Blackboard®

Making course content accessible

Problems

Institution

Instructor

Student

Institutional Problems

No insight into how institution is doing

Difficult to track and identify what to focus on

Manual remediation workflow

Lawsuits because of legal requirements

Instructor Problems

Lack of awareness of what to do

Lack of understanding on how it can affect students

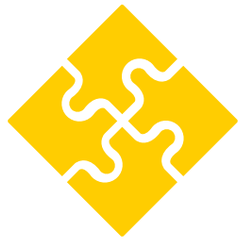
Lack of guidance on how to improve accessibility

Student Problems

Explicit alternative format requests

Long delays on receiving requested format

Excludes many students



Closely related to quality and usability

Learning Management System

- The Learning Management System is an important player in this
- Committed to providing Ally to everyone, including non-Blackboard products
- Potential for other integrations

Blackboard learn™

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BethCarlson

PASSWORD

••••••••••••••

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Accessibility information · Installation details

Beth Carlson

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Biology 101 | Course Info | Edit Mode is: ON

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  - Notifications
  - My Grades
  - Chapter 1
  - Chapter 2
  - Chapter 3
  - Videos
  - Enrichment Material
  - Student Blogs
  - Course Wiki
  - My Groups
  - Course Tools

Course Management

- **Control Panel**
  - Content Collection
  - Course Tools
  - Evaluation
  - Grade Center
  - Users and Groups
  - Customization
  - Packages and Utilities
  - Help

Course Info

Build Content | Assessments | Tools | Partner Content

Faculty Profiles

Enabled: Review

Professor: Beth Carlson

Email: beth.carlson@monument.edu

Office Hours: Mon/Wed 8-11am

Twitter: @bethcarl

Audio Welcome mp3

Course Description

This course will deal with historical and modern concepts of Biology. Throughout the course we will investigate how technological advances have aided scientists and biologists in their quest to learn more about the natural science of life and living organisms. The course will also challenge you to consider important issues related to biology by presenting thought-provoking discussion and related assignments.

During the semester there will be several guest lecturers joining the class both in person and online as well as several individual and group projects. All of these components will help to formulate your final evaluation for this course.

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Kingdoms of Organisms

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Create

- Item
- File
- Audio
- Image
- Video
- Web Link
- Learning Module
- Lesson Plan
- Syllabus
- Course Link
- Content Package (SCORM)

New Page

- Content Folder
- Module Page
- Blank Page

Mashups

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- SlideShare Presentation
- YouTube Video
- Blackboard Open Content

Adaptative Radiation in Galapagos Finches

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Create File

*Use the **File** content type to add a file that can be selected and viewed as a page within the course or as a separate piece of content in a separate browser window. Also, a collection of files or an entire lesson, including cascading style sheets (CSS), can be developed offline and uploaded into a course from a local drive and viewed in order. More Help*

* Indicates a required field.

SELECT FILE

*Select a local file by clicking **Browse My Computer** or one from within Course Files by clicking **Browse Course**. Enter a Name for the file and choose a Color for the text to appear in the list of content. Click **No** to display the file within the Course environment or **Yes** to display it as a separate piece of content with no Course page heading.*

