

Running Head: Disabilities affecting access (design)

**Project 1: Concept Learning – Instructional Design Document  
Disabilities Affecting Access to Web-Based Instruc**

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## **Overview**

Our team has created an instructional design document outlining recommendations for developing a short instructional module, based on the concept “Disabilities Affecting Access to Web-based Instruction”. This module, for reasons described in our analysis document, is intended to be presented at the Annual Conference on Distance Teaching and Learning at the University of Wisconsin – Madison.

First, we present the overall goal of instruction. Then, the objectives of instruction are described. These objectives are drawn from the scenarios of use, that were created during the analysis process.

The instructional design document contains the following sections:

## **Objectives and Assessment**

### ***Overall Goal of Instruction***

The overall goal of instruction describes generally what the instruction is intended to accomplish. We would like the learners to have a foundational understanding of the concept described above. This foundational understanding will help the learners to complete tasks in their daily jobs that were identified in our analysis phase. The items below summarize the tasks that the learners will need to perform, related to our concept.

- Attendees will need to personally review Web-based learning resources for accessibility rather than relying solely on publisher assurances and automated checking systems.
- Attendees will need to understand that Web accessibility is a concern for more than just those students with visual impairments.

- Attendees will need to comply with accessibility guidelines, in particular 508, ADA guidelines, and relevant state or institutional guidelines.

As our task list above and the concept analysis illustrated, the topic of “Disabilities Affecting Access to Web-based Instruction” is very large. Despite the high motivation and general high level of education of the participants, everything presented above in the outline could not realistically be covered in the time allotted. Our topic requires a student to understand two aspects: what are the types of disabilities that affect Web access and how a disabilities impairs Web access.

Our presentation focuses on answering the question “what is impaired Web access, as it relates to a student with a disability?” Web access is impaired, for the purposes of this presentation, when a user encounters substantive problems perceiving the content or operating on (navigating, responding to, interacting with) the content due to a disability. “Substantive problems” mean that even when students are equipped with assistive technologies, access to Web content may still be impaired if the content is not properly produced. If accessibility is not considered when content is implemented, then in many cases, the student will not be able to access the material, regardless of the assistive technology available to them.

The general goal of the presentation is that students will be able to:

- Articulate potential accessibility issues, i.e., potential situations of impaired access for a student with disabilities, related to a Web page or resource

***Objectives of Instruction***

According to Mager (1997), "Objectives provide the basis for achieving consistent instructional results." (p. 15). The specific objectives are:

- Recognize the limits of client-side assistive technology in addressing impaired access
- Discuss how alternative forms of content can benefit a variety of disabled learners
- Recognize particular examples of impaired access to Web content, related to major categories of disabilities
- Describe situations of impaired access to Web content, as it relates to common perceptual, motor, and health disabilities

***Assessment & Evaluation***

Because of the limits of the instructional context, it will not be possible to conduct a formal summative assessment. However, the instructor will invite learners to participate in discussions of specific Web resources throughout the presentation as well as at the end of the presentation. These discussions will focus on how access to the particular resources may or may not be impaired by disabilities. Specific strategies are included in the instructional strategies below.

***Prerequisites***

While conference attendees, as noted in the analysis, will all be involved in the selection or development of Web resources as a job requirement, there are no formal prerequisites to attend the presentation, other than registration at the conference. Almost all attendees will have an undergraduate degree and many will have one or more advanced degrees.

### Sequencing, Strategies, and Message Design

#### ***Learner Orientation to Instruction***

Most learners will choose this presentation over other presentations because of present or future job requirements, or because of personal classroom experience. The learner will likely respond positively to being shown a resource that will be available to them after the presentation. The learners can access the materials from the presentation (including Web links) to refresh their knowledge when they are presented a situation to apply the knowledge.

