California Open Online Library for Education & Accessibility

COOL4Ed (the California Open Online Library for Education) was created so that faculty can easily find, adopt, utilize, review and/or modify free and open etextbooks for little or no cost. The COOL4Ed accessibility open textbook evaluations can inform faculty, staff, and students how the free and open etextbooks meet 15 accessibility "checkpoints" that could impact the learning of learners with a range of disabilities.

SUMMARY OF ACCESSIBILITY EVALUATION:

Textbook: **Cell Biology and Genetics**
Format of Textbook: **PDF**

Assistive Technology (AT) Evaluation Score: Overall	5.6 (Maximum score = 10)
Assistive Technologies (AT) Evaluations applies specialized tools and software in the accessibility evaluation process. These specialized assistive technologies, see list below, are typically not used or available by the general public into the accessibility evaluation process. • Accessibility features of desktop operating systems (e.g. high-contrast display themes, settings from the Keyboard and Mouse control panels) • Accessibility-related software included with desktop operating systems (e.g. VoiceOver, Microsoft Narrator) • Third-party accessibility software and hardware: • Screen readers (e.g. JAWS, Window Eyes) • Magnification software (e.g. ZoomText Magnifier/Reader, MAGIC Pro with Speech) • Reading software for users with learning disabilities (e.g. Read and Write Gold, Kurzweil 3000) • Refreshable Braille displays	
Non- Assistive Technology (NAT) Evaluation Score: Overall	5.9 (Maximum score =10)
Non-Assistive Technologies (NAT) Evaluations applies only native or basic tools and software such as the keyboard and Narrator in the accessibility evaluation process. These non-assistive technologies are readily available and used by the general public.	

COOL4Ed Accessibility Evaluation Methods:

The California State University Accessible Technology Initiative and MERLOT (Multimedia Educational Resources for Learning and Online Teaching) developed the rubric or "checkpoints" for the accessibility evaluation. CAST, a nationally recognized organization with expertise in accessibility and UDL, reviewed and affirmed the appropriateness and value of the accessibility evaluation rubric and contributed the references and support resources to help people learn how best to design, evaluate, and remediate the learning materials to maximize the accessibility of the learning resources for all. The "checkpoints" have been built upon the Section 508 technical standards and has been organized and tailored to the typical characteristics of digital resources used in higher education courses.

The accessibility evaluations were performed by the Center for Usability in Design and Accessibility at California State University, Long Beach; faculty and graduate students with expertise in human factors, usability, and accessibility performed the evaluations of over 150 free and open etextbooks. COOL4ed.org has published the accessibility evaluation rubric and provides a detailed description of the methodology used to evaluate the accessibility of the etextbooks in COOL4ed.

LOOKING FOR DETAILED ACCESSIBILITY REPORTS?

See Detailed Accessibility Evaluation Report using Assistive Technologies

See Detailed Accessibility Evaluation Report using Non-Assistive Technologies

DETAILED ACCESSIBILITY EVALUATION REPORT using
Assistive Technologies

Assistive Technologies (AT) Evaluations applies specialized tools and software in the accessibility evaluation process.   These specialized assistive technologies, such as Kurzweil and NVDA, are typically not used or available by the general public into the accessibility evaluation process.

1. Accessibility Documentation

A. The organization providing the online materials has a formal accessibility policy.	**Fail**
Additional Information:	**Could not find this information.**
B. The organization providing the online materials has an accessibility statement.	**Fail**
Additional Information:	**Could not find this information.**
C. An Accessibility Evaluation Report is available from an external organization.	**Fail**
Additional Information:	**Could not find this information.**

2. Text Access

A. The text of the digital resource is available to assistive technology that allows the user to enable text-to-speech (TTS) functionality.	**Pass**
Additional Information:	**NVDA read all the text on pages 4-8. However, the pace was very fast and NVDA always read the images or "graphic" in the page header which disrupts the flow of reading.**

3. Text Adjustment

A. Text is compatible with assistive technology.	**Pass**
Additional Information:	**Used Adobe Reader XI and the text size was adjustable on pages 4-8.**
B. The resource allows the user to adjust the font size and font/background color (or is rendered by an application such as a browser,	**Pass**

media player, or reader) that offers this functionality).	
Additional Information:	**Used Adobe Reader XI to adjust the font and background colors. The colors were adjustable on pages 4-8.**

