Running Head: Disabilities affecting access

Project 1: Concept Learning – Analysis Document

Disabilities Affecting Access to Web-Based Instruction

Team 2:
Erika Devones
Richard Ruane
Cynthia Svilar

Indiana University

R521: Instructional Design and Development
Professor Robert Appelman
Keng-Soon Soo

September 24, 2006

<u>Overview</u>

Team 1 chose the concept "Disabilities Affecting Access to Web-based Instruction." A presentation on this topic would be necessary for, and appropriate to learners at the University of Madison-Wisconsin Distance Education conference. To verify this, and to get information for the analysis document, our team spoke to various individuals knowledgeable about the needs of attendees at the conference and/or of the concept covered. These individuals included:

- Ludmilla Battista, Program Director and instructor for the Education Paraprofessional Program at Kaplan University Online

- Justin O'Sullivan, ADA Coordinator and Manager of Academic Success, Kaplan University Online

- Kathy Pease, Director of Special Education for Porter County, Indiana

- Irene Adams, Special Education Consultant and Teacher, Valparaiso Community Schools

- Ed Pryzycki,, Multimedia Developer, Kaplan University Online

- Laura Roscher, Director, Office of Disability Services, Smith College

- Aisha Gabriel, Web Courseware Development Specialist and Liaison to Disability Services, Smith College

Additionally, the content analysis relied on further sources from the literature, which are detailed in that section.

Topics are generally chosen for presentations at academic conferences according to felt needs, and anticipated or future needs, and by looking at projects occurring at other organizations. Awareness of the issue of Web Accessibility is a current need, which is confirmed by the Department of Educations' grant funding for projects such as "Web Accessibility for all" (date?). Our topic was further narrowed to "Disabilities that Affect Web

Access" because learners must have a foundational understanding of the topic to effectively read, search for, and use the information available.

<div align="center">**Context Analysis**</div>

Process Used to Create Context and Audience Analysis

The context analysis process involved two steps: conducting interviews of the individuals mentioned above, considering the instructional context of the conference, and creating scenarios of use. These scenarios of use, refined from a larger set of examples, portray the needs of the audience and its general characteristics. Because each scenario of use we considered implied specific needs and goals for the instruction, we analyzed the needs and goals emerging from instruction using the six-step process of goal analysis detailed in Morrison, Ross, and Kemp (2004). The steps followed include:

1. Set Goals
2. Refine Goals
3. Rank Goals
4. Refine Goals Again
5. Make a Final Ranking

Morrison, Ross, and Kemp state that goal analysis is appropriate when the instruction is a confirmed need (2004). Our team confirmed that the need for instruction was felt across multiple subject-matter experts. For instance, Justin O'Sullivan commented: "From my experience as the ADA Coordinator at Kaplan University, faculty in general are consistently eager to learn information [on the topic of Disabilities that Affect Web Access], which will assist their students in addition to facilitating the learning process." In addition, Ludmilla Battista stated that the topic would appeal to her and that a broad overview would help her prepare to assist students with disabilities.

First, the team reviewed situations in which instructors (or in some cases, instructional support staff) creating or selecting Web resources, whether in secondary or higher education would be required understand specific disabilities affecting Web access in order to recognize and respond to the needs of learners. These are grouped according to the type of task in which the knowledge of this concept would be applied.

Second, the scenarios of use are analyzed. The presentation focuses on teaching instructors to categorize the different problem according to disability, because the different student needs presented by each disability would require a different response.

Goals of Instruction and Orienting Context

Scenarios of Use

a) A professor at an online university has a deaf student that is enrolled in her class. The video supplied by the textbook publisher has no captions. The professor would have liked to know to look for this issue prior to adopting the text.

b) A special education teacher who is her school's resident expert in distance education is at a parent-teacher conference at an area school. One of the parents is thinking of enrolling her child in one credit of a web-based course this summer since it has been shown to be helpful for some students that have trouble interacting with others.

c) A principal is considering having some high school seniors take an online course for college credit. The school has inclusive classrooms.

d) A community college instructor has placed all syllabi and assignments online.

e)

f)

g)

h)

i)

j)

<u>Goals Arising from Scenarios of Use</u>

The following goals emerged from the team's analysis of the scenarios of use.

