The Accessibility of Web-based Lessons During the Time of the COVID-19 Pandemic

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Abstract
In this age of content digitalization, equal access to web-based learning resources is important as it contributes to providing all students with same opportunities to pursue their learning and career goals. With the current circumstance, the outbreak of the Covid-19 pandemic has forced most governments in the world to temporarily close educational institutions of different levels, which is now influencing roughly 70% of the global learner population. Therefore, there has been an unprecedented worldwide shift from face-to-face to online modes of teaching and learning. At this stage, it is looking increasingly likely that the issue of web accessibility in online education is more crucial than ever. This paper reports on an analysis of a real online lesson for students who are doing their Master's degree at an Australian university. The analysis aims to describe the lesson that relies on a blend of text, audio-visual resources, links, and hyperlinks that usually poses certain obstacles related to perceiving and understanding the content to the students, especially those with vision and hearing disabilities. Then, it continues to analyze and evaluate the accessibility of the lesson using Web Content Accessibility Guidelines (WCAG) 2.1, which have been proposed by the World Wide Web Consortium (W3C). Some recommendations for improving the accessibility of the lesson have also been made to benefit and reach the widest audience.

Keywords: Accessibility, Disabilities, Web-based Lessons, Web Content Accessibility Guidelines (WCAG) 2.1, COVID-19

Introduction

Web accessibility aims at creating a barrier-free online environment in which all users can be fully engaged regardless of their different backgrounds and levels of disabilities (Rao et al., 2015). When it comes to educational concerns, Kurt (2019, p. 207) takes the view that equality of access to the web and learning resources is of great significance in that it is considered to be a "non-negotiable requirement" that contributes to providing all students with same opportunities for pursuing their learning and career goals. As regards the current circumstance, the outbreak of the COVID-19 pandemic across 188 countries (the British Broadcasting Corporation News, 2020) has forced most governments in the world to temporarily close educational institutions of different levels, which is now influencing roughly 70% of the global learner population (UNESCO, 2020). As a result, there has been an unprecedented worldwide shift from face-to-face to online modes of teaching and learning. At this stage, it is looking increasingly likely that the issue of web accessibility in online education is more crucial than ever. Therefore, this paper aims to describe an online lesson that relies on a blend of text, audio-visual resources, links, and hyperlinks that usually poses certain obstacles related to perceiving and understanding the content to the students, especially those with vision and hearing disabilities (Pearson & Koppi, 2002). Then, it continues to analyze and evaluate the accessibility of the lesson using WCAG 2.1, which have been proposed by W3C. The paper ends with some recommendations for improving the accessibility of the lesson so that it can benefit and reach the widest audience.

Brief Description of the Lesson

The lesson covered in this analysis is *Topic 10: Text-based Syllabus Design* (see Figure 1), which was selected randomly for analysis. Firstly, it belongs to the unit of *APPL6010 – Planning and Programming in TESOL* (see Figure 2), which covers fundamental aspects of language teaching: various English language teaching (ELT) contexts where TESOL is conducted, different methods and approaches to ELT, and TESOL lesson planning and testing and assessment practices. Next, the lesson is particularly aimed at Macquarie University students, including the author, who are doing their Master's degree in Applied Linguistics and TESOL and have some relevant prior qualifications or working experience in areas of linguistics, language teaching, education, and whose English should be at advanced levels (academic IELTS of 6.5 or equivalent) (Macquarie University, n.d.). Finally, this lesson offers the students a chance to learn what "approach" and "design" are, explore genre-based approach that provides a specific way of organizing teaching content, and adopt the teaching-learning cycle to analyze a given lesson plan, and practise developing lesson plans that are appropriate for certain groups of English learners.

Figure 1. Interface of the Lesson of Topic 10: Text-based Syllabus Design.

Figure 2. Interface of the Unit of APPL6010 – Planning and Programming in TESOL.