4. Reading Layout

A. Text of the digital resource is compatible with assistive technology that allows the user to reflow the text by specifying the margins and line spacing (or is rendered by an application such as a browser, media player, or reader that offers this functionality).	**Pass**
Additional Information:	**Used Adobe Reader XI and the text reflowed on pages 4-8.**
B. If the digital resource is an electronic alternative to printed materials, the page numbers correspond to the printed material.	**N/A**
Additional Information:	**No printed version.**

5. Reading Order

A. The reading order for digital resource content logically corresponds to the visual layout of the page when rendered by assistive technology.	**Pass**
Additional Information:	**Used NVDA and checked the digitial resource layout on pages 6, 14, 23, 20, and 48. The reading order logically corresponds to the page layout.**

6. Structural Markup/Navigation

A. The text of the digital resource includes markup (e.g. tags or styles) that allows for navigation by key structural elements (chapters, headings, pages) using assistive technology (or is rendered by an application	**Fail**

such as a browser, media player, or reader that offers this functionality).	
Additional Information:	**Used NVDA and checked pages 4-11. No headings were found. "No next heading."**
B. The text of the digital resource includes markup for bullets and numbered lists that is compatible with assistive technology (or is rendered by an application such as a browser, media player, or reader that offers this functionality).	**Fail**
Additional Information:	**Used NVDA and checked lists on pages 10, 36, 59, 60, 69, 80, 81, 83, 91, and 93. No lists were found. "No next list."**
C. If the text of the digital resource is delivered within an ebook reader application, a method is provided that allows users to bypass the reader interface and move directly to the text content that is compatible with assistive technology.	**N/A**
Additional Information:	**Not using reader application.**

7. Tables

A. Data tables include markup (e.g. tags or styles) that identifies row and column headers in a manner that is compatible with assistive technology (or are rendered by an application such as a browser, media player, or reader that offers this functionality).	**Fail**
Additional Information:	**Used NVDA to check table markup. 3/6 tables were detected. However, the the tables did not indicate the correct number of rows and columns and you cannot navigate the tables using the arrow keys. Checked tables on pages 8, 11, 111, 112, 119. No other tables found.**

8. Hyperlinks

A. In-book links take you to a location within the textbook. For example, the table of contents would be considered in-book links and embedded links take you to the correct location in the book.	**N/A**
Additional Information:	**No in book links found.**
B. Live hyperlinks take you to any website or webpages external to the book.	**Fail**
Additional Information:	**0/20 live links were functional and 0/20 live links had acceptable descriptions. Checked live links on pages 2, 4, 5, 6, 7, 50, 51, 53, 54, 55, 56, 119, 120, and 136.**
C. Live links take you to the correct webpage that is functioning properly.	**Fail**
Additional Information:	**0/20 live links were functional. Checked live links on pages 2, 4, 5, 6, 7, 50, 51, 53, 54, 55, 56, 119, 120, and 136.**
D. Live links are descriptive enough for the users to know where it should take them.	**Fail**
Additional Information:	**0/20 live links had acceptable descriptions. Checked live links on pages 2, 4, 5, 6, 7, 50, 51, 53, 54, 55, 56, 119, 120, and 136.**

9. Color and Contrast

A. All information within the material that is conveyed using color is also available in a manner that is compatible with those that do not perceive color, and information conveyed by color is also conveyed in other ways.	**N/A**
Additional Information:	**No color use found.**
B. Information is conveyed from the sub-categories for contrast.	**Pass**
Additional Information:	**Used Adobe Acrobat XI and Colour Contrast Analyzer to check the headers, text, and simple images and all**

		passed the color contrast requirements. Checked pages 4-11.
C. Contrast for headers passed WCAG AA standards for large texts (contrast ratio 3:1).		**Pass**
Additional Information:		**Used Adobe Acrobat XI and Colour Contrast Analyzer to check the headers and all headers pass the color contrast requirements. Checked pages 4-11.**
D. Contrast for text passed WCAG AA standards for normal texts (contrast ratio of 4.5:1).		**Pass**
Additional Information:		**Used Adobe Acrobat XI and Colour Contrast Analyzer to check the text and all text pass the color contrast requirements. Checked pages 4-11.**
E. Contrast for simple images (for example, images of atoms) passed WCAG AA standards (contrast ratio of 4.5:1).		**Pass**
Additional Information:		**Used Adobe Acrobat XI and Colour Contrast Analyzer to check the simple images and all simple images pass the color contrast requirements. Checked pages 4-11.**

