

Adaptive Course Design for WBI

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Abstract

Recently, with the popularization of end devices such as computer, mobile, and table PC, increasing number of web designers and developers recognize the importance of Web Standard. There are numerous advantages, inclusive of enhancing website maintenance and ensuring accessibility. The related techniques are not only cozy for people with disabilities such as visually impaired, but ease mobile access to web content. Because of mixed-ability grouping in physical classroom, it is constructive to exploit the updated functions of HTML5 or CSS3 for online course design, as to accord cognition style adaptively. By analyzing example website shows that completely separating layers into structure, show, logic and data are effective and practicable. We also find out jQuery Mobile could be a useful tool for web re-design on mobile devices.

Keywords: *Web Accessibility, CSS3 speech, nonverbal communication*

1. Introduction

1.1 Objective and Significance

In the first decade of the 21st century, secondary school in Taiwan with the adoption of mixed-ability grouping was one of the main policies of education. Beyond traditional curriculum, Web-based Instruction (hereafter use “WBI”) has become extension of physical classroom, for the hypermedia is helping to realize the individual learning.

For technology implementation is relevant to teachers’ information literacy 、 media creativity 、 social competence and responsibility. Mentioning to on-line classroom, open source accords to the principle technological minimalism, and not only dynamic effect but interaction are available. Content Management System(CMS) is useful tool, however, it’s necessary to possess know-how of program while customization[Martinez and Jagannathan 2008].

1.2 Listening model

Listening plays the vital role in daily communication. In academic setting, comparing to speaking 、 reading 、 writing, listening is the first acquired skill in language learning; Study of time spent communicating shows that students in secondary school listen for as much as 67% of their day[Swanson 1984]; core preparation for graduates to enter workplace includes listening skill.

The listening process is in a sequence of behaviors : receiving; attending; perceiving; interpreting; and responding. Not audio-only stimuli but other senses such as visual channel 、 smell 、 taste 、 and touch impact the listener’s .presence of receiving. Span and energy of attention influence a listener’s ability to attend significantly. As Fig.1 shows, it is obviously that listening behavior is complex—the dimension probably occur in sequence or in simultaneity, and the core of every stage of this process are communication influencers[Wolvin 2012].

Research of listening focused on key influencers — physiological, psychological, and contextual. Age and gender bring differences in attention styles and cognitive processing styles. Attitudinal state effects the willing to listen, while it depends on both communication apprehension and listening preferences. Four identified listening styles (people-oriented, content-oriented, action-oriented, time-oriented) [Watson et al. 1995], and listening type , personality style, etc. are variables to enhance or impede effective listening. Roles, culture and time are contextual influencers shaping the listening experience.

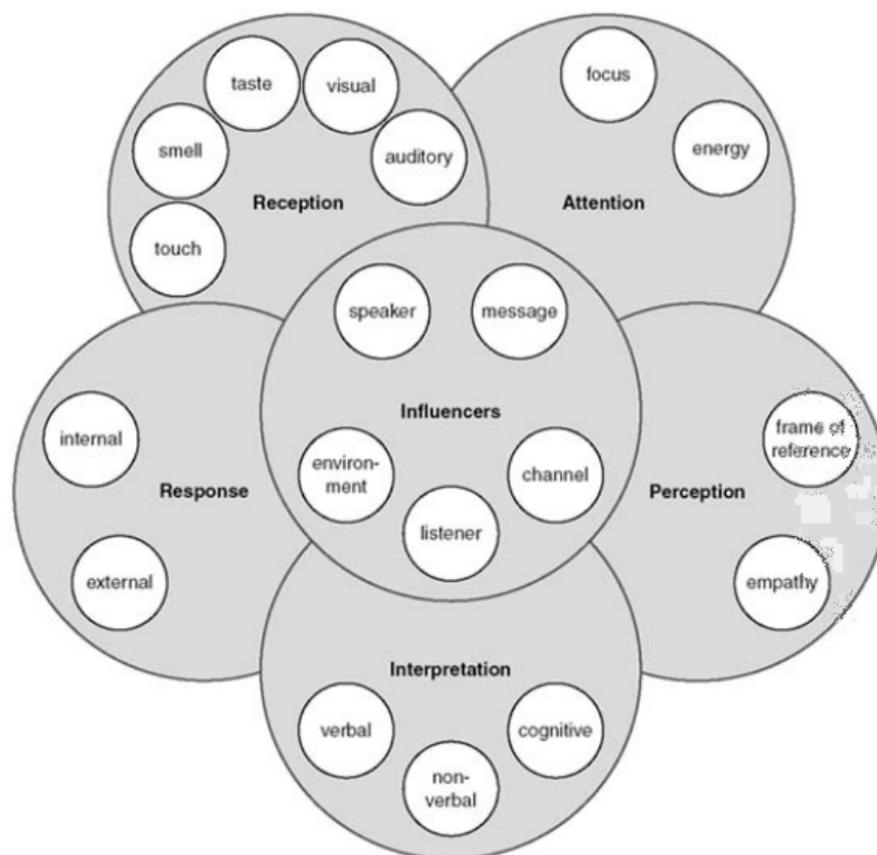


Fig.1 : Listening Model (Wolvin, 2012)