* Name

Color of Name — Black

* Find File — Browse My Computer | Browse Course

FILE OPTIONS

Open in New Window — Yes / No

Add alignment to content — Yes / No

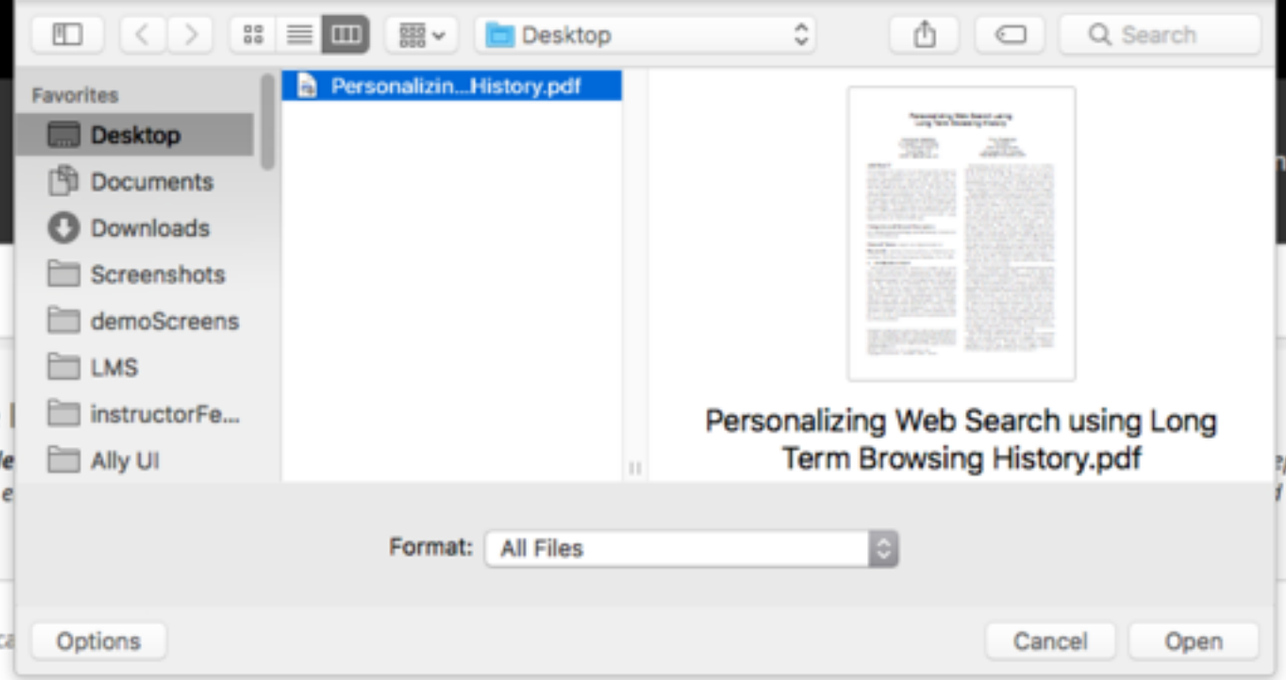
STANDARD OPTIONS

Permit Users to View this Content — Yes / No

Track Number of Views — Yes / No

Select Date and Time Restrictions — Display After

Enter dates as mm/dd/yyyy. Time may be entered in any increment.



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Services

System Admin

Biology 101

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Biology 101

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Advanced Search

Create

*Use the **File***

files or an e

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* Name

Color of Name Black

* Find File Browse My Computer Browse Course

FILE OPTIONS

Open in New Window Yes No

Add alignment to content Yes No

STANDARD OPTIONS

Permit Users to View this Content Yes No

Track Number of Views Yes No

Select Date and Time Restrictions Display After

Enter dates as mm/dd/yyyy. Time may be entered in any increment.

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* Indicates a required field.

SELECT FILE

*Select a local file by clicking **Browse My Computer** or one from within Course Files by clicking **Browse Course**. Enter a Name for the file and choose a Color for the text to appear in the list of content. Click **No** to display the file within the Course environment or **Yes** to display it as a separate piece of content with no Course page heading.*

* Name

Color of Name — Black

* Find File — Browse My Computer | Browse Course

Selected File
File Name **Personalizing Web Search using Long Term Browsing History.pdf**
File Type **PDF**
Select a Different File

FILE OPTIONS

Open in New Window — Yes / No

Add alignment to content — Yes / No

STANDARD OPTIONS

Permit Users to View this Content — Yes / No

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Edit Mode is: ON

Success: Personalizing Web Search using Long Term Browsing History created.

- **Biology 101**
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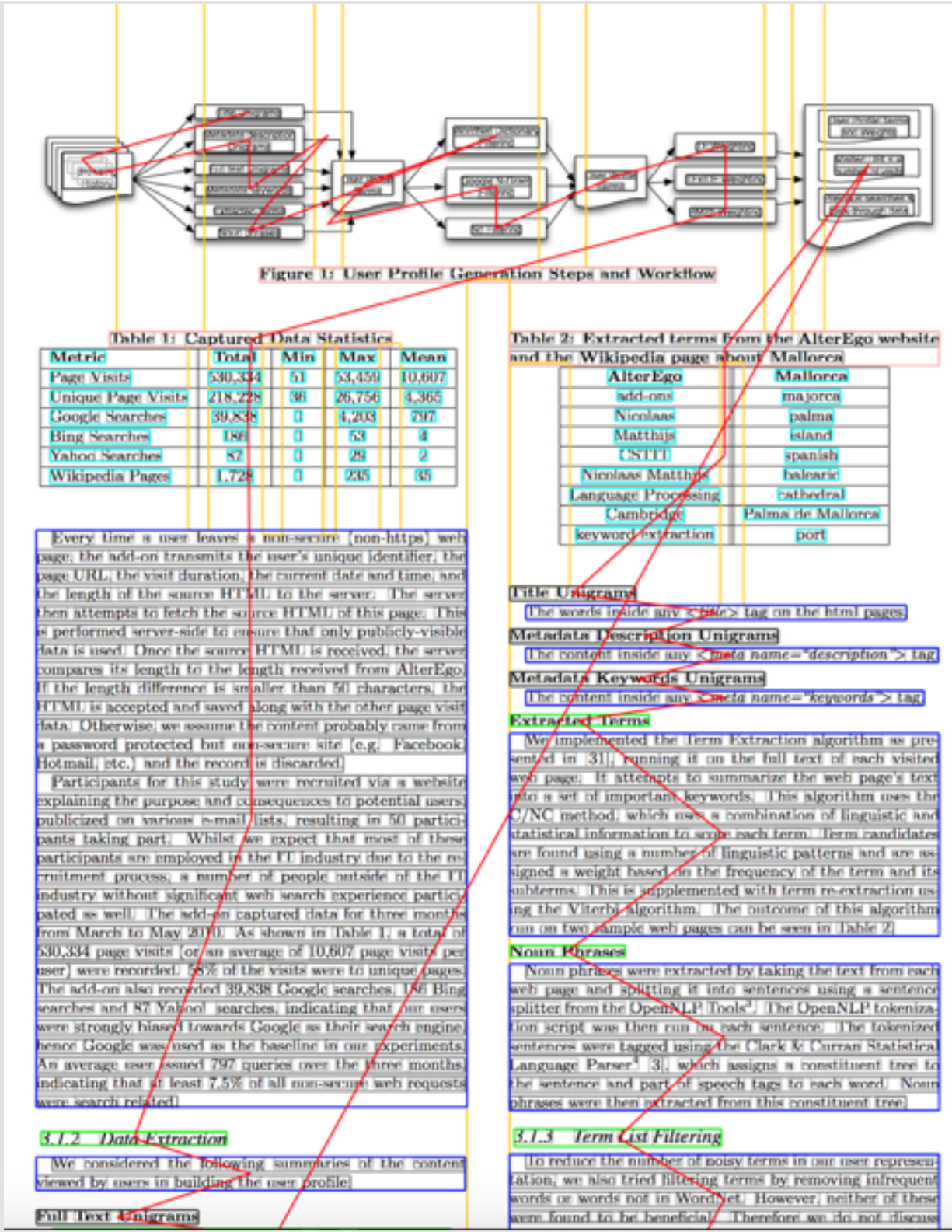
Automated Accessibility Checklist