10.Language

A. The text of the digital resource includes markup that declares the language of the content in a manner that is compatible with assistive technology.		**N/A**
Additional Information:		**Cannot check this because do not have Adobe Acrobat Pro.**
B. If the digital resource includes passages in a foreign language, these passages include markup that declares the language in a manner that is compatible with assistive technology.		**N/A**
Additional Information:		**Cannot check this because do not have Adobe Acrobat Pro.**

11.Images

A. Non-decorative images have alternative text that is compatible with assistive technology (or is rendered by an application such as a browser, media player, or reader that offers this functionality).	**Fail**
Additional Information:	**NVDA did not detect non-decorative images, there was no alternative text and the descriptions were not descriptive enough. Additionally NVDA always read the image source/credit information which disrupted the flow. Checked pages 4-18.**
B. Decorative images are marked with null alternate text or contain markup that allows them to be ignored by assistive technology.	**Fail**
Additional Information:	**NVDA did not skip over decorative images. Checked pages 4-18.**
C. Complex images, charts, and graphs have longer text descriptions that are compatible with assistive technology (or are rendered by an application such as a browser, media player, or reader) that offers this functionality).	**Fail**
Additional Information:	**NVDA did not detect complex images, there was no alternative text and the descriptions were not descriptive enough. Additionally NVDA always read the image source/credit information which disrupted the flow. Checked pages 4-18.**

12.Multimedia

A. A synchronized text track (e.g. open or closed captions) is provided with all video content.	**N/A**
Additional Information:	**No multimedia found.**
B. A transcript is provided with all audio content.	**N/A**
Additional Information:	**No multimedia found.**
C. Audio/video content is delivered via a media player that is compatible with assistive	**N/A**

technology. This includes support for all criteria listed in Section 15 below.	
Additional Information:	**No multimedia found.**

13.Flickering

A. The digital resource content does not contain anything that flashes more than three times in any one-second period.	**Pass**
Additional Information:	**No flickering found.**

14.Science, Technology, Engineering, and Math (STEM)

A. STEM figures have appropriate markup that indicates that the image is a figure.	**Fail**
Additional Information:	**0/10 figures had labels. Checked figures on pages 4, 5, 6, 7, 9, 13, 19, 30, 48, and 49.**
B. STEM graphs have appropriate markup that indicates that the image is a graph.	**Pass**
Additional Information:	**2/2 graphs had labels. Checked graphs on pages 74 and 76. No other graphs found.**
C. STEM equations have appropriate markup that indicates that the image is an equation.	**Fail**
Additional Information:	**0/5 equations had labels. Checked equations on pages 75, 107, 111, 114, and 117. No other equations found.**
D. STEM tables have appropriate markup that indicates the image is a table.	**Fail**
Additional Information:	**2/6 tables had labels. Checked tables on pages 8, 11, 111, 112, and 119. No other tables found.**
E. STEM figures have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content.	**Fail**

Additional Information:	**0/10 figures had acceptable descriptions and the reader skips over the images. Checked figures on pages 4, 5, 6, 7, 9, 13, 19, 30, 48, and 49.**
F. STEM graphs have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content.	**Fail**
Additional Information:	**0/2 graphs had acceptable descirptions and the reader skips over the graphs. Checked graphs on pages 74 and 76. No other graphs found.**
G. STEM equations have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content.	**Fail**
Additional Information:	**0/5 equations had acceptable descriptions and equations did not display correctly and NVDA did not read the equations properly. Checked equations on pages 75, 107, 111, 114, and 117. No other equations found.**
H. Assistive technology used can access the content from the STEM tables.	**Fail**
Additional Information:	**3/6 tables were detected. However, the the tables did not indicate the correct number of rows and columns and you cannot navigate the tables using the arrow keys. Checked tables on pages 8, 11, 111, 112, 119. No other tables found.**

