OFFICE OF THE STATE AUDITOR

DIANA DIZOGLIO

Official Audit Report – Issued December 26, 2024

University of Massachusetts Boston

For the period July 1, 2022 through August 31, 2023

OFFICE OF THE STATE AUDITOR

DIANA DIZOGLIO

December 26, 2024

Dr. Marcelo Suárez-Orozco, Chancellor
University of Massachusetts Boston
100 Morrissey Boulevard
Boston, MA 02125

Dear Dr. Suárez-Orozco:

I am pleased to provide to you the results of the enclosed performance audit of the University of Massachusetts Boston. As is typically the case, this report details the audit objectives, scope, methodology, findings, and recommendations for the audit period, July 1, 2022 through August 31, 2023. As you know, my audit team discussed the contents of this report with university managers. This report reflects those comments.

I appreciate the overall efforts of you and your staff at the University of Massachusetts Boston, who I am told demonstrated the utmost professionalism. I am disappointed, however, with reports I received from my team that the UMass Internal Audit Unit exhibited a tremendous lack of cooperation throughout the audit. I am hopeful that we can resolve this issue, moving forward, so that our audit teams can look forward to working together to make government work better. I am available to discuss this audit if you or your team has any questions.

Best regards,

Diana DiZoglio
Auditor of the Commonwealth

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LIST OF ABBREVIATIONS

ADA	Americans with Disabilities Act
CIS	Center for Internet Security
CIW	Commonwealth's Information Warehouse
LMS	learning management system
UMass	University of Massachusetts
URL	uniform resource locator
W3C	World Wide Web Consortium
WCAG	Web Content Accessibility Guidelines

EXECUTIVE SUMMARY

In accordance with Section 12 of Chapter 11 of the Massachusetts General Laws, the Office of the State Auditor has conducted a performance audit of the University of Massachusetts (UMass) Boston for the period July 1, 2022 through August 31, 2023.

The purpose of this performance audit was to determine whether UMass Boston's website and its learning management system (LMS), Blackboard, adhered to the accessibility standards established by the Web Content Accessibility Guidelines (WCAG) 2.0 and 2.1, respectively, for user accessibility, keyboard accessibility, navigation accessibility, language, error identification, and color accessibility. WCAG ensures that all users, regardless of ability, can access the content and functions of UMass Boston's website and LMS. Further, it supports UMass Boston's commitment to equal access for students, faculty members, and visitors, fulfilling legal[1] and ethical standards.

Additionally, we determined whether UMass Boston ensured that its employees completed cybersecurity awareness training in accordance with its "Information and Security Awareness Policy." Cybersecurity awareness is important because adhering to internal security policies helps UMass Boston demonstrate the university's commitment to protecting sensitive information.

Below is a summary of our findings, the effects of those findings, and our recommendations, with links to each page listed.

Finding 1 **Page 15**	UMass Boston's website is not fully accessible for all Massachusetts residents and users.
Effect	Broken or faulty hyperlinks limit users from having equitable access to critical information and key online services offered by UMass Boston. They also increase the likelihood that Massachusetts residents and students will either access outdated or incorrect information or be directed to webpages that no longer exist.
Recommendation **Page 15**	UMass Boston should continually review its webpages to ensure that all hyperlinks lead to related information and provide equitable access to critical information and services offered online by UMass Boston.
Finding 2 **Page 16**	UMass Boston's learning management system, Blackboard, is not fully accessible for all students.

1. Title II of the Americans with Disabilities Act requires that state universities' and colleges' websites be accessible.

Effect	The above instances of noncompliance have the following effects on the user: Broken or Faulty Hyperlinks • This can limit Blackboard users from having equitable access to critical information and key online services offered on the LMS. • This can increase the likelihood that users will either access outdated or incorrect information or be directed to webpages that no longer exist. Missing Search Bars • This can prevent users from navigating to other relevant information. Hyperlinks Without Identifiable Markers or Sufficient Contrast • This can negatively impact the user experience by making it difficult to locate other relevant information. Zoom In to 200% and 400% • Users may be unable to read Blackboard content. Bypass Blocks • Users may be unable to navigate to the important main content of a webpage quickly. Portrait Mode • Users may be unable to interact with their course content on their mobile devices effectively. Keyboard Accessibility/Navigation • Users who have mobility issues may be unable to access certain features and content. Titles • Users with screen readers may lose comprehension of the course content. Language Attributes • The lack of language attributes renders screen readers unable to have the content read to users. Error Identification • If users are not informed of errors when making inputs on data entry, it means that users will be unable to identify their errors and retrieve the content they need.
Recommendation **Page 19**	UMass management should review the accessibility statements and reports of its LMS vendor to determine instances of WCAG noncompliance. UMass management should work with its LMS vendor to ensure that any potential instances of WCAG noncompliance are resolved.
Finding 3 **Page 20**	UMass Boston did not always ensure that its employees completed cybersecurity awareness training.
Effect	If UMass Boston does not educate all employees on their responsibility to protect its information assets by requiring cybersecurity awareness training, then UMass Boston is exposed to a higher-than-acceptable risk of cybersecurity attacks, which may cause financial and/or reputational losses.