Short Overview of WCAG 2.1

In "intra-period digital pedagogy" (Crawford et al., 2020, p. 1) response to the COVID-19 pandemic, the lesson of *Topic 10: Text-based Syllabus Design* has been delivered fully online

via iLearn, the online learning environment of Macquarie University, since March 30th 2020 (Macquarie University, 2020). Therefore, it is practical to utilize WCAG 2.1, which is a set of design principles, guidelines, success criteria (SC) for checking web accessibility, and techniques for creating and making web-based content more accessible and usable to all users (W3C, 2018), to analyze and evaluate the lesson. According to White (2019), the W3C, which is an organization responsible for web technology regulation and evolution, has developed and published three versions of their guidelines that have proven invaluable and attained wide recognition among specialists. In 1999, the W3C launched the first version that was WCAG 1.0, which dealt with simplest websites containing text (Murley, 2008). However, due to the advent of multimedia and diverse access platforms, in 2008, WCAG 2.0 was released to create accessible web content for people with disabilities related to sight, hearing, cognition or mobility (Ochoa & Crovi, 2019). Eventually, WCAG 2.1, the latest version at the time of conducting the analysis, was published in 2018 with a view to satisfying further requirements of people who suffer from low vision and rely heavily on mobile and touch-based devices (White, 2019). In general, these guidelines are categorized into four central principles of accessibility as shown in Table 1.

Table 1. Web Content Accessibility Guidelines 2.1.

Web Content Accessibility Guidelines 2.1				
No.	Principle	Guideline	SC	Intent
1	Perceivable	Text alternatives	1	Provide text alternatives for any non-text content
		Time-based media	9	Provide captions and alternatives for audio-visual content
		Adaptable	6	Create content that can be adaptable or presented in different ways (simpler layout) without any information loss
		Distinguishable	13	Make content easy to see and hear by using appropriate contrast
2	Operable	Keyboard accessible	4	Help users interact with content via a keyboard
		Enough time	6	Offer users enough time to read and use content
		Seizures and physical reactions	3	Do not create content that causes seizures
		Navigable	10	Help users navigate and find content with ease
		Input modalities	6	Help users operate functionality through various inputs beyond keyboard
3	Understandable	Readable	6	Make text content readable and understandable
		Predictable	5	Make content operate in predictable ways
		Input assistance	6	Help users avoid and correct mistakes
4	Robust	Compatible	3	Make content compatible with various access platforms and users

Accessibility of the Lesson

As mentioned in the previous part, WCAG 2.1 is developed and utilized widely among practitioners, hence it consists of many technical terms related to computer science, information technology and code writing. Although the current analysis of the lesson is conducted in accordance with WCAG 2.1, particularly the four key principles, it is largely based on some success criteria that sound more familiar to the general public and do not require

much specialist knowledge instead of covering all of the success criteria included in WCAG 2.1. Due to the limited space, only significant results are presented in the subsequent parts. However, the complete analysis and results can be found in the Appendix. There will not be grades of 'Pass' and 'Fail' that are suggested by W3C (2018). Instead, the analysis aims to show the positive aspects of the lesson and indicate room for any improvement.

1. Perceivable

In general, the lesson is <u>adaptable</u> and <u>distinguishable</u> in that it ensures the students can see, recognize, or hear the lesson content. The adaptability of the lesson is realized by a meaningful sequence that offers the students a sense of smooth and effective organization. In fact, the lesson is structured into four main parts that are introduction, reading lists, lecture materials and learning tasks. Besides, this sequence is consistent with the lecturer's instruction in the introduction part and can be observed in the other topics in the unit, which aids both the lesson and unit in making logical sense (see Figure 3). Next, the lesson is distinguishable with regard to proper use of color and contrast, effective visual presentations, and text resizing. Firstly, red is consistently employed to signal all the links to lecture materials. In addition, text is written in black against a white background, which is proven to be adequate contrast that helps people with moderately low vision and color deficiencies (W3C, 2018). Secondly, the lesson is presented in such a visual way that makes the lesson legible. More precisely, texts are arranged in chunks according to their role and content, which enables the students to scan the lesson without difficulty. White space is utilized successfully to create clear grouping and indicate where each chunk of text begins and ends (see Figure 1). Moreover, salient information is presented in italic and bold type and larger sizes (headings). Also, the choice of font contributes greatly to the perceivability of the lesson. The observation is that text is written in the San Serif font like Arial, Calibri and Helvetica, which greatly contributes to more efficient reading and less consumption of readers' limited attention span, rather than the Serif font, which contains "extraneous decorative elements" (Tetlan & Marschalek, 2016, p. 77). Finally, when the lesson is resized up to 200%, there is no information loss or truncated, hidden content, which means that the students are not required to scroll horizontally to read a text line on a full screen window (see Figure 4).