The learners will apply the information in the presentation in many contexts, as our scenarios of use described in the analysis phase. The chart below describes how the objectives of instruction support these tasks. This information has been used in designing the practice activities listed below.

|  |   |
|--|---|
| <b>General goal:</b> Articulate potential accessibility issues, i.e., potential situations of impaired access for a student with disabilities, related to a Web page or resource |   |
| <b>Opportunity to transfer knowledge</b>   | <b>Application of instructional goal</b>  |
| Review Web-based learning resources for accessibility rather than relying solely on publisher assurances and automated checking systems  | The learner could apply their knowledge of the different types of access impairments to check that learners will be able to access the material regardless. |
| Understand that Web accessibility is a concern for more than just those students with visual impairments.  | One way to recognize that other impairments exist is to learn about another type of impaired access (e.g., inability to hear audio).                        |

|   |  |
|---|--|
| Comply with access guidelines, in particular 508, ADA guidelines, and relevant state or institutional guidelines. | In order to implement guidelines effectively, development teams need a clear idea of who will be aided by implementing the guidelines.<br><br>Additionally, to read most compliance guidelines, one must be able to associate the terms used to describe three components of access: ability to perceive the content, ability to operate the content, ability to understand the content. |
|---|--|

### ***Motivational Strategies***

According to Keller, there are four components important when designing instruction in a way that increases student motivation: attention, relevance, expectancy and satisfaction. Embedding these components is part of the ARCs model described in Gagne, Wager, Golas, and Keller (2005), otherwise known as the ARCS model, which they adapt from Keller (1987).

Our analysis identified that our students will come to the presentation motivated to learn – they are, after all, choosing to attend this presentation from among multiple others in the same time slot. Additionally, we believe there are two primary motivators for attendance: intrinsic (sympathy for and/or ethical commitment to disabled students) and extrinsic (obligation to better understand and comply with accessibility regulations and standards). Bearing the learners' incoming motivations in mind, we've identified the following ways to embed each component of motivational design:

**Attention**

Gagne, et al identify three sub-components of attention: perceptual arousal (capturing interest), inquiry arousal (stimulating curiosity), and variability (maintaining attention) (2005). Given the learners' incoming motivations, we believe that the best way to capture and maintain attention (perceptual and inquiry arousal) is by connecting the concepts to existing practices. Given that conference attendees are professional adults who are generally motivated to start presentations on time (in order to finish on time), initial perceptual arousal should be easily gained by signaling that we are ready to begin. Inquiry arousal will be the focus of our pre-instructional strategy, detailed below. Variability will be maintained by constantly bringing the presentation back to types of Web content and students the attendees will be familiar with.

**Relevance**

Gagne, et al identify three components of the relevance component of ARCS: goal orientation and motive matching (do the learners see the presentation as aligned with their goals), and familiarity (does the instruction relate to their existing experiences) (2005). As noted above, most attendees will enter the presentation already committed to the goal of the presentation, and we intend to make sure the purpose and scope are clearly stated in the conference agenda. Familiarity will be addressed by focusing on disabilities that affect access across age ranges and educational levels and using a variety of examples.

**Confidence**

Like attention and relevance, confidence has three subcomponents: learning requirements (do students believe they can handle the material), success opportunities (do students have the ability to demonstrate that they have increased their competence),

and personal control (do students understand that their success is a reflection of their efforts) (Gagne et al, 2005). With a professional audience, the most likely source of doubt in their abilities is time and lack of tools to correct problems, so we will make sure that all practice activities demonstrate that use of the concept can be accomplished quickly and that tools are readily available.

### **Satisfaction**

Like the other components of the ARCs model, satisfaction has three subcomponents: natural consequences (students have natural opportunities to use what they have learned), positive consequences (students have opportunities to see that they have succeeded), and equity (students continue to feel positive about what they have accomplished) (Gagne et al, 2005). While we will not be able to follow learners into their work contexts, we will be able to give them a final formative assessment that allows them to practice their skills: a distinct Web resource they can analyze to identify potential disability challenges. By completing assessment, students have an opportunity to see how their problem-solving skills have increased. Additionally, we will provide opportunities for students to learn find materials that they can use to study issues beyond the scope of this presentation (access for cognitive and behavioral disabilities, access for second-language learners, access across technological platforms, specific regulations and guidelines, specific criteria and strategies for ensuring accessibility, etc.).