15. Interactive Elements

A. Each interactive element (e.g. menu, hyperlink, button) and function (e.g. annotations) allows keyboard-only operation both with and without assistive technology.	**N/A**
Additional Information:	**No interactive elements found.**
B. Each interactive element conveys information to assistive technology regarding the	**N/A**

element's name, type, and status (e.g. "Play, button, selected").	
Additional Information:	**No interactive elements found.**
C. All instructions, prompts, and error messages necessary to complete forms are conveyed as text to assistive technology (or are rendered by an application such as a browser, media player, or reader that offers this functionality).	**N/A**
Additional Information:	**No interactive elements found.**

DETAILED ACCESSIBILITY EVALUATION REPORT using
Non-Assistive Technologies

Non-Assistive Technologies (NAT) Evaluations applies only native or basic tools and software such as the keyboard and Narrator in the accessibility evaluation process. These non-assistive technologies are readily available and used by the general public.

1. Accessibility Documentation

A. The organization providing the online materials has a formal accessibility policy.	**Fail**
Additional Information:	**No Content Found.**
B. The organization providing the online materials has an accessibility statement.	**Fail**
Additional Information:	**No Content Found.**
C. An Accessibility Evaluation Report is available from an external organization.	**Fail**
Additional Information:	**No Content Found.**

2. Text Access

A. The text of the digital resource is available to assistive technology that allows the user to enable text-to-speech (TTS) functionality.	**Pass**
Additional Information:	**Pgs 20-25 were checked. The text is available to assisstive technology that allows user to enable text-to-speech functionality.**

3. Text Adjustment

A. Text is compatible with assistive technology.	**Pass**
Additional Information:	**Pgs 20-25 were checked. When the window page chaged in size, no horizontal bar appeared. The font size of all pages checked could be adjusted.**
B. The resource allows the user to adjust the font size and font/background color (or is rendered by an application such as a browser, media player, or reader) that offers this functionality).	**Pass**
Additional Information:	**Pgs 20-25 were checked. When changing the font/background color to green text on black, the background color changed to black, and the font color changed to green.**

4. Reading Layout

A. Text of the digital resource is compatible with assistive technology that allows the user to reflow the text by specifying the margins and line spacing (or is rendered by an application such as a browser, media player, or reader that offers this functionality).	**Fail**
Additional Information:	**Pgs 20-25 were checked. I was able to reflow the text, however, when reflowing the text, the text to speech function said "warning empty page."**

B. If the digital resource is an electronic alternative to printed materials, the page numbers correspond to the printed material.	N/A
Additional Information:	**Need additional information. We do not have printed material to compare it too.**

5. Reading Order

A. The reading order for digital resource content logically corresponds to the visual layout of the page when rendered by assistive technology.	**Pass**
Additional Information:	**Pgs 29-34 were checked. The reading order was logical on all five pages.**

6. Structural Markup/Navigation

A. The text of the digital resource includes markup (e.g. tags or styles) that allows for navigation by key structural elements (chapters, headings, pages) using assistive technology (or is rendered by an application such as a browser, media player, or reader that offers this functionality).	**Fail**
Additional Information:	**No method provided that allows user to bypass sections of text. The tagged PDF, Title, Bookmarks, and Headings all failed using the accessibility checker.**
B. The text of the digital resource includes markup for bullets and numbered lists that is compatible with assistive technology (or is rendered by an application such as a browser, media player, or reader that offers this functionality).	**Fail**
Additional Information:	**No markups found. The Tagged PDF, Title, Bookmarks, and Headings all failed.**
C. If the text of the digital resource is delivered within an ebook reader application, a method	**N/A**

is provided that allows users to bypass the reader interface and move directly to the text content that is compatible with assistive technology.	
Additional Information:	**No additional eReader used.**

