navigation, help, educational content and interactivity, section headings, and institutional branding. By having these elements consistent throughout, we created an interface that was easy to learn (Mehlenbacher et al., 2005; Nielsen, 2005; Tognazzini, n.d.). This allowed our users to quickly master the tutorial interface and focus their attention on learning the actual content of the tutorial. Though we attempted to integrate the recommendations for visual clarity as best we could, and were generally successful, we discovered during implementation an area where the design was weak. One of the recommendations for visual clarity is to use visual clues to draw attention to important aspects of the page. What we discovered was that our use of color in the master design did not give users clear enough visual cues in some cases. One example of this was that students noted that they had a hard time distinguishing between the activities that were worth points and those that were not. We remedied this by revising our use of color from a more haphazard “this looks nice here” to a deliberate use of color to communicate information. By giving “for-credit” activities red indicators and “practice” or “think about it” activities blue indicators we succeeded in providing more effective communication using very basic visual indicators (Figure 4). The ultimate goal of the visual clarity design recommendation is that learners should be able to focus on learning the content in the tutorial without becoming distracted or confused by complicated or inconsistent design elements. Everything that the learner sees should serve a purpose and that purpose should not compete with the ultimate goal of the tutorial, which is to meet the tutorial learning outcomes.

Along with visual clarity, it is also important to consider the clarity of the information presented. To develop clear and concise information, the designer should follow the general guidelines for writing for the web and ensure that information within the tutorial is organized by concept. In addition to breaking up content by concept, information should be presented in the simplest way possible. While simplicity and clear language is a key component of tutorial design, designers should resist the urge to dumb down the content for the sake of simplicity (Reece, 2005). While it is good practice to refrain from the overuse of jargon in the design of library websites (Kupersmith, 2012), using difficult terms or library jargon should be used if it is a necessary part of the instructional experience (Reece, 2005). The way we worked around this contradiction was by explaining the difficult terms simply and utilizing glossaries or pop-ups for more information (Figure 5). Taken together, the visual clarity and information clarity recommendations will result in a small amount of text on one page that is clear and well-explained. We discovered in the building of *LGRL* that creating small sections within the modules for like content and incorporating interactive elements on a single page can help break up content into easily digestible chunks (Figure 6).

Clear and consistent navigation is also necessary for successful information literacy tutorials. Elements of clear navigation include providing consistently placed, highly recognizable navigational elements into the tutorial interface in addition to an outline or table of contents (Zhang, 2006). It is important that learners do not divert too much attention to finding the “next” button or understanding where they are within the tutorial. In the design of *LGRL* we created a navigational system that includes fixed next and previous buttons at the bottom of the screen, page progress, and an outline of the module sections at the top. While we felt that all of these interface elements were sufficient in orienting students within the tutorial, students noted that they would prefer more visual clues to measure their progress. Given this feedback, we are planning on incorporating a progress bar to replace the page counter and a “point” counter so students can check on their score throughout the tutorial.

Revising the tutorial to give students more information about their progress and score throughout the tutorial naturally leads us into our next design consideration: user control. At first, it may seem like clear navigation and user control is the same, but they occupy separate spaces. Giving users control within an online tutorial means that you design the tutorial to accommodate diverse learning styles. This includes incorporating multiple content formats when applicable (such as providing written transcripts for videos or audio for written material) (Figure 7), providing callouts or additional information for either remediation or advanced concepts, and allowing users to recover from error (Tognazzini, n.d.). In addition, because many students are multimodal learners, it is important to provide a way for learners to work alongside or within the information presented in the tutorial (Mestre, 2012). As we were designing the tutorial, we were under the impression that we were being sensitive to aspects of user control. However, upon implementation, we discovered that at many places within the tutorial, particularly within the drag-and-drop exercises, we were not providing our learners with a way to recover from any potential errors (Figure 8). We remedied this by changing the way the interactive exercises work so that students can undo and redo before they commit to submitting their response.