Recommendation Page 21	UMass Boston should revise its policy to implement a mechanism that requires employees to complete cybersecurity awareness training at hire and at least annually thereafter; UMass Boston should consider cutting off user access if an employee does not complete their training by a stated deadline.

In addition to the conclusions we reached regarding our audit objectives, we also identified issues not specifically addressed by our objectives. For more information, see Other Matters.

OVERVIEW OF AUDITED ENTITY

The University of Massachusetts (UMass) Boston is a member of the Massachusetts public higher education system, which consists of 15 community colleges, nine state universities, and five UMass campuses. In 1964, UMass Boston became one of the five public institutions of higher learning in the UMass system, in accordance with Chapter 75 of the General Laws. UMass is led by a president who oversees the UMass system and by a chancellor at each UMass campus. It is also governed by a board of trustees composed of 22 members, with 17 members who are appointed by the Governor for five-year terms and 5 UMass students who are elected by the student body for one-year terms. The board shapes general policies that govern all five UMass campuses. As the administrative head of the campus, the chancellor of UMass Boston reports to the president and is supported by several vice chancellors, a provost, and a director of athletics.

As of fall 2023, UMass Boston had a total enrollment of 15,671 students (12,234 undergraduate and 3,437 graduate students), and approximately 2,579 employees (1,816 full-time and 763 part-time employees). According to Section 7 of Chapter 75 of the General Laws, "The [UMass system] trustees shall prepare and submit a detailed budget in such form and manner as the governor, secretary and general court may direct." UMass Boston had $506,185,000 total revenues and $491,457,000 total expenses for fiscal year 2023 and incurred revenues of $486,208,000 and expenses of $481,706,000 for fiscal year 2022. UMass Boston had state appropriations of $158,380,000 and $184,083,000 for fiscal years 2022 and 2023, respectively.

Website Accessibility

Americans with Disabilities Act

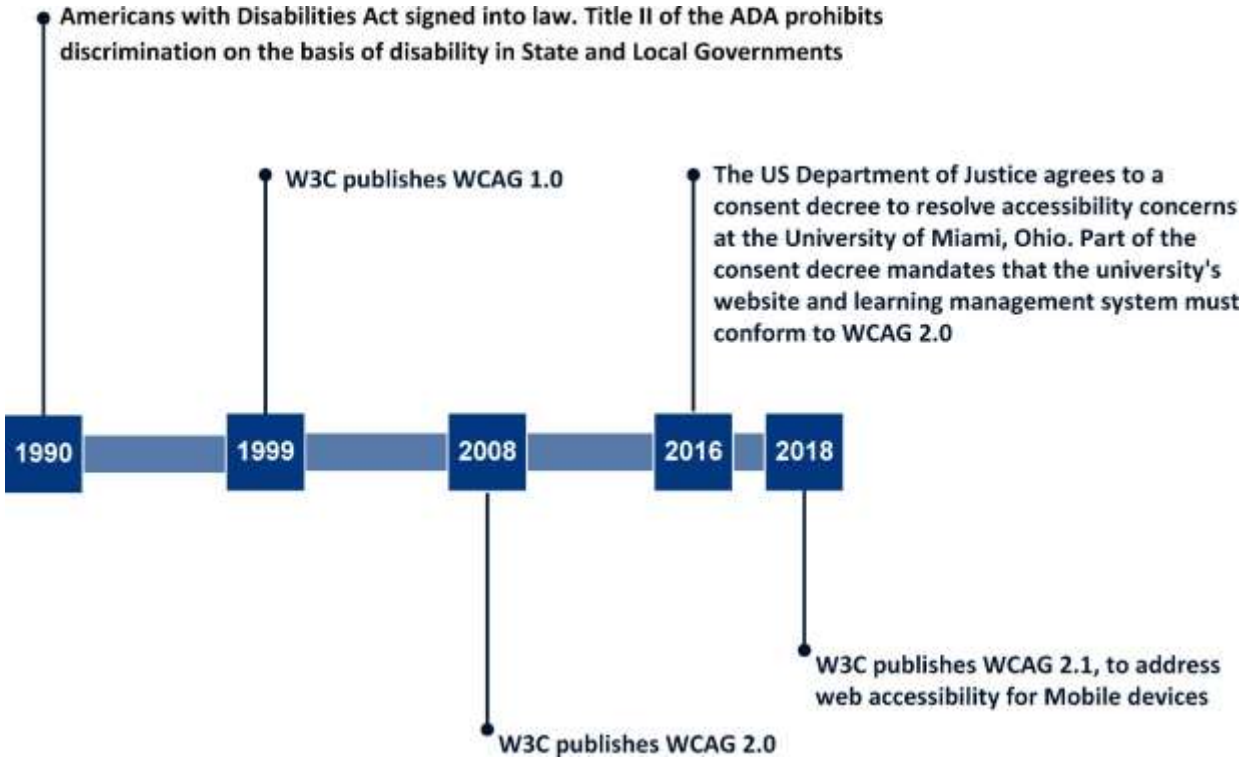
In 1990, the Americans with Disabilities Act (ADA), a comprehensive civil rights law prohibiting discrimination based on disability, came into effect. Title II of the ADA covers state-funded programs such as universities, community colleges, and career and technical education programs, including all activities of state and local governments, regardless of whether these entities receive federal financial assistance. (See 42 US Code § 12131B65.) More recently, the Justice Department filed a proposed consent decree to resolve allegations that Miami University in Oxford, Ohio, violated the ADA by using inaccessible classroom technologies and other technologies. As part of the consent decree, Miami