<u>1) Attendees will want to review online learning resources to ensure acccessibility</u>

<u>Examples: a),</u>

The individual is charged with reviewing proposed electronic educational resources, including those from publishers of textbooks and developers of specific online instructional materials. The individual is evaluating not only for the instructional value of the subject matter but also to discern whether the resource will be accessible to those students with various disabilities. This individual may be an educator, special education specialist, member of the instructional support staff, or administrator.

<u>2) Attendees will want to refer students using online material to appropriate resources</u>

The individual is an online instructor or classroom teacher with a student who has a disability that hinders easy access to Web-based learning resources. The individual needs the knowledge to guide the student to the appropriate assistive technology solution or tools. The individual may guide the student to the appropriate solution for at-home use and/or on-capus use.

Supporting information:

▪ Our audiences often want to know where the resources and tools related to Web accessibility are located.

<u>3) Attendees will need to convert online materials, provide alternative materials</u>

The individual is an online instructor, classroom teacher, or instructional designer/technologist. The individual is working with a student with specific disabilities which are not currently accessible by the student. This requires either that the instructional materials being delivered by means of the Web be changed or else that a viable alternative to meet the needs of the student be found.

4) Attendees will need to speak with students (whether potential or current) and other faculty and staff to set expectations of online activity

The individual must understand the student experience in order to serve as an advocate for the student to request additional accommodations, or to identify activities are inappropriate. The individual will serve as an advocate for the student(s) to ensure that accessible Web-based resources and assistive technologies are provided in a seamless manner so as not to draw attention to the special needs of students. This individual may be an educator, special education specialist, instructional designer/technologist, administrator, or program director. Accommodations may be provided online, in the classroom, classroom computer lab setting, or in the home of the student.

Analysis of the Goals

- Attendees will need to personally review Web-based learning resources for accessibility rather than relying solely on publisher assurances and automated checking systems
- Dispel a misconception: When people talk about disabilities concerning Web accessibility, they tend to address the visual impairment only. (Applies to all scenarios)
- Need to comply to ADA/508 guidelines
- Need to help students with disabilities without embarrassing them

Orienting Context

The need for this instruction has been substantiated by the numerous professionals interviewed. Educators will be looking to gain further knowledge in the existence, recognition and availability of assistive technology for the disabled student. Designers will be looking to gain an understanding of the type of disabilities and solutions they can provide through their designs.

Instructional Context

Transfer Context

The concepts and skills learned in this instructional setting will prepare educators to return to their classrooms, virtual or otherwise, better prepared to guide their disabled students to resolutions with assistive technology solutions. The learners who will be involved with evaluation of textbooks and electronic support materials which come along with those textbooks will be able to recognize and look for cues of Section 508 compliance. This will help with more a informed selection process.

Audience Analysis

Morrison, Ross, and Kemp note that "It is essential…to give attention to the characteristics, abilities, and experiences of the learners – both as a group and individuals" (2004, p. 56). Attendees at this conference include a wide range of educational professionals who will need and use the content: high school educators, college and university educators, and instructional designers/technologists. While many educational conferences focus on the needs of and interests of one of these sectors, The Annual Conference on Distance Teaching and Learning at the University of Wisconsin – Madison draws faculty and staff from across sectorss,

their specific common attribute being that they are responsible for developing and/or evaluating Web-based instruction.

Process

The audience analysis follows the sources of information from the context analysis described above, using interviews and scenarios of use and variations on these scenarios to develop a profile of what characteristics the learners have in common. From these, as well as from the nature of the instructional context, we were able to identify three types of learner characteristics named by Morrison, Ross, and Kemp: general characteristics, entry competencies, and attitudes and motivation for attending this presentation.

Analysis:

According to our experts interviewed the learner will be looking for a learning environment to expand their knowledge and dispel misconceptions concerning students with disabilities and their use of assistive technology to access instructional content online.