WHAT WAS LEARNED ABOUT THE RECOMMENDATIONS THROUGH APPLICATION

By now it is probably clear that in many of the design considerations I outline here, a number of them overlap. I found that in many cases, this is because incorporating a design recommendation from one category will enhance the user’s experience in another. At the same time, you will also notice that some of the design recommendations in one category seem to contradict the design recommendations in another. In the best cases, your design decisions will enhance more than one category in these design recommendations. However, in others, you will have to compromise in one design category to accommodate another. Mehlenbacher et al. (2005) illuminate this paradox by explaining that design is both constructive and

argumentative. Design is constructive because a synthesis of distinct parts produces a concrete thing and yet it is argumentative because design decisions must be justified while design tradeoffs and alternatives must be critically assessed in order to produce a thoughtful product. It was helpful for me to think about design this way in the development of *LGRL*. I learned that these design considerations cannot be used as a checklist, where if you incorporate all of the design recommendations listed you will automatically create the perfect tutorial. In fact, it would be impossible to do that due to the aforementioned contradictory recommendations. The considerations presented here are simply guidelines and how you use them will have everything to do with the goal and pedagogy of your own tutorial.

Another takeaway from this entire process is that the design considerations I have outlined above have a tendency to exclude one very important user group: faculty. The design considerations are very focused on the student learning from the tutorial, but what I discovered from the implementation process is that the faculty incorporating the tutorials into their course should also be comfortable using it and teaching with it. It is my belief that more research on the usability and incorporation of digital learning objects from the faculty or instructor perspective would be useful. At LMU, we have been soliciting faculty feedback and are planning revisions that will make the tutorial simpler for them to integrate into their FYS courses.

Finally, the most important thing I came to realize during this entire project was that, regardless of how thoughtfully you incorporate these design recommendations, you will miscalculate and make mistakes. In the implementation process you will find elements that you overlooked or technical issues that you didn’t foresee. Therefore, it is critical that you build in time for user testing and multiple revisions.

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Figure 1: Translating In-Person Library Instruction

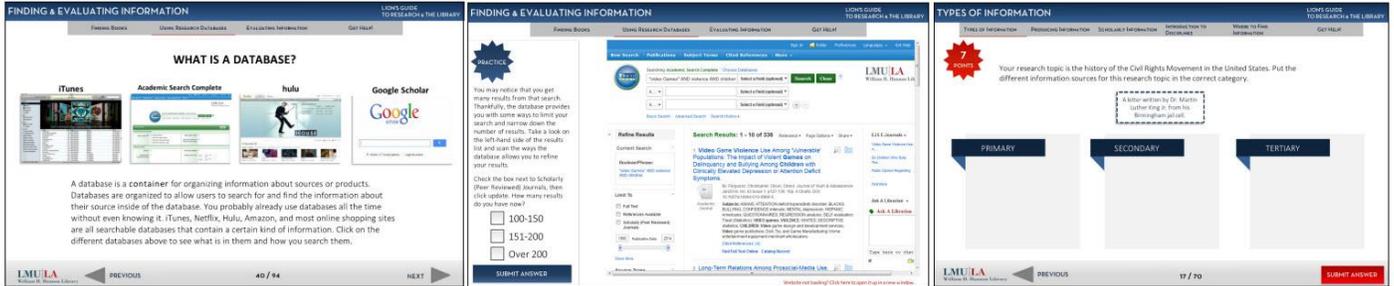


Figure 2: Active Learning, Adapted from D. Fink, Creating Significant Learning Experiences, 2003