7. Tables

A. Data tables include markup (e.g. tags or styles) that identifies row and column headers in a manner that is compatible with assistive technology (or are rendered by an application such as a browser, media player, or reader that offers this functionality).	**Fail**
Additional Information:	**Tables on pages 8, 11, 12, 74, and 76 were checked manually. The text to speech function separated and read the tables by row. Using the accessibility checkeer, the rows, TH and TD, headers and regularity all failed.**

8. Hyperlinks

A. In-book links take you to a location within the textbook. For example, the table of contents would be considered in-book links and embedded links take you to the correct location in the book.	**N/A**
Additional Information:	**No within book hyperlinks found. However, the accessibility checker resulted in navigation links passed.**
B. Live hyperlinks take you to any website or webpages external to the book.	**Fail**
Additional Information:	**16/20 live links worked. Pgs 2-22 were checked. Live links in page 6, 7 (2 links), and 19 did not function. In addition, links were not higlighted or underlined. They were in black and were amongst the text of the book.**

C. Live links take you to the correct webpage that is functioning properly.	**Fail**
Additional Information:	**16/20 live links worked. Pgs 2-22 were checked. Live links in page 6, 7 (2 links), and 19 did not function.**
D. Live links are descriptive enough for the users to know where it should take them.	**Fail**
Additional Information:	**0/20 live links had a description. Pgs 2-22 were checked. 20 out of the 20 links were in html (URL) form and did not have a description on where the link would take you.**

9. Color and Contrast

A. All information within the material that is conveyed using color is also available in a manner that is compatible with those that do not perceive color, and information conveyed by color is also conveyed in other ways.	**Pass**
Additional Information:	**Pgs 4-12 were checked. Information not conveyed by color alone. Size of font, and type of font (Bold versus Non-Bold font) were used. The subsection headings were in black font, bold font, and the size was larger than the rest of the text. This happened throughout the book. Roman Numerals were used for each subsection. Ex: "XIII. Useful Links."**
B. Information is conveyed from the sub-categories for contrast.	**Pass**
Additional Information:	**Pgs 4-12 were checked. Most pages had the contrast ratio of 4.51:1 and above (18.86:1). Chapter headings passed with a ratio of 18.86:1. Text throughout the 8 pages checked had a ratio of 19.9:1.**
C. Contrast for headers passed WCAG AA standards for large texts (contrast ratio 3:1).	**Pass**
Additional Information:	**Pgs 4-12 were checked. Large chapter headings passed with a ratio of 18.86:1.**

D. Contrast for text passed WCAG AA standards for normal texts (contrast ratio of 4.5:1).	**Pass**
Additional Information:	**Pgs 4-12 were checked. Most of the text was above the ratio 4.51:1 (19.9:1). Large text (chapter headings) had a ratio of 18.86:1.**
E. Contrast for simple images (for example, images of atoms) passed WCAG AA standards (contrast ratio of 4.5:1).	**Pass**
Additional Information:	**Pgs 13-21 were checked. Simple images passed with a ratio of 4.51:1 and above (EX: 10.04:1 ratio for image on page 13).**

10.Language

A. The text of the digital resource includes markup that declares the language of the content in a manner that is compatible with assistive technology.	**Fail**
Additional Information:	**Using the accessiblity checker the primary language failed.**
B. If the digital resource includes passages in a foreign language, these passages include markup that declares the language in a manner that is compatible with assistive technology.	**Fail**
Additional Information:	**Using the accessiblity checker the primary language failed.**

11.Images

A. Non-decorative images have alternative text that is compatible with assistive technology (or is rendered by an application such as a browser, media player, or reader that offers this functionality).	**Fail**
Additional Information:	**10/10 images did include descriptions. Pgs 4, 5, 6 (2 images), 7, 12, 22, 23, 30, and 33 all had images and**

	were checked manually. Overall images did include descriptions. However, the descriptions were part of the text as oppose as being directly below the image. ---> Using the accessibility checker, figures alternate text failed.
B. Decorative images are marked with null alternate text or contain markup that allows them to be ignored by assistive technology.	**N/A**
Additional Information:	**No Decorative Images Found.**
C. Complex images, charts, and graphs have longer text descriptions that are compatible with assistive technology (or are rendered by an application such as a browser, media player, or reader) that offers this functionality).	**Fail**
Additional Information:	**10/10 image descriptions did convey meaning (descriptions were present for images). Pgs 8, 11, 12, 74, 76, 77, 111, 111, 112, 119 had images and were checked. All images did contain descriptions. The descriptions were part of the text as oppose to directly being under the image. --->Using the accessibility checker, figures alternate text failed.**