University had to ensure that its web content and learning management systems (LMS)[2] conform with Web Content Accessibility Guidelines (WCAG) 2.0 AA standards. Additionally, the university was required to meet with every student who has a disability in order to develop an accessibility plan and procure web technology or software that best met various accessibility standards.

WCAG

In 1999, the World Wide Web Consortium (W3C), an international organization overseeing internet standards, released WCAG 1.0. These guidelines aimed to offer directions on enhancing the accessibility of web content for people with disabilities. In 2008, W3C published WCAG 2.0. In 2018, W3C published WCAG 2.1, which was built on WCAG 2.0 to improve web accessibility on mobile devices and to further improve web accessibility for people with visual impairments and cognitive disabilities.

Progression of Internet Accessibility Standards



2. An LMS is a web-based application that functions like a website. Instructors and students can access the classes to which they are assigned.

How People with Disabilities Use the Web

According to W3C, people with disabilities use assistive technologies and adaptive strategies specific to their needs to navigate web content. Examples of assistive technologies include screen readers, which read webpages aloud for people who cannot read text; screen magnifiers for individuals with low vision; and voice recognition software for people who cannot (or do not) use a keyboard or mouse. Adaptive strategies refer to techniques that people with disabilities employ to enhance their web interaction.[3] These strategies might involve increasing text size, adjusting mouse speed, or enabling captions. To make web content accessible to people with disabilities, developers must ensure that various components of web development and interaction work together. This includes text, images, and structural code; users' browsers and media players; and various assistive technologies.

UMass Boston made efforts to create and maintain an accessible website in the following ways: In 2020, UMass Boston hired new staff members to address internet accessibility and marketing concerns; a new website was launched in July 2023 as a result of this effort. In accordance with the ADA, the UMass Boston website (www.umb.edu) is designed to comply with the WCAG 2.0 AA guidelines. To achieve compliance with WCAG 2.0, the university transitioned to a new content management system. Additionally, UMass Boston's Web Services Team uses third-party software (called SiteImprove) to run weekly scans of UMass Boston's website to identify accessibility issues.

3. Web interaction refers to the various actions that users take while navigating and using the internet. It encompasses a wide range of online activities, including, but not limited to, clicking on hyperlinks, submitting forms, posting comments on webpages, and engaging with web content and services in other forms.

Common Accessibility Features of a Website*

* This webpage was modified to fit in our report

Blackboard LMS

According to UMass, Blackboard Learn Original is the third-party vendor LMS chosen by the university to help instructors provide effective and engaging learning in the classroom. The LMS allows instructors to conduct their courses either partly or entirely online and allows students to take tests, submit homework assignments, watch lecture videos, keep track of their grades, engage in student discussions, and take other actions. Blackboard's website indicates that its products are generally designed and developed in alignment with WCAG 2.1 Level AA success criteria.

In spring 2023, UMass Boston announced that it had selected a new LMS called Canvas. We did not have an opportunity to test Canvas because it was not fully implemented by the university during the audit period. The university made this transition to address accessibility concerns, increase inclusivity for mobile users, and further integrate the learning and teaching experience.

Cybersecurity Awareness Training

Starting in 2008, in reaction to significant data losses faced by organizations in the US defense sector, the Center for Internet Security (CIS) introduced best practice guidelines for computer security known as CIS Controls. There are 18 controls; they are a set of prioritized cybersecurity actions that organizations can implement to protect against the most common cyber threats. CIS Control 14 (Security Awareness and Skills Training) focuses on the importance of developing and sustaining a security awareness program aimed at shaping employee behavior to be more security minded and adequately trained, thereby minimizing cybersecurity risks to the organization.