General Characteristics

Molenda, Pershing, and Reigeluth (1996) "consider it essential to take into account the characteristics of the people to be trained, the learners" (p. 273). General characteristics are "broad identifying variables such as gender, age, work experience, and ethnicity" (Morrison, Ross, & Kemp, 2004, p. 57). The learners consist of faculty and staff from a variety of K-12 and postsecondary positions, though all will be resbonsible for the evaluation and/or creation of Web-based instruction. While there is incredible diversity in our group of learners, we can make two generalizations about them due to the nature of the conference:

1. The vast majority of learners will have a bachelor's degree and many will have one or more advanced degrees

2. Despite a diversity of position titles, pay scales, and levels of experience, all will have the creation and/or selection (and evaluations) of Web-based learning resources as a job responsibility or are exploring adding this as a job responsibility.

Learner Attitudes and Motivation

Based on interviews and the learner's ability to self-select attendance at this presentation from among other simultaneous presentations, we believe that the learners are motivated to increase their level of knowledge on the concept. Some learners will be attending to enhance their level of knowledge for personal growth or a sense of ethical commitment, while others will be attending in order to ensure or improve compliance with relevant legal or institutional accessibility standards. Interviews with our subject-matter experts also confirmed that an education conference is where the learners would look for this type of presentation and where they would expect to gain a foundational awareness of this issue.

Entry Competencies

Based on SME interviews and scenarios of use, our team believes that we can expect our learners to know the following:

- Learners will be broadly aware of the types of media that can be part of Web-based instruction.
- The learner will have knowledge of some challenges posed to the disabled student when trying to access instructional materials online, especially for students with sensory disabilities.
- The learners will be aware that some disabled students use assistive technologies to help them use the Web, and be aware the learners with limited vision make use of screen readers

• Learners will be aware that some regulations require them to provide materials that are accessible to all students.

Some learners, especially those with a K-12 or compliance background, will be aware of a broader range of disabilities, including challenges faced by students with learning disabilities. The team also expects that a significant number of the learners will also have some knowledge of specific regulations affecting their institution, such as Section 508 of the Rehabilitation Act, which requires federal agencies to make their electronic and information technology accessible to people with disabilities.

Content Analysis

Procedure for Content Analysis

Two procedures were used in content analysis for this presentation: topic analysis and learning-task analysis. In *Designing Effective Instruction*, Morrison, Ross, and Kemp suggest using topic analysis to uncover information about cognitive skills such as concepts. They describe the procedure as, "a designer working with the SME carefully reveals the first layer of information while looking for indicators of content structure (facts, concepts, principles, and rules). Once the structure is revealed, additional detail is gather for each structure, and new information appears as he or she digs deeper into the content" (2004, p. 80).

Gagne, Wager, Golas, and Keller, define the steps needed to complete a learning-task analysis. The learning-task analysis begins with the stated purpose of instruction and works backward to determine what information or intellectual skills enable students to fulfill the purpose (2005). These intellectual skills are then further sorted into those that are enabling (required to fulfill the purpose) and those that are supportive. Gagne et al note that, for the purposes of the learning task analysis, the stated purpose does not need to be a formally stated outcome or objective, just a broad statement about the instructional goal (2005).

Team member Richard Ruane served as a subject-matter expert. As part of duties to supervise course production for online programs in education and nursing at Kaplan University, Richard has trained on and implemented the 1999 Web Content Accessibility Guidelines 1.0 (WCAG 1.0) standards created by the World Wide Web Consortium's Web Accessibility Initiative (W3C WAI). In addition, the team conducted confirmative interviews with experts mentioned previously, especially Ludmilla Batista and Kathy Pease. Finally, the team closely reviewed documentation for the Section 508 guidelines from the U.S. Access Board and the draft documents for WCAG 2.0 from the W3C-WAI, as well as the University of Maryland University College's Accessibility in Distance Education Web site (2005).

Analysis of Content

As noted previously, the stated purpose of this presentation, "Disabilities Affecting Access to Web-based Instruction," is to ensure that students can identify which disabilities are likely to impair access to Web-based learning resources and how each is likely to impair access. The concept that this presentation will cover, disabilities affecting access to Web-based instruction, is a goal-oriented concept. According to Smith (1988), goal-based concepts emerge in an attempt to understand the conditions required to meet a goal – in our case, creating accessible Web-based content for disabled students. Thus, the characteristics we identify for the related subordinate concepts are those relevant to the overarching goal: each disability is a subordinate concepts that is characterized. The other related concepts cover knowledge that is prerequisite to understanding how the specific disabilities affect Web access.