Figure 3. The Structure of the Lesson.
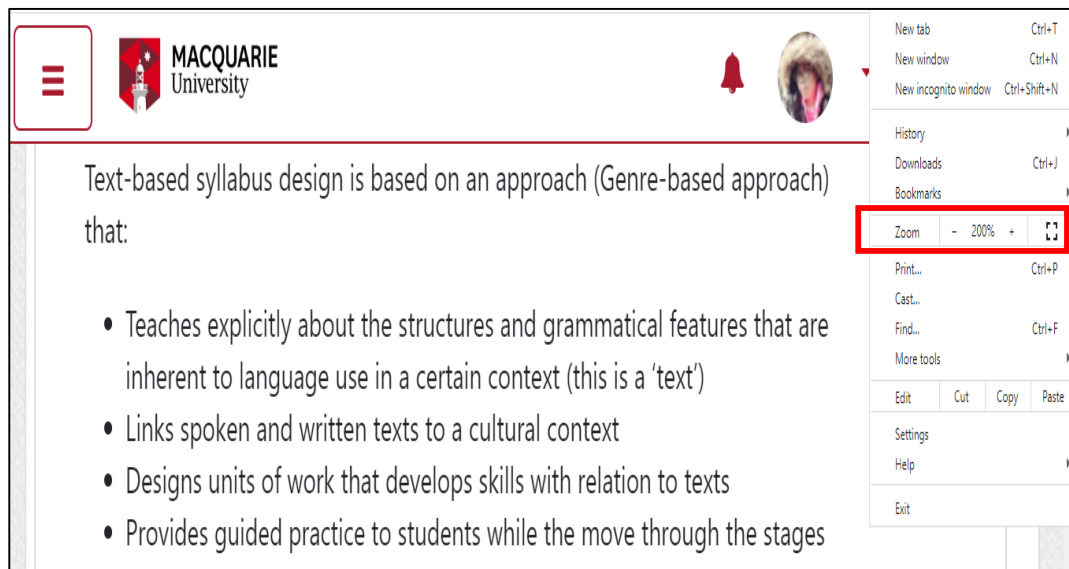
Figure 4. The Interface of the Lesson When Resized up to 200%.