### ***Examples and Non-Examples***

The instructor must demonstrate examples of disabilities that clearly affect Web access. The instructor must also demonstrate non-examples: disabilities that do not impair Web accessibility, and non-disabilities that do impair access. These examples



and non-examples must make it easy for the learner to discern and apply criteria for recognizing the concept.

| <b>Examples</b>        | <b>Non-Examples</b>   | <b>Non-Examples</b>  |
|------------------------|---|--|
| <b>Limited Vision</b>  | Disabilities that do not Affect Web Access<br><br>A student with chemotherapy-related fatigue that limits sustained activity and energy but does not limit ability to see or manipulate computer peripherals. | Accessibility issues not related to Disability<br><br>A second-language student may have trouble reading and navigating a site, but is not technically disabled. |
| <b>Limited Hearing</b> | A student with Asperger's disorder, which does not affect attention span or information-processing (i.e., reading) ability.   | Students using an older version of Netscape Navigator on Windows 98 would have trouble accessing Web resources, but is not disabled.                             |
| <b>Color Blindness</b> | For programs that do not use Web-based synchronous voice communication, a student with a stammer would not be impaired in accessing   | Many students using very new or experimental browsers, or using Linux or Unix platforms, may have trouble accessing Web resources, but is not                    |

|                                |          |                       |
|--------------------------------|----------|-----------------------|
|                                | the Web. | technically disabled. |
| <b>Dyslexia</b>                |          |                       |
| <b>Cerebral Palsy</b>          |          |                       |
| <b>Photosensitive Epilepsy</b> |          |                       |

### ***Instructional Sequence***

For content sequencing, this team selected sequencing strategies from Posner and Strike (1976) as summarized by Morrison, Ross, and Kemp (2004). In particular, we made sequencing decisions based on learner-centered sequences, specifically those that move from most familiar and simple content to less familiar and more difficult, as well as sophistication concept-related sequencing. The presentation moves from definition to application, with each representing a phase. In each of these two phases, content will move from simple (familiar) examples and non-examples to more complex and less familiar examples and non-examples.

- Definition: Define concept and give criteria
  - Most Simple example: limited vision
  - Most Simple non-example: Limited technology
  - Simple example: limited hearing
  - Simple non-example: Health disabilities not impairing access
  - Complex example: Color-blindness
  - Complex non-example: Second-language learners
  - More Complex example: Dyslexia
  - More Complex example: Motor disabilities

- Non-typical case example: Photosensitive epilepsy
- Application: Infer subconcepts from examples of particular Web resources
  - Most simple: Types of content causing problems for perceptual disabilities
  - Simple: Types of content causing problems for dyslexic students
  - More Complex: Types of content causing problems for color-blind students
  - More Complex: Types of operations causing problems for motor disabled students
  - Most Complex/non-typical: Content causing problems for photosensitive epileptic students

### ***Instructional Strategies***

#### **Pre-Instructional Strategy**

Noting Morrison, Ross, and Kemp (2004) on the adult learner, “By being sensitive and alert to the characteristics of special groups of learners, a designer can plan programs especially effective for them” (p. 63). The authors go on to suggest that adult learners want to see that the content is relevant. Thus, as noted above, we will use pre-assessment as our introductory/pre-instructional activity. Morrison, Ross, and Kemp note that pre-assessments (or pre-tests) focus the learner on the key questions to be addressed in the instruction.

Our pre-assessment will consist of a group discussion of specific “before” resources that are part of the W3C’s Web Accessibility Initiative Before and After Demo. The demo provides a vehicle to demonstrate Web pages in an inaccessible state and an accessible version of the same pages. “The demonstration serves a variety of purposes

such as raising awareness on the issue of Web accessibility or for providing practical examples for Web developers” (2006).

### **Instructional Strategies**

The nonexamples and examples listed above should be presented in the ways that help the learners practice and receive feedback on the learning objectives.