Outline

Topic: Disabilities Affecting Access to Web-based Instruction

I.   Enabling Concepts

      a. Disability: A mental or physical impairment that substantially limits an individual's

ability to perform or continue performing a major activity of life, in our case,

hinders ability to access Web-based instruction.

b. Web Access: The user can perceive the content, interact with (navigate, operate

controls for, and enter input to) the content, and understand the content.

c. Impaired access: In reference to Web-based instruction or Web-based learning

resources, impaired access limits a users ability to perceive, interact with

(operate on), or understand Web content.

d. Types of Web content:

- Static: Content that does not require users to make decisions or operate

  interactive controls

  - Text

  - Audio

  - Video

  - Graphics

  - Animation

- Dynamic: Content which calls for or requires user input and/or otherwise

  responds to user operation.

  - Content-input forms

  - Interactive multimedia

- Contextual: Content that serves as a space for other static or dynamic

  content.

  - Frames

  - Windows

  - Inline frames

a. Assistive technologies: A technology selected by or provided to a learner to

supplement or replace the standard Web browser in accessing Web pages (and which may be used to provide access to other applications as well)

- Used by: Most commonly used by students with visual and mobility impairments, but may also be used by learning disabled students

- Software examples: Screen readers, speech recognition, user style sheets

  - User style sheets: User style sheets allow disabled users to change the appearance, especially font size, of the text on their screen.

- Hardware examples: Adaptive keyboards, adaptive pointing devices, Braille displays, Braille printers

- Responsibility: The primary responsibility of those selecting and creating Web-based learning resources is to prepare the resources so that they work correctly for students using assistive technologies or that alternate methods are available to those using assistive technologies

- Misconceptions: Assistive technologies eliminate problems for visually and mobility impaired students

II. Specific Disabilities (subconcepts)

a. Limited vision

- Fact: Limited vision users frequently use assistive technology (screen readers) to perceive Web resources

  o Principles:

    - Provide Web resources that can be read by screen readers or have font face and size adjusted by user style sheets

    - Provide code that presents text in a meaningful sequence

- Provide CSS instead of table-based layouts

- Provide ability to skip over complex navigation

- Provide clear labeling of navigational and content components

- Provide logical structure of headings and body content

- Fact: Assistive technologies may be unable to distinguish acronyms and foreign-language words from standard English words

  o Principle: Pages that cue screen readers of shifts in language and use of acronyms

- Fact: Assistive technology cannot interpret graphics or video without proper accompanying text or audio information (reliance on screen readers or non-graphical Web browsers)

  o Principle: Provide graphics that can be processed by screen readers or non-graphical browsers

  o Principle: Provide audio or text descriptions of actions occurring in a video, animations, or other multimedia presentations, for instance:

    - Alternate secondary soundtrack that describes actions

    - Textual cues available to screen readers

    - A complete "screen play" of the material available in the same location as the material

- Fact: Inability to see and type text in forms

  o Principle: Code forms to be read by screen readers

- Fact: Inability to see when specific actions cause a change in context (new windows popping up, frames changing content, content on page shifts)

  o Principle: Make actions that may cause contextual changes explicit

  o Principle: Take no actions on a form's content until a submit button is

pressed

b. Limited hearing

- Fact: Inability to hear some or all auditory material (audio files, music, sound effect-based cues)

    o Principle:

        - Provide redundant content in non-auditory formats, such as transcripts of auditory presentations

            - Redundant content must convey ALL information contained in the auditory material

            - Redundant content must convey ALL information conveyed in nonverbal cues

        - Provide synchronized captions for audio-visual materials

            - Captions must include important non-verbal information, such as noting presence of background music and important sound effects

        - Provide cues that do not rely *solely* on sound effects, such as chimes that indicate correct choices

c. Color blindness

- Fact: Unable to perceive color-based cues (such as hyperlinks)

    o Principle: Avoid cues that are *solely* color-based for hyperlinks and feedback (such as a red light for incorrect answers). Make sure a redundant cue (other formatting, text, a recognizable graphic) that does not provide cue is available.