In the 2010s, the transition to cloud computing led to an increased focus on cloud security. At the same time, the rise of increased cyber threats highlighted the necessity for cooperative strategies to combat emerging digital challenges. As a result of various data breaches and other cyberattacks, there was an effort to invest in cybersecurity measures to protect sensitive information across organizations. The absence of cybersecurity awareness training poses one of the highest risks an organization can face, as untrained employees are often the weakest link in an organization's security defenses. Recognizing this, organizations have prioritized investments in cybersecurity awareness training to educate their workforce about potential cyber threats, such as phishing scams and malware.

In 2010, the UMass board of trustees passed a new Information Security Policy (Doc. T10-089), which commits the university to adopt controls modeled on ISO 27002.[4] This includes controls requiring employees to receive cybersecurity awareness training. According to the university's President's Office, in the intervening years, the university adopted CIS Controls, which require the university's campuses to maintain a cybersecurity awareness training program across its entire workforce.

In June 2020, UMass Boston adopted an initial version of the "Information Security Training and Awareness Policy." The policy states,

> *It is the responsibility and policy of the University of Massachusetts Boston to conduct an on-going information security awareness and training program for all faculty, staff, students, vendors, and contractors. . . . All users shall complete security awareness training and training on information security policies upon hire and subsequently at least annually.*

UMass Boston conducts awareness campaigns and periodic phishing simulations (monthly or every other month) for staff members, faculty members, and students, as part of its efforts to enhance compliance and cybersecurity readiness. During the audit period, there were no procedures or enforcement mechanisms in place to ensure that employees completed cybersecurity training. UMass Boston employees expressed to the Office of the State Auditor that the percentage of individuals who completed cybersecurity awareness training was slightly above 10%. UMass Boston provides cybersecurity awareness training through a web-based, third-party platform, which tracks and records all activities and documentation (e.g., assignment status, automatic reminders, and completion status) regarding cybersecurity awareness training for each workforce member.

4. ISO 27002 is an information security standard published by the International Organization for Standardization that offers model practices for cybersecurity risk management.

AUDIT OBJECTIVES, SCOPE, AND METHODOLOGY

In accordance with Section 12 of Chapter 11 of the Massachusetts General Laws, the Office of the State Auditor has conducted a performance audit of certain activities of the University of Massachusetts (UMass) Boston for the period July 1, 2022 through August 31, 2023.

We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Below is a list of our audit objectives, indicating each question we intended our audit to answer; the conclusion we reached regarding each objective; and, if applicable, where each objective is discussed in the audit findings.

Objective	Conclusion
1. Did UMass Boston's website and its learning management system (LMS), Blackboard, adhere to Web Content Accessibility Guidelines (WCAG) 2.0 and 2.1, respectively, for user accessibility, keyboard accessibility, navigation accessibility, language, error identification, and color accessibility?	**No; see Findings 1 and 2**
2. Did UMass Boston ensure that its employees completed cybersecurity awareness training in accordance with its "Information Security and Awareness Policy"?	**No; see Finding 3**

To accomplish our audit objectives, we gained an understanding of the aspects of UMass Boston's internal control environment relevant to our objectives by both reviewing applicable policies and procedures and by interviewing UMass Boston staff members and management. In addition, to obtain sufficient, appropriate evidence to address our audit objectives, we performed the procedures described below.

Web Accessibility

To determine, for the audit period July 1, 2022 through August 31, 2023, whether UMass Boston's website and its LMS, Blackboard, adhered to WCAG 2.0 and 2.1, respectively, for user accessibility, keyboard accessibility, navigation accessibility, language, error identification, and color accessibility, we performed website accessibility testing procedures on the following:

1. a judgmental sample of the 20 most-visited webpages, from a population of 7,269 UMass Boston webpages. This sample examined these webpages during the last month of the audit period;

2. a random, statistical sample of 60 selected webpages using a 95% confidence level,5 a 0% expected error rate,6 and a 5% tolerable error rate,7 from a population of the remaining 7,249 UMass Boston webpages; and

3. all 59 Blackboard student features from a population of 59 student features.

User Accessibility

- We determined whether content on the webpage was undamaged and remained readable when zoomed in to 200%.

- We determined whether the webpage could be viewed in both portrait and landscape modes (for the 59 student features only).

- We determined whether content on the webpage was undamaged and in a single column (for the 59 student features only) when zoomed in to 400%.

Keyboard Accessibility

- We determined whether all elements[8] of the webpage could be navigated using only a keyboard.