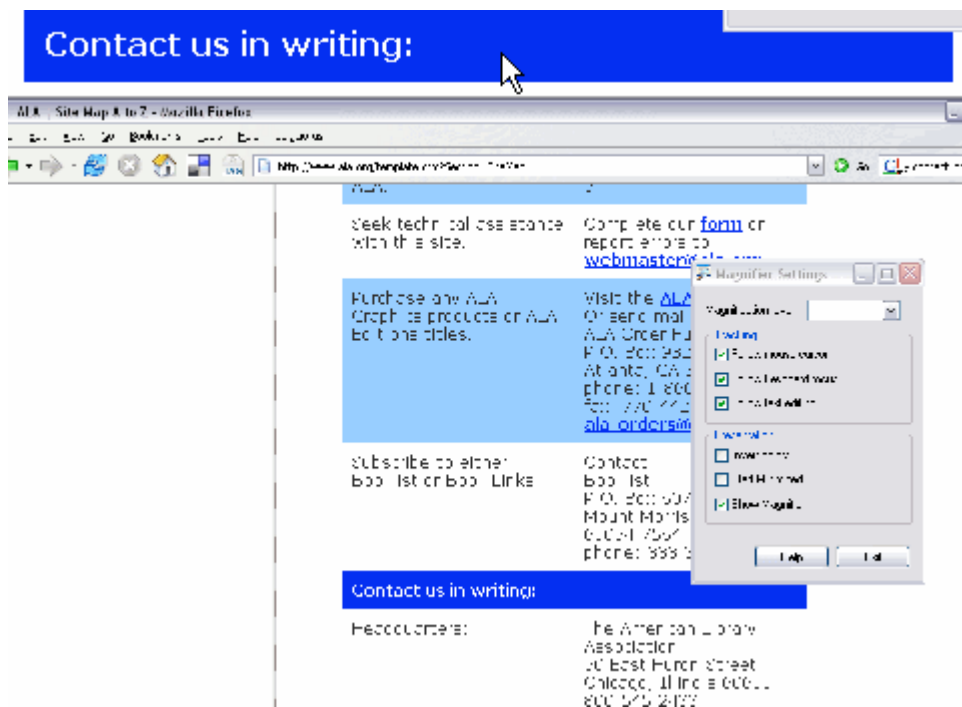
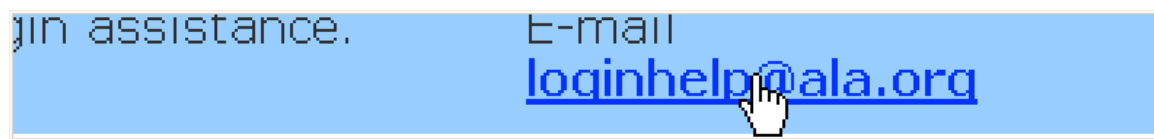
#### ***Objective 1***

- Recognize the limits of client-side assistive technology in addressing impaired access

The most simple example, limited vision, will be used to show the learners that that client-side assistive technology cannot function unless the Web-based content is properly produced. The instructor will show the learners a Web page that does not allow the text-size to be increased and that does not sequence content properly. This will allow them to associate the material with previous experience and encourage the learner to ask “what if I were vision impaired?”

The instructor will then run the “Magnifer” tool in Windows XP to increase the text size. The instructor will ask the learners questions that require them to infer properties of kinds of assistive technology. Can the magnifier guide the limited vision student to the section he or she wishes to read (e.g., the email address for login help) if the student cannot read the headers without magnification? The limited vision student would need to mouse over each portion of the page until the magnifier was centered on the correct information.

**Example:** The magnifier shows a limited amount of text to the user.

*User Attempt 1:**User Attempt 2:*

While the assistive technology allowed the user to find the information, it was with some difficulty. If the user had been able to increase the font size, the reading area on the page would have been larger and the task would have been easier.

The instructor then proceeds to an example where the user with a disability is unable to understand or access the information. Here the concept of a screenreader would be introduced. The instructor could use the learner's experience thus far in the presentation to construct an analogy. A screenreader, like the magnifier, also cannot jump to the paragraph the user wants to read without user input. The screenreader relies upon the structure of the document. If the document is structured in a nonstandard way, then the blind user will be unable to identify the various sections of the Web content and

will not be able to give the input needed to navigate to the desired section of the document.

Finally, the instructor could establish boundaries to the concept through giving a simple non-example, an outdated browser that prevented a student from downloading the images and alternate text.

**Evaluation:** To evaluate the learner's mastery of objective 1, final assessment will include the following example element: an image does not have appropriate alternate text (e.g., a "next page arrow" has alternative text that reads "yellowimage"). The instructor will prompt learners to discuss how access will be impaired and will assess comprehension based on how learners respond. This assessment is based on the idea that if a student can define, describe, given examples and relate the concept to other knowledge they are demonstrating knowledge of the concept (Tessmer YEAR 48).