2. Operable

The online lesson is operable in that the students can use a <u>keyboard</u> to operate the lesson, <u>re-authenticate</u>, <u>easily navigate</u> within the lesson, and <u>avoid seizures</u>. To begin with, keyboard control is believed to be one of the most important success criteria and come into major focus of web developers (W3C, 2018). In fact, the students can employ 'Tab' and 'Enter' or the spacebar to move between and interact with the interactive elements of the lesson like the drop-down list or play-video buttons, respectively. Furthermore, there is no keyboard trap in that the students can escape an interactive element like the introduction video without resorting to a mouse via pressing 'Shift' and 'Tab' simultaneously. Secondly, the lesson sometimes expires due to student inactivity. However, the students can continue the learning without any loss of data after re-authenticating. A good example is Leganto, an online reading resource. When the students are deeply engaged in reading the materials and remain inactive in the platform for roughly one hour, their session expires. In this case, there is a message box appearing on the screen and requiring them to re-authenticate to continue (see Figure 5). Next, the lesson is navigable in that it has a meaningful title, and descriptive headings and labels that reflect their content. Hence, the students can find the content easily without visual reference and better locate themselves within the lesson. Additionally, inside the part of learning tasks that contain several true/false questions and a forum is the table of contents that assists the students in easily navigating between smaller sections (see Figure 6). Lastly, owing to the absence of flashes, animations, advertisements, and auto-playing audios or videos in the lesson, the students are not exposed to any seizures and physical reactions, which results in better learning experience.
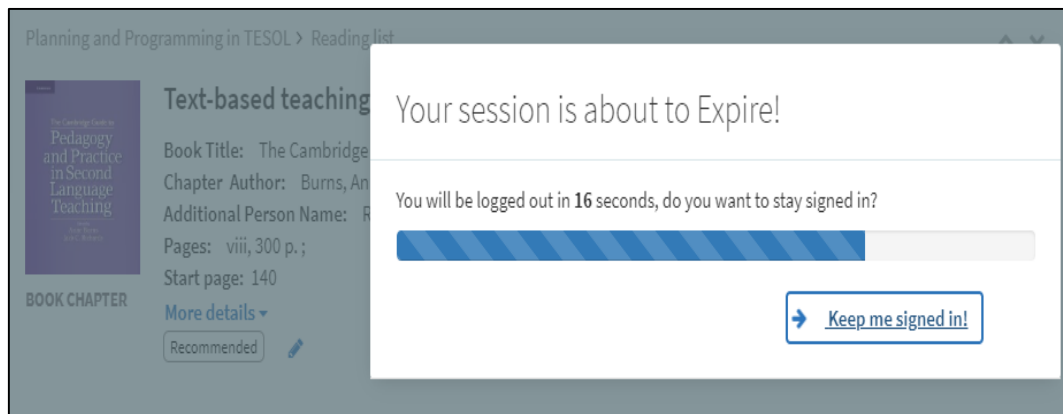
Figure 5. A Message Informing the Students of Session Expiring.
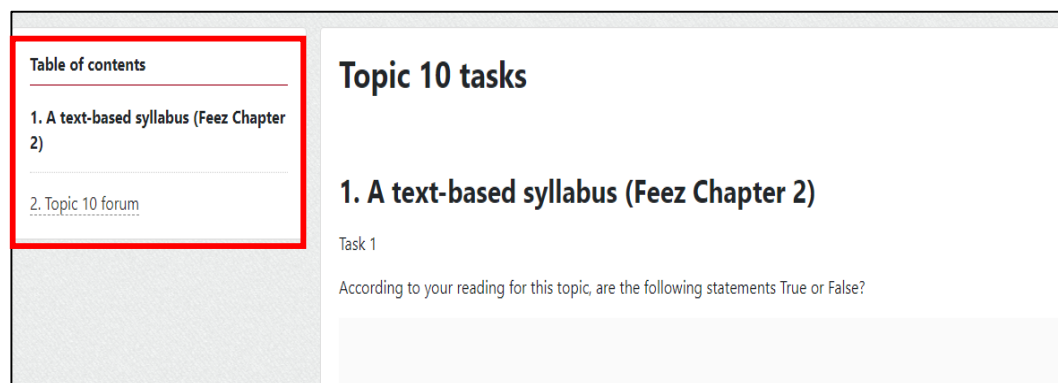
Figure 6. The Table of Contents in Topic 10 Tasks.

3. Understandable

The understandability of the lesson is realized through the use of plain English, consistent identification, and input assistance. Firstly, it is clear that the default language used in the lesson is plain English that features short sentences and paragraphs, clear chunks of text and adequate white space, which helps every user read and understand content quickly and easily (Centre for Inclusive Design, 2020) (see Figure 7). In addition, there is almost an absence of unusual and restricted ways of using words, except for some jargon such as 'behaviorism' and 'constructivism' (in the lecture slides), abbreviations like 'TESOL' and 'ELT' (in the lecture notes). Nevertheless, the jargon and abbreviations do not cause much obscurity because the audience of the lesson is graduate students who have specialist knowledge. Secondly, there is consistent identification with the same lesson structure and design of headings (a symbol of a book indicating the reading lists) throughout the whole unit. Therefore, this practice makes it easy for the students to follow the lesson and predict the content of each part. Finally, the lesson aids the students in providing input via error identification. For instance, when the students enter an incorrect password, there will be a message appearing and informing them of the error (see Figure 8).

Script: Hello. In this week, our focus moves on to a specific way of organising lesson content: the text-based syllabus and genre-based teaching. We are going to look at how this new approach fits into the approaches we have seen before; for example how it compares to Audiolingualism or Communicative Language Teaching. This kind of lesson planning – and you will see later, unit planning as well - provides systematic support as it guides students through the stages of learning. Your tasks include covering the set readings, watching and analysing a video and analysing a lesson plan.

Text-based syllabus design is based on an approach (Genre-based approach) that:

- Teaches explicitly about the structures and grammatical features that are inherent to language use in a certain context (this is a 'text')
- Links spoken and written texts to a cultural context
- Designs units of work that develops skills with relation to texts
- Provides guided practice to students while the move through the stages

In this topic, the following order of activities has been set:

1. Do the reading
2. Cover the lecture materials (video, or slides with lecture notes)
3. Complete the lecture tasks and post your answers in the Forum on the second page of the Topic 10 tasks activity

Unit outcome 5: Develop lesson plans appropriate for specific groups of language learners

Figure 7. An Example of Using Plain English in the Lesson.