- We determined whether any elements on the webpage prevented a user from moving to a different element when using only a keyboard to navigate the webpage.

- We determined whether the first focusable control[9] is a hyperlink that redirects to the main content of the website. The first focusable control is known as either a bypass block[10] or a skip link.

Navigation Accessibility

- We determined whether the website contained a title that was relevant to website content.

- We determined whether there was a search function present to help users locate content.

- We determined whether related hyperlinks allowed navigation to the intended webpage.

- We determined whether headings within websites related to the content of the header's section.

5. Confidence level is a mathematically based measure of the auditor's assurance that the sample results (statistic) are representative of the population (parameter), expressed as a percentage.
6. Expected error rate is the number of errors that are expected in the population, expressed as a percentage. It is based on the auditor's knowledge of factors such as prior year results, the understanding of controls gained in planning, or a probe sample.
7. The tolerable error rate (which is expressed as a percentage) is the maximum error in the population that is acceptable while still using the sample to conclude that the results from the sample have achieved the objective.
8. An element is a part of a webpage that contains data, text, or an image.
9. The first focusable control is the first element a user will be brought to on a webpage when navigating with a keyboard.
10. This is a link that brings users to the main content of a webpage.

Language

- We determined whether video content found within the website had all important sounds[11] and dialogue captioned.
- We determined whether the language of the webpage was tagged with the correct language attribute.
- We determined whether words that appeared on the webpage matched the language to which the webpage was set.

Error Identification

- We determined whether mandatory form fields alerted users if the field was left blank.
- We determined whether there was a label for elements that required user input.
- We determined whether the label was programmed correctly.
- We determined whether there were examples given to assist the user in correcting mistakes (for example, a warning when entering a letter in a field meant for numbers).

Color Accessibility

- We determined whether there was at least a 3:1 contrast in color and additional visual cues to distinguish hyperlinks, which WCAG recommends for users with colorblindness or other visual impairments.

Cybersecurity Awareness Training

To determine whether UMass Boston's cybersecurity awareness training met the requirements of its "Information Security and Awareness Policy," we selected a random, statistical sample of 60 faculty/staff employees out of a population of 3,438 faculty/staff employees, using a 95% confidence level, a 0% expected error rate, and a 5% tolerable error rate, and inspected their cybersecurity awareness training certificates of completion to determine whether they completed the cybersecurity awareness training.

Additionally, we selected a random, statistical sample of 60 student/graduate employees of out a population of 2,646 student/graduate employees, using a 95% confidence level, a 0% expected error rate, and a 5% tolerable error rate, and inspected their cybersecurity awareness training certificates of completion to determine whether they completed the annual refresher cybersecurity awareness training.

11. Important sounds are defined as sounds that convey additional meaning or context for the viewer. For example, a horn may indicate a negative sound or a warning, while a bell might indicate something positive.

We used statistical sampling methods for testing, but we did not project the results of our testing to any population.

Data Reliability Assessment

Web Accessibility

To determine the reliability of the uniform resource locator (URL)[12] lists that we received from UMass Boston management, we interviewed knowledgeable UMass Boston staff members and checked that certain variable formats (e.g., dates, unique identifiers, and abbreviations) were accurate. Additionally, we ensured that none of the following issues affected the URL lists: abbreviation of data fields, missing data (e.g., hidden rows or columns, blank cells, or absent records), and duplicate records. We also ensured that all values in the dataset corresponded with expected values.

We selected a random sample of 20 URLs from the UMass Boston URL list that included all UMass Boston webpages and traced each to the corresponding webpage on UMass Boston's website, checking that each URL and webpage title matched the information on the UMass Boston website. We also selected a random sample of 20 URLs from UMass Boston's website and traced the URL and webpage title to the URL list that included all UMass Boston webpages to ensure that there was a complete and accurate population of URLs on the URL list.

We also received a URL list that listed the 20 most-visited webpages during the last month of the audit period. To determine the reliability of that list, we sampled all 20 URLs and traced each to the corresponding webpage on UMass Boston website, checking that each URL and webpage title matched the information on the UMass Boston website.

LMS Accessibility

As part of our review of UMass Boston's Blackboard system, we requested and received access to an online course. To determine the reliability of the Blackboard course we received access to, we interviewed knowledgeable UMass Boston staff members regarding the student features of the course. Additionally, we used Blackboard's publicly available information to determine what features are available for students and conducted inquiries to determine which features were available to UMass Boston students during the audit period. We were able to identify 59 features that were available to

12. A URL uniquely identifies an internet resource, such as a website.

UMass Boston students during the audit period. We then traced all 59 features available to UMass Boston students from the list obtained publicly from Blackboard and identified by UMass Boston staff members to the Blackboard course to ensure that we received access to a complete and accurate course.