As stated above, the analysis phase showed that a learner may need to later, "Review Web-based learning resources for accessibility rather than relying solely on publisher assurances and automated checking systems." The instructor has demonstrated a basic example of this task above. The learner can infer that using an assistive technology tool reveals some of the limitations of the tool.

## **Objective 2**

The second objective that will be addressed in the examples listed above is:

- Discuss how alternative forms of content can benefit a variety of disabled learners

Our analysis phase showed that the learners are interested in gaining information about disabilities other than visual impairments. The instructor can gain interest in the next section by asking a question that highlights the misconception that Web accessibility is only a concern for those students with visual impairments. For example, the instructor might ask, "Other than a limited vision user, which we just saw, is there

any user that may also have difficulty accessing Web content?” The instructor would then guide the learners by listing properties of web-based content and asking them to infer a disability. As Tessmer stated, “inference-making requires students to reason spontaneously using the concept, making connections between information not previously stored contingently in memory” (1990, p. 48).

The best example to use here would be limited hearing. After listing the types of web-based content: visual text, visual non-text (graphics, video), audio, and multimedia, the instructor asks specifically about audio. Our learners should have enough background knowledge to respond with “limited hearing.” From there, the instructor can move to the more complex example of video (images with audio). Most learners have watched television with closed captions on since many exercise rooms have television sets with the audio off. In the same way that televisions with closed captions are used by users that do not have limited hearing, an alternative form of content will be used by a variety of disabled users.

**Evaluation:** At the end of the class, the instructor will go to a webpage that gives an example of this the need for text resources to supplement audio resources.

### **Objective 3**

- Recognize particular examples of impaired access to Web content, related to major categories of disabilities

At this point, the groundwork has been laid to introduce other concepts more rapidly. To make sure the learners are not intimidated, the instructor should now show the variety of tools that will allow the student to quickly respond to an issue. After this, the instructor may now show a chart, outlining the major types of content and the challenges associated with the type of content. This chart should include quick reference information on the definitions of “perceiving the content” and “operating on (navigating, responding to, interacting with) the content”. After showing the chart, which could be

printed as a handout, the instructor can present slides listing the disability, a link to a website (or a screenshot) that illustrates it, and a description of what the user would experience. These slides would be based on the examples and nonexamples given previously.

**Evaluation:** The learners will be given a sheet with a screenshot of three separate examples after the presentation. The learners will need to circle the correct response. The instructor will then provide the correct responses.

#### **Objective 4**

- Describe situations of impaired access to Web content, as it relates to common perceptual, motor, and health disabilities

Towards the end of the presentation, the instructor will focus on case studies that relate to the major types of disabilities. Upon giving a case study, the instructor will ask the students to describe another similar situation.

**Evaluation:** Finally, the instructor will end the presentation with asking a sampling of learners to describe a case in which they may be required to help an individual with a disability.

#### **Basic Plan for Instructor Materials**

Given the instructional context detailed in the analysis document, the primary materials used by both instructors and learners will be PowerPoint presentation to be controlled by the instructor and given in handouts to students. Additional material for instructors, such as recall or definition prompts and questions to guide discussion and analysis of sample Web resources, will be provided in an instructor notes document aligned with the slideshow and the Web resources linked on each slide. An additional slide will provide hyperlinks additional resources that instructors can use to supplement their presentations or that students can use individually to further their own learning.



Linking the instructor notes slide-by-slide to the presentation will ensure congruence between what the instructor is saying and what the students are seeing on the screen and in the handouts.

Usability will also be strong – the context for this particular session ensures that each conference room is equipped with a projector and Internet access. Additionally, PowerPoint is a common technology with which almost all instructors have experience. Web pages to be evaluated in pre-instruction and assessment will be linked through the presentation (with URLs printed in the handouts). Additionally, the presentation and additional notes provided to the learners will be checked to make sure that they can be read by individuals with only limited Web-production experience. The instructor notes will include for the presentation will cue the instructors to confirm that audience members understand the vocabulary used.

### References

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