📁 VIDEO

As part of your lecture tasks, complete the worksheet that you have started filling in (Topic 4). **Post your answers in the Topic 10 tasks forum, please.**

mq1234

Password Required
If you've got it, enter it below.

••• **Watch Video**

Uh oh. There was a problem. Please try again.

vimeo
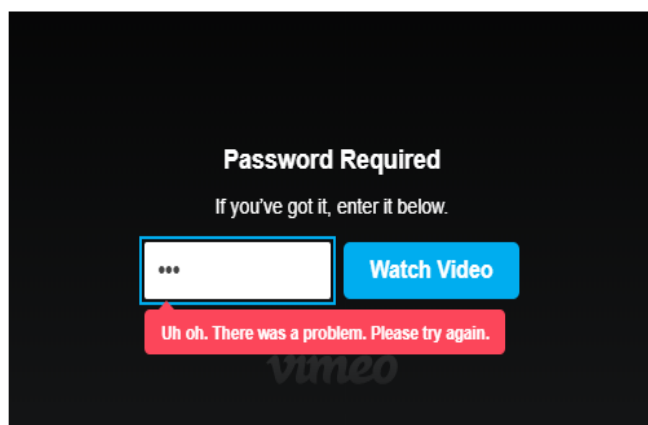
An example of a teacher implementing the Teaching/Learning Cycle in an Australian primary classroom.

Figure 8. A Message Informing the Student of the Error.

4. Robust

The robustness of the lesson is demonstrated by both interface components that have compatible name, role, and value and access stability across various devices. First, an object needs to have a name or label. The role and value provide users with information about how the object functions and what its state is, respectively (W3C, 2018). In the case of this lesson, the success criterion of name, role, value can be applicable to the button and links. For example, the name is 'Topic 10: Text-based Syllabus Design'; the role is a button and the value is 'collapsed' but 'not clicked' (see Figure 9). These interpretations tend to remain compatible among a wide range of students. Second, the lesson can be reliably operated across various devices like laptops, tablets, and mobile phones. Despite some minor changes in the interface, the button and links are still in good size and function well when clicked on.
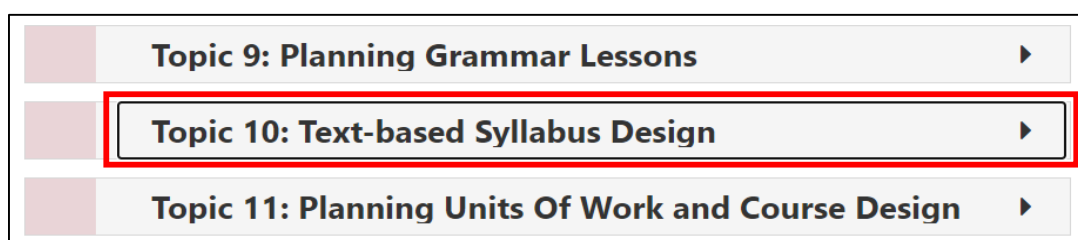
Figure 9. The Name, Role, Value Of The Button Topic 10: Text-Based Syllabus Design.

Recommendations

As far as accessibility is concerned, despite the above-mentioned success in helping the students participate actively in the online space, there are three aspects that need to be considered to make the lesson more usable and accessible to the students in terms of alternative formats of content and organizational issues. A brief summary of the recommendations can be found in Table 2.

Table 2. Recommendations for Improving the Accessibility of the Lesson.

Principle	Guideline	Recommendation
Perceivable	Text alternatives	- Provide short descriptions reflecting what is seen for pictures, diagrams, and tables in the lecture slides.
	Time-based media	- Provide a downloadable or accessible transcript with the pre-recorded lecture and the video. - Use tools like YouTube, Apple Clips and Amara to generate captions.
	Adaptable	- Organize the reading materials into different folders based on the topics in Leganto.
Operable	Navigable	- Provide links next to the reading materials.
Robust	Compatible	- Create materials in both Word and PDF formats.