Cybersecurity Awareness Training

To determine the reliability of the employee list we received from UMass Boston management, we checked that certain variable formats (e.g., dates, unique identifiers, and abbreviations) were accurate. Additionally, we ensured that none of the following issues affected the list: abbreviation of data fields, missing data (e.g., hidden rows or columns, blank cells, and absent records), and duplicate records. We also ensured that all values in the dataset corresponded with expected values.

We selected a random sample of 20 faculty/staff employees from the employee list and traced their names to the Commonwealth's Information Warehouse (CIW) to determine whether the list was accurate. We also selected a random sample of 20 faculty/staff employees from CIW and traced their names back to the employee list we received from UMass Boston to ensure that we received a complete and accurate employee list.

To determine the reliability of the student employee and graduate employee list we received from UMass Boston management, we checked that certain variable formats (e.g., dates, unique identifiers, and abbreviations) were accurate. Additionally, we ensured that none of the following issues affected the list: abbreviation of data fields, missing data (e.g., hidden rows or columns, blank cells, and absent records), and duplicate records. We also ensured that all values in the dataset corresponded with expected values.

We selected a random sample of 20 student/graduate employees from the employee list and traced their names to CIW to determine whether the list was accurate. We also selected a random sample of 20 student/graduate employees from CIW and traced their names back to the employee list we received from UMass Boston to ensure that we received a complete and accurate student employee and graduate employee list.

Based on the results of the data reliability assessment procedures described above, we determined that the site map, Blackboard course, and employee list were sufficiently reliable for the purposes of our audit.

DETAILED AUDIT FINDINGS WITH AUDITEE'S RESPONSE

1. The University of Massachusetts Boston's website is not fully accessible for all Massachusetts residents and users.

The University of Massachusetts (UMass) Boston's website is not fully accessible. We determined that 9 webpages out of our sample of 80 were not accessible in accordance with the Web Content Accessibility Guidelines (WCAG) for navigational accessibility. Of these, we determined that all 9 had broken hyperlinks.

Broken or faulty hyperlinks limit users from having equitable access to critical information and key online services offered by UMass Boston. They also increase the likelihood that Massachusetts residents and students will either access outdated or incorrect information or be directed to webpages that no longer exist.

Authoritative Guidance

The Web Accessibility Initiative's WCAG 2.0 states,

> ***Success Criteria 2.4.5,***
>
> *More than one way is available to locate a Web page within a set of Web pages except where the Web Page is the result of, or a step in, a process.*

Reasons for Issue

The UMass Boston accessibility team told us that the broken hyperlinks were currently being addressed and explained that broken hyperlinks were related to expired events and retired webpages.

Recommendation

UMass Boston should continually review its webpages to ensure that all hyperlinks lead to related information and provide equitable access to critical information and services offered online by UMass Boston.

Auditee's Response

> *The University understands the importance of ensuring the accessibility of its webpages for all users. It is important to note that accessibility is and has been a priority of the campus and webpage reviews were performed before a launch and weekly during the audit scope period. The campus will continue to perform weekly accessibility reviews and resolve issues as they are identified. Also, the campus has fixed all hyperlink issues identified in the audit.*

Auditor's Reply

Based on its response, UMass Boston is taking measures to address our concerns regarding this matter.

2. The University of Massachusetts Boston's learning management system, Blackboard, is not fully accessible for all students.

UMass Boston's learning management system (LMS), Blackboard, is not fully accessible. We determined that 44 of the Blackboard student features out of the 59 student features we tested were not accessible for user accessibility, keyboard accessibility, navigational accessibility, language, and error identification. Specifically, we determined the following:

User Accessibility

- One student feature could not be accessed in portrait mode.
- Two student features could not be zoomed in to 200% without a loss of functionality.
- Thirty-one student features could not be zoomed in to 400% without a loss of functionality.

Keyboard Accessibility

- Five student features could not be navigated using a keyboard.
- One student feature trapped the focus.[13]
- Two student features did not contain bypass blocks as the first focusable element as a way to skip to a page's main content.

Navigational Accessibility

- One student feature included a webpage title that did not identify the content on the webpage.
- Seven student features did not have search bars.
- Four student features contained broken hyperlinks.

Language

- One student feature was missing a language attribute.

13. This is a situation where the user is locked into using only a limited section of the webpage until the page is either refreshed or the computer is restarted.

Error Identification

- Two student features did not provide instructions to users when they were missing a required entry field.

The above instances of noncompliance have the following effects on the user:

Broken or Faulty Hyperlinks

- This can limit Blackboard users from having equitable access to critical information and key online services offered on the LMS.
- This can increase the likelihood that users will either access outdated or incorrect information or be directed to webpages that no longer exist.