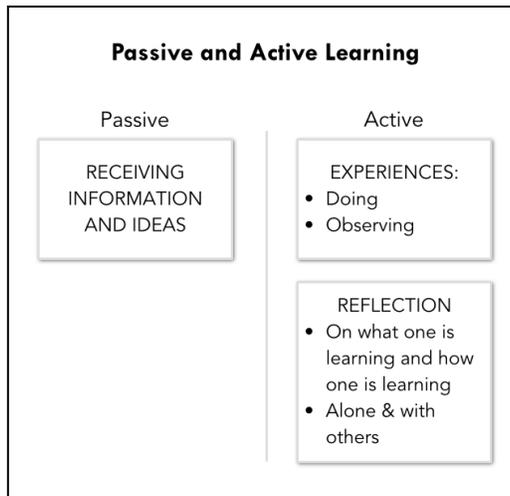


Figure 3: Embedded Communication

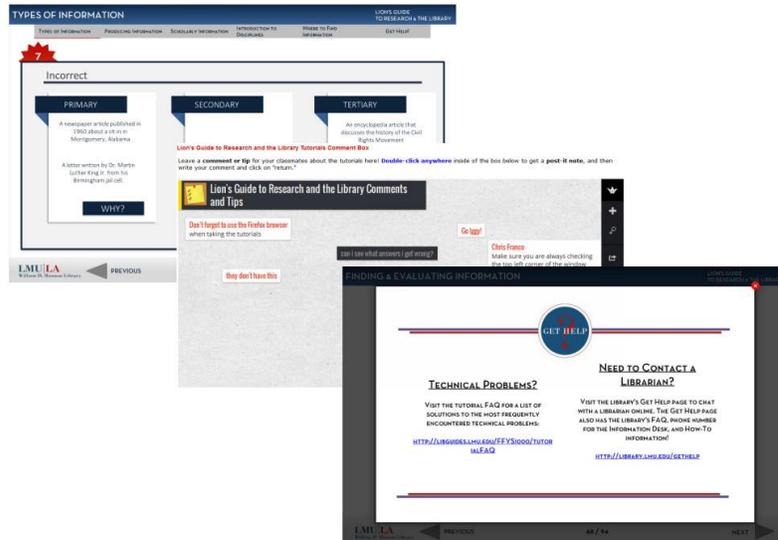


Figure 4: Color Revision for Visual Clarity

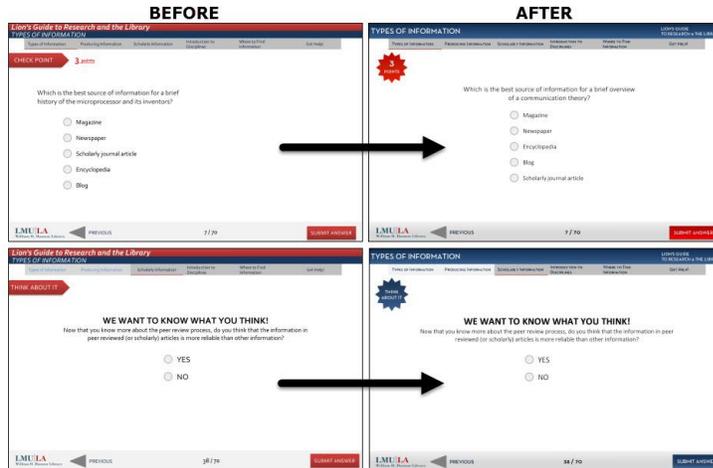


Figure 5: Providing Additional Information



Figure 6: Moderate the Amount of Text on a Page

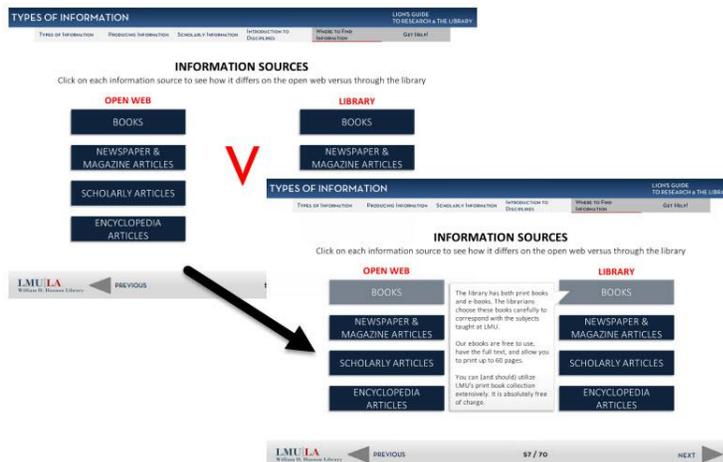


Figure 7: Give Student Multiple Formats When Possible



Figure 8: Give Students a Way to Undo or Review Work



APPENDIX A

Instructional Design Considerations Table: http://lgdata.s3-website-us-east-1.amazonaws.com/docs/187/670594/Online_Tutorial_Design-Pedagogy_Tips.pdf