Firstly, Kurt (2019) believes that educational content that is presented visually, orally, and textually can enhance accessibility in that the students have the opportunity to select the format that is the most accessible to them. However, apart from the introduction video accompanied by a script (see Figure 10), the pre-recorded lecture and the teaching-learning cycle video do not have any captions or scripts. Moreover, no description accompanies pictures and diagrams used in the lecture slides. These practices pose barriers to students with sensory and cognitive disabilities (Kurt, 2019). In other words, they may not see or hear what is presented. To address

these issues, it is suggested that the lecturer should provide a downloadable or accessible transcript with the pre-recorded lecture and the video (Sokolik, 2018). Additionally, there are useful tools that generate captions for uploaded videos, three of which are YouTube, Apple Clips and Amara (Centre for Inclusive Design, 2020). As for pictures, diagrams and tables, short descriptions reflecting what is seen should be included.
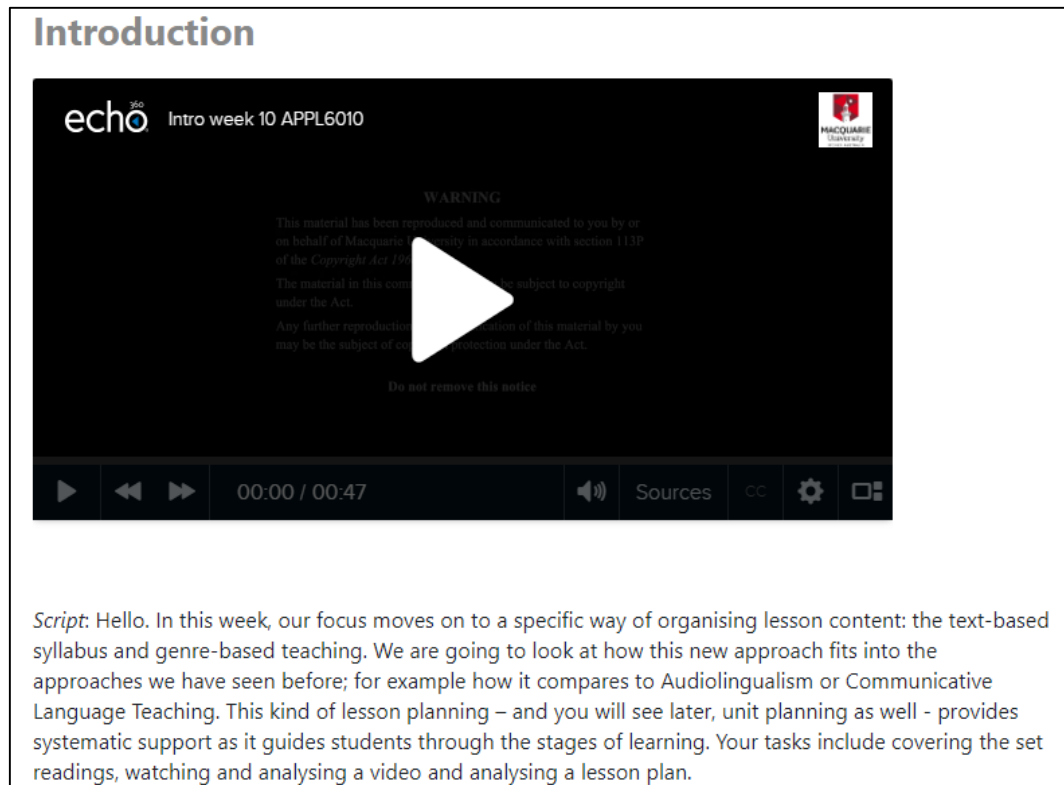
Figure 10. A Script Accompanies the Introduction Video.