Missing Search Bars

- This can prevent users from navigating to other relevant information.

Hyperlinks Without Identifiable Markers or Sufficient Contrast

- This can negatively impact the user experience by making it difficult to locate other relevant information.

Zoom In to 200% and 400%

- Users may be unable to read Blackboard content.

Bypass Blocks

- Users may be unable to navigate to the important main content of a webpage quickly.

Portrait Mode

- Users may be unable to interact with their course content on their mobile devices effectively.

Keyboard Accessibility/Navigation

- Users who have mobility issues may be unable to access certain features and content.

Titles

- Users with screen readers may lose comprehension of the course content.

Language Attributes

- The lack of language attributes renders screen readers unable to have the content read to users.

Error Identification

- If users are not informed of errors when making inputs on data entry, it means that users will be unable to identify their errors and retrieve the content they need.

Authoritative Guidance

The Web Accessibility Initiative's WCAG 2.1 states,

> ***Success Criterion 1.3.4 Orientation (Level AA)***
>
> *Content does not restrict its view and operation to a single display orientation, such as portrait or landscape, unless a specific display orientation is essential.*
>
> ***Success Criterion 1.4.10 Reflow (Level AA)***
>
> *Content can be presented without loss of information or functionality, and without requiring scrolling in two dimensions for:*
>
> - *Vertical scrolling content at a width equivalent to 320 [cascading style sheet (CSS)] pixels;*
> - *Horizontal scrolling content at a height equivalent to 256 [cascading style sheet (CSS)] pixels.*
>
> *Except for parts of the content which require two-dimensional layout for usage or meaning. Success Criterion 1.4.4 Resize Text (Level AA)*
>
> *Except for captions and images of text, text can be resized without assistive technology up to 200 percent without loss of content or functionality.*
>
> ***Success Criterion 2.1.1 Keyboard (Level A)***
>
> *All functionality of the content is operable through a keyboard interface without requiring specific timings for individual keystrokes, except where the underlying function requires input that depends on the path of the user's movement and not just the endpoints.*
>
> ***Success Criterion 2.4.1 Bypass Blocks (Level A)***
>
> *A mechanism is available to bypass blocks of content that are repeated on multiple Web pages. Success Criterion 2.4.5 Multiple Ways (Level AA)*
>
> *More than one way is available to locate a Web page within a set of Web pages except where the Web Page is the result of, or a step in, a process.*

Success Criterion 3.3.1 Error Identification (Level A)

If an input error is automatically detected, the item that is in error is identified and the error is described to the user in text.

Success Criterion 3.3.2

Labels or Instructions (Level A) Labels or instructions are provided when content requires user input.

Success Criterion 1.4.1 Use of Color (Level A)

Color is not used as the only visual means of conveying information, indicating an action, prompting a response, or distinguishing a visual element.

Reasons for Issue

UMass management shared with us that they expected Blackboard to be largely WCAG accessible because of the marketing of the product and availability and review of the Voluntary Product Accessibility Template.[14] Additionally, UMass management expressed that UMass Boston was in the process of changing its LMS from Blackboard to Canvas, with accessibility being one of the factors leading to the change.

Recommendation

UMass management should review the accessibility statements and reports of its LMS vendor to determine instances of WCAG noncompliance. UMass management should work with its LMS vendor to ensure that any potential instances of WCAG noncompliance are resolved.

Auditee's Response

The University understands the importance of utilizing an LMS that is accessible. As noted in the report, the campus transition to Canvas, a new LMS vendor, was underway in the spring of 2023 before the start of this audit. Blackboard's accessibility issues were one of the factors that led the campus to transition from Blackboard to Canvas. The University did monitor Blackboard's accessibility statements during the audit scope period. It will continue to review Canvas' accessibility statements and reports to determine if it meets accessibility requirements since the vendor is responsible for maintaining their LMS' accessibility.

14. The Voluntary Product Accessibility Template is a report prepared by the vendor that describes how well the product conforms to accessibility standards.

Auditor's Reply

The university states in its response that it monitored Blackboard's accessibility statements during the audit scope period. However, as part of our audit testing, we determined that 44 of the Blackboard student features out of the 59 Blackboard student features we tested (75%) were not accessible for user accessibility, keyboard accessibility, navigational accessibility, error identification, or color accessibility. Based on our audit results, and even with a new vendor for this service (Canvas), we recommend that UMass Boston implement our recommendation in order to be in compliance with WCAG.

3. The University of Massachusetts Boston did not always ensure that its employees completed cybersecurity awareness training.