d. Limited mobility

- Fact: Unable to move or at least execute fine movements

- Fact: May use keyboard only for navigation

    o Principles:

        ▪ Avoid need for fine maneuvering to make selections

        ▪ Create resources that permit keyboard navigation

- Fact: May not be able to operate Web-based applications quickly, especially Web-based assessments:

    o Principle: Web-based assessment applications that clearly indicate time allowed and that permit *unnecessary* timing mechanisms to be disabled

- Fact: May rely on assistive speech-recognition software for navigation or input

    o Principle: Create pages that allow for speech input for interaction.

e. Learning disabilities and ADHD

- Fact: Perceptual and processing disadvantages with specific types of cognitive content, especially with text

    o Principles:

        ▪ Use redundancy in content presentation - Media, text, and graphics that reinforce complex content across multiple channels

        ▪ Provide access to information on challenging words and acronyms

            • Code that links to glossaries and identifies the meaning of acronyms

        ▪ Provide content that avoids *unnecessary* levels of verbal or mathematical complexity or has supplementary material to

reinforce complex sections

- Fact: May have trouble when entering data or manipulating Web resources under time constraints
    - Principle: Use Web-based assessment applications that clearly indicate time allowed and that permit *unnecessary* timing mechanisms to be disabled
- Fact: Students struggle with high-volume information, especially when disorganized
    - o Principle: provide Web resources that cue students to visually separate and organize the information
- Fact: Some students with learning disabilities may be using adaptive technologies
    - o Students with reading disabilities (such as dyslexia) may use similar adaptive technologies to visually impaired students
    - o Students with learning disabilities, especially students mathematical disabilities (such as dyscalculia), may use calculators or other assistive technologies in assessments
        - Principle: Web-based assessment applications that allow disabled learners to use of appropriate assistive technologies (i.e. dictionaries, calculators, etc.) – avoid locking down computer desktop
- Fact: ADHD students and some learning disabled students will be distracted by animated or flashing objects, especially those meant to draw attention.
    - o Principles:
        - Flashing or animated objects meant to draw attention need to

           stop moving/flashing after 3 seconds

- Provide ability to stop or pause ongoing animated objects

f. Photosensitive epilepsy

- Facts: Objects flashing at particular rates and/or colors may trigger seizures

  o Principles: Flashing objects should conform to the most restrictive current version of relevant guidelines

    - Section 508 guidelines

    - State regulatory or institutional guidelines

    - WCAG 2.0 draft guidelines – currently most specific, though completely non-binding

References

Center on Education and Work at The University of Wisconsin at Madison (2002). Web

accessibility for all. Retrieved September 24, 2006 from the Center on Education and

Work Web site: http://www.cew.wisc.edu/accessibility/abstract.htm.

Gagné, R.M., Wager, W. W., Golas, K.C., & Keller, J.M. (2005). *Principles of instructional

design* (5th ed.). Belmont, CA: Wadsworth.

Molenda, M., Pershing, J. A., Reigeluth, C. M. (1996). Designing instructional systems. In R. L.

Craig (Ed.), *The ASTD training and development handbook* (4 ed., pp. 266-293). New

York, NY: McGraw-Hill.

Morrison, G.R., Ross, S.M., & Kemp, J.E. (2004). *Designing effective instruction* (4th ed.).

Hoboken, NJ: John Wiley & Sons.

U.S. Access Board (2000). Electronic and information technology accessibility standards

(Section 508). Retrieved September 23, 2006 from the Access Board Web site:

http://www.access-board.gov/sec508/standards.htm.

University of Maryland University College (2005). Accessibility in distance education: A resource

for faculty in online teaching. Retrieved September 22, 2006 from the UMUC Web site:

http://www.umuc.edu/ade/index.html.

World Wide Web Consortium (April 27, 2006). Web content accessibility guidelines 2.0: W3C

working draft. Retrieved September 23, 2006 from the W3C Web site:

http://www.w3.org/TR/2006/WD-WCAG20-20060427.