Secondly, the observation is that most lecture materials are in form of PDFs that cannot always be compatible with screen reading software, which is a disadvantage for students with vision impairments (Pearson & Koppi, 2002). Therefore, it is advisable to create downloadable materials in both Word and PDF formats. Finally, regarding the reading list, there should be a link to the suggested reading under each item so that the students can gain direct access to the sources (see Figure 11). Moreover, reading materials in Leganto should be organized into different sections or folders so that the students can easily find what they have to read for each topic (see Figure 12). For example, all the reading needed for topic 10 can be found in the section titled Topic 10: Text-based Syllabus Design.
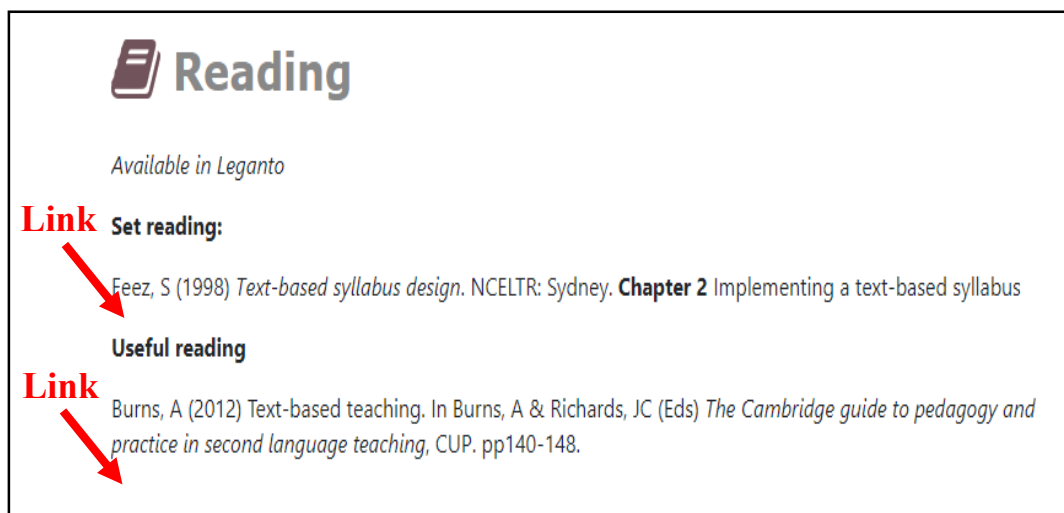
Figure 11. Example of How to Add Links to the Reading Materials.

Figure 12. The Interface of Leganto.

Conclusion

The goal of this paper is to critically analyze the accessibility of the lesson *Topic 10: Text-based Syllabus Design* in the unit of *APPL6010 – Planning and Programming in TESOL* in accordance with WCAG 2.1. The results indicate that the lesson in general is perceivable, operable, understandable, and robust. The greatest strengths of the lesson include using a meaningful sequence to organize the teaching content, employing colors and white space properly to create sufficient contrast, and featuring plain English to aid the students' comprehension. Nevertheless, there are some aspects to which the lecturer needs to pay attention with the aim of improving the accessibility of the lesson. Practices like providing brief descriptions for pictures and tables, creating captions for prerecorded lectures, organizing the reading materials into folders are believed to be advantageous to students with hearing or visual impairments. This analysis may be relatively subjective due to reliance on the author's perception and interpretation of WCAG 2.1. However, it can be useful for the lecturer or lesson designers to refer to the analysis as a reference with a view to examining and enhancing the accessibility of the lesson for later use.

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Appendice

Complete WCAG 2.1 Analysis and Results

Topic 10: Text-based Syllabus Design					
Principle	**Criteria**	**Not applicable**	**Good**	**Not good**	**Explanation**
PERCEIVABLE	**1.1. Text alternatives**				
	1.1.1. Non-text content			√	No descriptions for images and diagrams used in the lecture slides
	1.2. Time-based media				
	1.2.1. Audio-only and video-only (Pre-recorded)	√			No audio-only and video-only resources
	1.2.2. Captions (Pre-recorded)			√	No captions available for the pre-recorded lecture and the video, except the script for the introduction video
	1.2.3. Audio description or Media Alternative (Pre-recorded)	√			No resources of these kinds found
	1.2.4. Captions (Live)				
	1.2.5. Audio Description (Pre-recorded)				
	1.2.6. Sign language (Pre-recorded)				
	1.2.7. Extended audio description (Pre-recorded)				
	1.2.8. Media alternative (Pre-recorded)				
	1.2.9. Audio-only (Live)				
	1.3. Adaptable				
	1.3.1. Info and relationships	√			Technically related
	1.3.2. Meaningful sequence		√		The lesson structure consistent with the lecturer's instruction