12.Multimedia

A. A synchronized text track (e.g. open or closed captions) is provided with all video content.	**N/A**
Additional Information:	**No content found.**
B. A transcript is provided with all audio content.	**N/A**
Additional Information:	**No content found.**
C. Audio/video content is delivered via a media player that is compatible with assistive technology. This includes support for all criteria listed in Section 15 below.	**N/A**
Additional Information:	**No content found.**

13.Flickering

A. The digital resource content does not contain anything that flashes more than three times in any one-second period.	**Pass**
Additional Information:	**Pgs 4-14 were checked. No flickering content was observed. Using the accessibility checker, screen flicker passed.**

14.Science, Technology, Engineering, and Math (STEM)

A. STEM figures have appropriate markup that indicates that the image is a figure.	**Fail**
Additional Information:	**0/10 figure markups did not convey meaning. Pgs 4, 5, 6 (2 figures), 7, 12, 22, 23, 30, and 33 all had images and were checked. Overall the (labels/tags) did not convey meaning. This is because the figures did not include markups. In other words the figures did not have a label or tag specifying them as figures.**
B. STEM graphs have appropriate markup that indicates that the image is a graph.	**Fail**
Additional Information:	**0/3 graph markups did not convey meaning. There were a total of 3 graphs throughout the entire book. The graphs were found in pages 9, 74, and 76. The graphs did not include any labels or tags. Meaning that the graphs had no label or tag identifying them as graphs.**
C. STEM equations have appropriate markup that indicates that the image is an equation.	**N/A**
Additional Information:	**No Equations found throughout the book.**
D. STEM tables have appropriate markup that indicates the image is a table.	**Fail**
Additional Information:	**0/9 table markups did not provide enough information to convey meaning. Pgs 8, 11, 12, 74, 76, 111, 111, 112, and 119 all had tables and were checked. There were only 9 tables found throughout the book. Overall markups did not convey meaning.**

		There were no labels or tags that identified the tables as tables.
E.	STEM figures have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content.	**Fail**
Additional Information:		**0/10 notation markups were sufficient to convey meaning. There were not descriptions of the figures. Pgs 4, 5, 6 (2 figures), 7, 12, 22, 23, 30, and 33 all had figures and were checked. The notation markups were not sufficient enought to convey presentation primarily because their was no notation markups.**
F.	STEM graphs have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content.	**Fail**
Additional Information:		**0/3 notation markups did not convey meaning. Pgs 9,74 and 76 had graphs and were all checked. There were no notation markups therefore this was not enough to convey the presentation.**
G.	STEM equations have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content.	**N/A**
Additional Information:		**No equations found throughout the book.**
H.	Assistive technology used can access the content from the STEM tables.	**Fail**
Additional Information:		**0/9 notation markups provided good descriptions sufficient enough to convey meaning. Pgs 8, 11, 12, 74, 76, 111 (2 tables), 112, and 119 all had tables and were checked. There was a total of 9 tables throughout the books. There were no notation markups therefore there was not sufficient enough to convey presentation.**

15.Interactive Elements

A. Each interactive element (e.g. menu, hyperlink, button) and function (e.g. annotations) allows keyboard-only operation both with and without assistive technology.	N/A
Additional Information:	**No Interactive Elements Present.**
B. Each interactive element conveys information to assistive technology regarding the element's name, type, and status (e.g. "Play, button, selected").	N/A
Additional Information:	**No Interactive Elements Present.**
C. All instructions, prompts, and error messages necessary to complete forms are conveyed as text to assistive technology (or are rendered by an application such as a browser, media player, or reader that offers this functionality).	N/A
Additional Information:	**No Interactive Elements Present.**

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