UMass Boston did not always ensure that its employees completed cybersecurity awareness training. We determined that 28 out of 60 UMass Boston faculty/staff employees did not complete their cybersecurity awareness training. Additionally, UMass Boston could not provide evidence (i.e., training records) that 12 employees took the training, leaving a question as to whether they completed the training or not. In total, this amounted to 40 testing exceptions out of our population of 60 faculty/staff employees selected for testing.

We also determined that 35 out of 60 UMass Boston student/graduate employees did not complete their cybersecurity awareness training. Additionally, UMass Boston could not provide evidence (i.e., training records) that 19 employees took the training, leaving a question as to whether they completed the training or not. In total, this amounted to 54 testing exceptions out of our population of 60 student/graduate employees selected for testing.

If UMass Boston does not educate all employees on their responsibility to protect its information assets by requiring cybersecurity awareness training, then UMass Boston is exposed to a higher-than-acceptable risk of cybersecurity attacks, which may cause financial and/or reputational losses.

Authoritative Guidance

UMass Boston's "Information Security Training and Awareness Policy" states,

> *All users shall complete security awareness training and training on information security policies upon hire and subsequently at least annually.*

Reasons for Issue

UMass Boston management told us that training completion rates are low because currently there is no enforcement mechanism for employees who do not complete the training.

Recommendation

UMass Boston should revise its policy to implement a mechanism that requires employees to complete cybersecurity awareness training at hire and at least annually thereafter; UMass Boston should consider cutting off user access if an employee does not complete their training by a stated deadline.

Auditee's Response

Cybersecurity awareness training is only one part of a highly sophisticated and comprehensive cybersecurity program deployed by the campus to detect and prevent threats to the campus' information technology infrastructure, assets and data. All new employees are required to take the training as part of the on-boarding process. Annually, all employees are required to take a refresher course and emails are sent out with the link to the learning management system training site. Furthermore, management monitors whether employees have timely completed training. The training material will be reviewed periodically and if necessary, the material will be revised for any new and applicable authoritative guidelines.

UMass Boston has updated its Security Education Training and Awareness policy that reflects the new cybersecurity awareness training requirements.

Auditor's Reply

As stated in our audit finding, we noted 40 testing exceptions (67%) out of our population of 60 faculty/staff employees selected for cybersecurity awareness training completion. In addition, for student/graduate employees, we noted 54 testing exceptions (90%) out of our population of 60 employees selected for testing. The requirement to provide this training is not new and UMass Boston has failed to comply with it in the vast majority of instances we tested. Therefore, we reiterate our recommendation for UMass Boston to implement a mechanism that requires employees to complete cybersecurity awareness training at hire and at least annually thereafter. The systems and processes used by UMass Boston have not proven adequate to meet its needs.

OTHER MATTERS

The University of Massachusetts Boston can further enhance the accessibility of its marketing webpages.

Out of our sample of 80 University of Massachusetts (UMass) Boston webpages, we found that one webpage did not include a search bar. After consulting with UMass Boston management, it was clarified that this webpage served as a landing page for a marketing campaign. As such, it is considered part of a specific process for which Web Content Accessibility Guidelines (WCAG) 2.1 does not mandate a search bar or additional navigable elements. However, some industry professionals suggest that incorporating a search bar and other navigable elements can enhance overall accessibility.

The absence of a navigation bar or search feature can make it difficult for users to explore the UMass Boston website.

Authoritative Guidance

The Web Accessibility Initiative's WCAG 2.0 states,

> ***Success Criteria 2.4.5,***
>
> *More than one way is available to locate a Web page within a set of Web pages except where the Web Page is the result of, or a step in, a process.*

Additionally, private industry sources, like Bureau of Internet Accessibility, state,

> *Many landing pages remove the navigation bar to improve conversion rates. This isn't strictly necessary, and it can be frustrating for people who want to explore your website without reentering the URL. . . .*
>
> *The [landing page with a navigation bar] has an effective [call to action (CTA)] and strong sales copy, but the navigation bar is still accessible. The page's layout keeps the user's attention on the CTA button, but it doesn't prevent users from visiting other parts of the website.*

Reasons for Issue

UMass Boston management told us that this webpage was used for generating marketing leads and is therefore designed to guide users to engage with the marketing materials. UMass Boston management added that navigational tools like a search bar or a navigation menu will lead users away from the landing page.

Recommendation

UMass Boston should consider adding a navigation bar and search box on its landing page as a way of further enhancing user accessibility.

Auditee's Response

The University will take this under consideration; however, a marketing landing page is a webpage that does not include searchable content and is made to be seen only by people who have clicked on a digital ad from platforms such as Facebook, Instagram, and Google Search. This is a common practice and an industry standard.

Auditor's Reply

Based on its response, UMass Boston is taking measures to address our concerns regarding this matter.