		Not applicable	Good	Not good	
	1.3.3. Sensory Characteristics	√			No resources of this kind found
	1.3.4. Orientation				Technically related
	1.3.5. Identify Input Purpose	√			
	1.3.6. Identify Purpose				
	1.4. Distinguishable	**Not applicable**	**Good**	**Not good**	**Explanation**
	1.4.1. Use of color		√		Red indicates links
	1.4.2. Audio control	√			No automatically playing audio
	1.4.3. Contrast (Minimum)		√		Black words presented on a white background
	1.4.4. Resize text		√		No information loss when resized up to 200%
	1.4.5. Images of text	√			No resources of this kind found
	1.4.6. Contrast (Enhanced)	√			Technically related
	1.4.7. Low or no background audio	√			No resources of this kind found
	1.4.8. Visual Presentation		√		Clear chunks of text, italic and bold type for important information, white space
	1.4.9. Images of text (No exception)	√			No resources of this kind found
	1.4.10. Reflow	√			No resources of these kinds found
	1.4.11. Non-text contrast				
	1.4.12. Text spacing	√			Small web page not containing many long texts
	1.4.13. Content on Hover or Focus	√			Technically related
OPERABLE	**2.1. Keyboard accessible**				
	2.1.1. Keyboard		√		Use keyboard to control interactive elements
	2.1.2. No keyboard trap				
	2.1.3. Keyboard (No exception)	√			Technically related

		Not applicable	Good	Not good	
	2.1.4. Character key shortcuts				
	2.2. Enough time				
	2.2.1. Timing Adjustable	√			No resources of this kind found
	2.2.2. Pause, stop, hide	√			No moving, blinking, scrolling information
	2.2.3. No timing	√			No tests or games with a time limit
	2.2.4. Interruptions	√			No updates and alerts
	2.2.5. Re-authenticating		√		No information loss after re-authenticating
	2.2.6. Timeouts				
	2.3. Seizures and physical reactions	**Not applicable**	**Good**	**Not good**	**Explanation**
	2.3.1. Three flashes or below threshold		√		No flashes, animation, advertisements
	2.3.2. Three Flashes				
	2.3.3. Animation from interactions				
	2.4. Navigable				
	2.4.1. Bypass blocks	√			Small web page
	2.4.2. Page titled		√		Clear page title reflecting the content
	2.4.3. Focus order		√		Focus moves from left to right, top to down when pressing 'Tab'
	2.4.4. Link purpose (In context)		√		Make contextual sense, describe its purpose
	2.4.5. Multiple ways	√			Small web page, most content included in one web page
	2.4.6. Headings and labels		√		Descriptive, easy to find content without visual reference
	2.4.7. Focus visible		√		Clear borders around focus when it moves from left to right, top to down

		Not applicable	Good	Not good	Explanation
	2.4.8. Location	√			Small web page, most content included in one web page
	2.4.9. Link purpose (Link only)		√		Make sense without context
	2.4.10. Section headings	√			Small web page, most content included in one web page
	2.5. Input modalities				
	2.5.1. Pointer gestures				
	2.5.2. Pointer cancellation				
	2.5.3. Label in name	√			Technically related
	2.5.4. Motion actuation				
	2.5.5. Target size				
	2.5.6. Concurrent input mechanisms				
UNDERSTANDABLE	**3.1. Readable**	**Not applicable**	**Good**	**Not good**	**Explanation**
	3.1.1. Language of page		√		Plain English is the default language
	3.1.2. Language of parts	√			No words borrowed from other languages
	3.1.3. Unusual words		√		No idioms and jargon
	3.1.4. Abbreviations		√		Almost no abbreviations, except some common ones like TESOL, ELT
	3.1.5. Reading Level	√			Content targets only TESOL and Applied Linguistics students
	3.1.6. Pronunciation	√			No resources of this kind
	3.2. Predictable				
	3.2.1. On focus				
	3.2.2. On input	√			Technically related
	3.2.3. Consistent navigation	√			Small web page, content in one page

		Not applicable	Good	Not good	
	3.2.4. Consistent identification		√		Consistent design throughout the unit and the lesson
	3.2.5. Change on request	√			Technically related
	3.3. Input assistance				
	3.3.1. Error Identification		√		Message appears on the screen when error occurs
	3.3.2. Labels or instructions		√		Instruct the students to enter the password to watch the video
	3.3.3. Error suggestion			√	No suggestion found
	3.3.4. Error prevention	√			Applicable to legal, financial data
	3.3.5. Help	√			No links to hints or instructions
	3.3.6. Error prevention (All)	√			Students are not required to complete any form
ROBUST	**4.1. Compatible**	**Not applicable**	**Good**	**Not good**	**Explanation**
	4.1.1. Parsing	√			Technically related
	4.1.2. Name, role, value		√		Compatible name, role, value among users; stability across platforms
	4.1.3. Status messages	√			Technically related