| PLANNING | INCORPORATE ACTIVE LEARNING | EMBED COMMUNICATION | PEDAGOGY | TESTING |
|--|--|--|--|--|
| <p>Advance planning is essential when developing online tutorials. Tutorials are difficult to overhaul once they are finished so planning will help to you understand your audience and their IL needs. Knowing this will shape the content of the tutorial and help you deliver meaningful instruction.</p> | <p>According to the ACRL Instructional Technologies Committee (2008), "Web tutorials should include interactive exercises such as simulations or quizzes." Interactivity, multimedia, and game-like quality are identified as essential components in an effective online tutorial.</p> | <p>Embed multiple forms of communication within the tutorial. This communication can range from emailing with a librarian with a question, providing feedback on the tutorial's usefulness, or commenting for the benefit of other students.</p> | <p>The basic principles of good library instruction in face-to-face environments are transferrable to online tutorials. Utilize these principles to help guide the content and maintain best practices in your online tutorial</p> | <p>Including tests in an online tutorial both promote interactivity and active learning and assess the user's performance. Make sure that you follow best practices for constructing test questions for the greatest impact on learning.</p> |
| <p>Perform a needs assessment.</p> <p>Identify all stakeholders who will be involved in tutorial discussion, development, evaluation, and implementation.</p> <p>Create a team or committee if appropriate.</p> <p>Verify funding sources, if applicable.</p> <p>Verify the selected technology.</p> <p>Develop instructional goals, objectives and expected learning outcomes.</p> <p>Use storyboards to organize and outline all of the material included in the tutorial.</p> | <p>Develop or adapt exercises that use these interactive components:</p> <ul style="list-style-type: none"> -Free text or fill-in-the-blank -Mouse-over -Drag and drop (matching or fill-in-the-blank) -Hot spots -Simulation/Guided Search <ul style="list-style-type: none"> -Multiple Choice and True/False quizzes -Decision Tree (results dependent on user input) -Short videos, animations, screen capture | <p>Provide meaningful feedback whenever possible. Build messages into the tutorial that reinforce correct answers, fix and explain incorrect responses, clarify ambiguity, and send encouraging messages.</p> <p>Embed a way to contact a librarian or instructor with specific questions or to get help using chat, email, or other communication means.</p> <p>Embed a way for the user to send feedback or suggestions concerning the tutorial.</p> <p>Link to a blog, discussion board, or feed where previous users can leave tips for new users.</p> <p>Choose your communication tools wisely and anticipate how they will work together within the tutorial.</p> | <p>Teach concepts, not mechanics.</p> <p>Offer multiple examples presented in multiple contexts and variations to allow for knowledge transfer.</p> <p>Use metaphors and analogies.</p> <p>Define all jargon used.</p> <p>Construct tasks that promote critical thinking such as application, analysis, synthesis, & evaluation.</p> <p>Personalize the experience (scenarios, characters).</p> <p>Simulate a realistic context.</p> <p>Use retrieval-based learning (provide cues for knowledge reconstruction or recall such as questions or quizzes).</p> | <p>True/False Questions:</p> <ul style="list-style-type: none"> -Test only one idea per item -Ask a direct question -Avoid using negatives -Construct statements that are not obviously true/false -Make sure the answer is true or false without ambiguity <p>Multiple Choice Questions:</p> <ul style="list-style-type: none"> -Provide 5 choices for the answer -Make the choices roughly the same length -Arrange choices in a logical order, like alphabetical. -Avoid using "all of the above," "none of the above," or A&B. -Scatter correct responses equally in random order. - Remove obvious cues to correct answer <p>Matching Items:</p> <ul style="list-style-type: none"> -Make homogeneous lists using same unit of measurement -Provide more responses than premises -Keep matching premises to no more than 10 items -Place longer phrases on the left |