Generally we access the WWW or Internet visually, while navigation by voice is helpful when walking or driving. Voice-based user interface provides alternative to access information for especially the visual impaired[Zhu et al. 2010]. Besides of disable permanently, resulting from cognition or physical injury temporally, assistive technology is essential. And further, the impact from rapidly aging world[Zhou et al. 2012]. As a result, we discuss the aural presentation in application of course design for WBI, and choose the basic music theory as the digital material. In order to promote the capacity of secondary school's students who cannot read score, the digital material include theory skills and ear training, combination with visual and aural elements.

2. Related work

2.1 Verbal and Nonverbal communication

Listening is a critical factor in academic success. With the diversity of situation, the interaction between speaking and listening is one of the most complex human behaviors. Features such as timing to speak, pitch, pet phrases, and so on which are not relevant to colloquialism itself directly are critical clues for comprehension in communication. In other words, either what you say or how you say it is important and parallel. The related researches of paralanguage[A.Hall 1992] include level and change of pitch, level and change of volume, speed, rhythm, length of the sound, pause、resonating voice, precise or vague pronunciation, speak inserted dummy words (like “ah”), take turns and tacit response in conversation.

Because of judgment from paralanguage stimuli, it attributes to personality or

emotion[Argyle 1998]. Users will infer the social role by interacting with computers. This is why almost talking machine (like GPS) take the female voice as the default voice prompts. Stereotypes that female is relatively no-threatening exist in people's minds, and affect the social perception. However, older adults prefer natural male voice as the navigation aid on PDA because for understanding more easily[Goodman et al. 2005]. Proper length and speed of audio navigation aids should be applied, too. Fig.2 displays the location of some style properties from CSS3 speech model[Chung 2011].

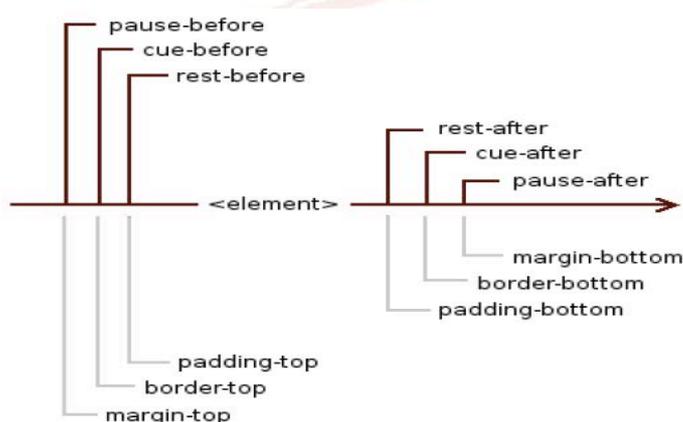


Fig.2

2.2 Auditory User Interface (AUIs)

In the field of HCI there have been documented that AUIs such as earcons, auditory icons, soundtrack, and so on accord to acceptance and usability. The functions, for example, are attracting attention, diminishing the amount of information on the screen, and helping the visually disabled or textually illiterate to navigate or access the information on the websites[David Benyon 2009]. Besides, elderly-specific or no screen phones demonstrate the speech-to-text technology. For ordinary people, auditory modality may be important in multitask environment[Fickas et al. 2008]

2.3 Web Accessibility

Designing and building web with normative specifications of technologies and methodologies bring numerous advantages, principally to promote accessibility of more people and more types of mobile devices. By an investigation from Opera of 2008, more than 95% that websites had useless tags and codes. Ignoring web standards results in slower download speed, deficient appearance, poor functionality, etc.. In contrary, with standard compliance ensure user experience, access to content, menu usability, and predictable behavior. Moreover, accessible techniques improve the overall quality of websites.

Assistive technology(AT) refer to devices or tools that using for web browsing by people with disabilities, such as screen reader is for the visual impaired. Due to voice modality, design strategy should involve these two groups simultaneously while authoring content[Sikos 2011]. Distinguishing layers of content, structure, presentation, and behavior is effective and practicable.