APPENDIX B

Visual and Technical Design Considerations Table : http://lgdata.s3-website-us-east-1.amazonaws.com/docs/187/670594/Online_Tutorial_Design-Pedagogy_Tips.pdf

| VISUAL CLARITY | INFORMATION CLARITY | CLEAR NAVIGATION | USER CONTROL | TECHNICAL CONSIDERATIONS | ACCESSIBILITY |
|---|--|---|---|---|---|
| <p>The design of the tutorial should be minimal, clear, and visually consistent throughout. The goal is to enable the user to focus on learning the content of the tutorial instead of becoming distracted or confused by complicated design elements.</p> | <p>Users of the tutorial should be presented with clear and concise information throughout the tutorial. It is recommended that information within the tutorial should be divided into multiple modules with each module covering one distinct topic.</p> | <p>Consistent, clear, and highly visible navigation is essential to an effective online tutorial. Users should be able to move through the tutorial both linearly and non-linearly without becoming confused about their place within the tutorial or the tutorials content.</p> | <p>The users of your tutorial should have some control over how they use it. By designing the tutorial to embed user control, the users can decide what they learn based on their own needs as well as how they learn it based on their learning style.</p> | <p>The tutorial should function properly in as many technological environments as possible because users will be utilizing various devices and browsers and have varying access to bandwidth and software. The back-end of the tutorial has to take as many of these variables into consideration as possible.</p> | <p>The tutorial should be accessible to all of the potential users of that tutorial. These users include students using the tutorial for learning purposes as well as the varying systems that "talk" to your tutorial. This increases accessibility on the front-end and back-end of your tutorial.</p> |
| <p>Use the library or institutional branding.</p> <p>Apply consistent and limited (3-5) color choices throughout.</p> <p>Use graphics only when they directly facilitate student understanding.</p> <p>Use clear images zoomed to their critical feature.</p> <p>Create consistent "zones" on each page so that the content, navigation, help and other information is in the same place throughout the tutorial.</p> <p>Use visual or verbal cues to draw attention to the most important part of the page (i.e. arrows, bold type, circles, captions).</p> <p>Use descriptive links not urls.</p> | <p>Present only one idea or concept per screen.</p> <p>Severely limit the amount of text on each page by simplifying content as much as possible and utilizing bullet points and carefully chosen visuals as an alternative to text.</p> <p>Use multimedia or screencasts sparingly and only when they are necessary to the instruction.</p> <p>Narrate videos slowly and keep the length short (3 min. max).</p> <p>Use words in only one format at a time—avoid similar words in multiple formats simultaneously.</p> <p>Summarize and review key points at the end of each section.</p> | <p>Create a good outline of the sections covered in the tutorial.</p> <p>Consider having a table of contents and site index always accessible.</p> <p>Make the outline and navigation transparent throughout the tutorial.</p> <p>Use consistent and highly visible navigation throughout the tutorial.</p> <p>Use meaningful headings for the tutorial's sections.</p> <p>Navigational elements should be clearly separated from the tutorial's content.</p> | <p>Provide a way for users to work alongside the tutorial.</p> <p>Give users multiple content formats to choose from based on their learning style and environment.</p> <p>Show the user's progress throughout the tutorial.</p> <p>Provide call-outs for additional explanations, definitions, and information for remedial help.</p> <p>Provide a way for the user to undo or backtrack at any time in the tutorial or to skip ahead.</p> <p>Provide a visible, consistent way to get help throughout the tutorial.</p> | <p>Make sure plugins necessary for your tutorial are freely available to a wide range of users and device types.</p> <p>Conform to web video compression guidelines.</p> <p>Locate and maintain enough server space to host your tutorial (minimum 8-10 GB).</p> <p>Do usability testing with students and faculty. Test the tutorial in multiple browsers and on multiple devices (including mobile), including download speed if applicable.</p> <p>Record screencasts at a lower resolution (800x600).</p> <p>Only use file types that are functional for streaming and downloading.</p> | <p>The elements within the tutorial should adhere to ADA accessibility guidelines, Section 508, Bobby, and W3C accessibility standards.</p> <p>Quiz software should be SCORM (sharable content object reference model) compliant to work with learning management systems.</p> <p>Provide downloadable Mp3 audio recordings and captioned online tutorials to help ADA compliance.</p> <p>Provide captions or transcripts for screencasts or videos.</p> <p>Include PDF or text version and/or slide notes.</p> |