3. Materials and Methods

3.1 analysis

First step is to analyze "teoria", an award-wining web site about music theory, for it providing exercises versions to PC and mobile individually. The mobile

version(<http://www.teoria.com/mobile/index.php?l=en>) have 4 levels hierarchical menu : index/options/exercise/end or reset. Taking the second level of deep menu for analysis and it's file construction can be separated to four layers, as Table 1 shows :

Table 1 : file construction

Layer standards	file	Function
structure <i>XHTML1.0</i>	clef.php	XHTML file of substance
presentation <i>CSS2.1</i>	mobile.css	CSS file of wrapper
logic <i>Javascript jQuery</i>	jquery.min.js Note.js Interval.js clef.js clef_exe.js StaffView.js notePanel.js commonPanel.js common.js ClefOptins.js	Three kind of choice to choose clef, notes over, and show notes in group by putting a check
content <i>text image audio</i>	options.gif back.gif clave-(7 types) (below are excluded)	Images of clefs and bottoms

3.2 re-design for mobile devices

Through the test of mobile version pages on a 3.5 inch smart phone, we found that it's necessary to magnify the pages. In consequence, we adopt jQuery Mobile to develop a Mobile HTML Application for re-designing. It's a framework based on jQuery, using Markup-driven to set and layout UI, and cross-platform. The execution environment for jQuery Mobile is :

- Opera Mobile Emulator(see Fig.3)
- Server2Go
- jQuery Mobile

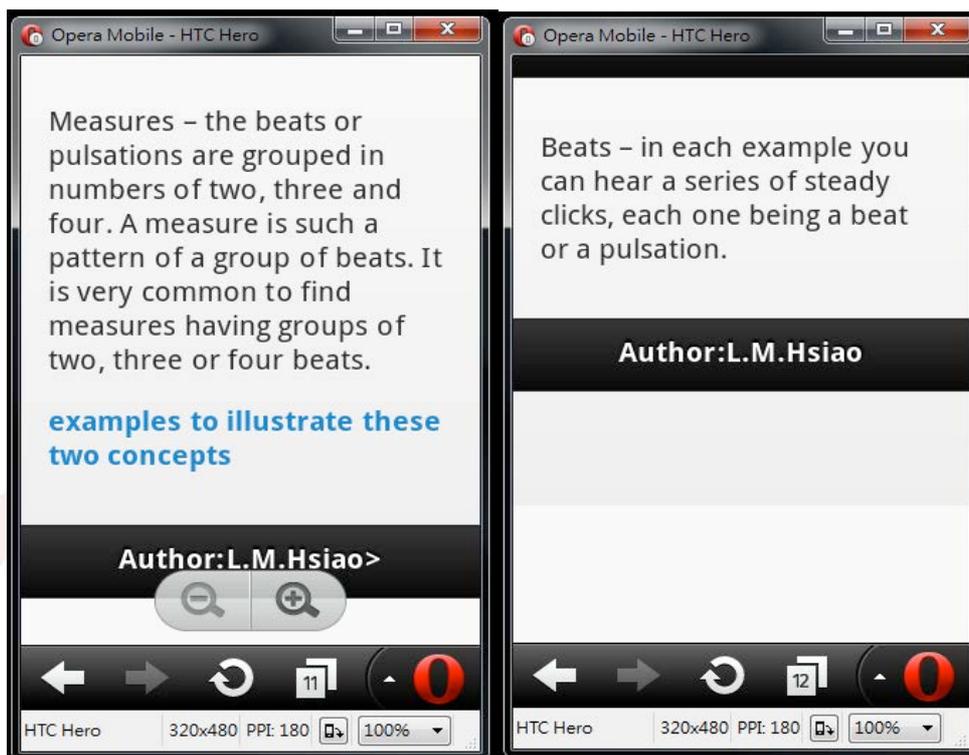


Fig.3

4. Summary and Discussion

Previewing web pages on mobile emulator can confirm the usability about input, output, menu, and part of functions. Referring to the realization of aural navigation, combination of PhoneGap and jQuery may facilitate accessibility for PhoneGap API on Capture, Media, and Notification. These provide function to scratch multimedia data, play or record audio file, attract users' attention by sensory acuity of auditory, visual, or tactile. In another way, Screen Reader such as aiBrowser is useful to simulate voice-based navigation on PC, though learning curve exists and time costs. In practice PC is more available than handheld computers for students in secondary schools.

In addition, the emerging HTML5 provides new functions or upgrade ones, especially with the new tags about local multimedia content <audio>、<video>. Under development of Web Standards imply the power of the web is in its universality and potential in online entertainment, education,, and so on.

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