- Automated accessibility checklist based on content type
- Based on WCAG 2.0 AA

Machine Learning Algorithms

- Full structural and visual analysis to learn semantics of document

- Identify headings, heading structure, paragraphs, footers, tables, lists, mathematical formulas, etc.



Alternative Accessible Versions

3.1.4 Term Weighting

After the list of terms has been obtained, we compute weights for each term in three ways.

TF Weighting

The most straightforward implementation we consider is Term Frequency (TF) weighting. We define a frequency vector $\vec{F}$ that contains the frequency counts of a given term t_i for all of the input data sources, as shown in Equation (1). For example, f_{title_i} is the number of times a given term t_i occurs in all of the titles in the user's browsing history. We calculate a term weight based on the dot product of these frequencies with a weight vector $\vec{w}$:

$$\vec{F}_{t_i} = \begin{bmatrix} f_{title_i} \\ f_{website_i} \\ f_{text_i} \\ f_{subpage_i} \\ f_{history_i} \\ f_{referrer_i} \end{bmatrix} \quad (1)$$

$$w_{TF}(t_i) = \vec{F}_{t_i} \cdot \vec{w} \quad (2)$$

For simplicity, we limit ourselves to three possible values for each weight w_i: 0, ignoring the particular field, 1, including the particular field, and $\frac{1}{N_i}$, where N_i is the total number of terms in field i. This gives more weight to terms in shorter fields (such as the meta keywords or title fields). We call the last relative weighting.

TF-IDF Weighting

The second option we consider is TF-IDF (or Term Frequency, Inverse Document Frequency) weighting. Here, words appearing in many documents are down-weighted by the inverse document frequency of the term:

$$w_{TF\text{-}IDF}(t_i) = \frac{1}{log(DF_{t_i})} \times w_{TF}(t_i) \quad (3)$$

To obtain IDF estimates for each term, we use the inverse document frequency of the term on all web pages using the Google N-Gram corpus[3].

Personalized BM25 Weighting

The final weight method we consider was proposed by Teevan et al. [28], which is a modification to BM25 term weighting:

3.2 Re-ranking Strategies

Like previous work, we use the user profile to re-rank the top results returned by a search engine to bring up results that are more relevant to the user. This allows us to take advantage of the data search engines use to obtain their initial ranking, by starting with a small set of results that can then be personalized. In particular, [28] noted that chances are high that even for an ambiguous query the search engine will be quite successful in returning pages for the different meanings of the query. We opt to retrieve and re-rank the first 50 results retrieved for each query.

3.2.1 Scoring Methods

When reranking, each candidate document can either be scored, or just the snippets shown on the search engine result page can be scored. We focus on assigning scores to the search snippets as it was found to be more effective for re-ranking search results by Teevan et al. [28]. Also, using search snippets allows a straightforward client-side implementation of search personalization. We implemented the following four different scoring methods:

Matching

For each word in the search snippet's title and summary that is also in the user's profile, the weight associated with that term will be added to the snippet's score:

$$score_M(s_i) = \sum_{j=1}^{N_{s_i}} f_{t_j} \times w(t_j) \quad (5)$$

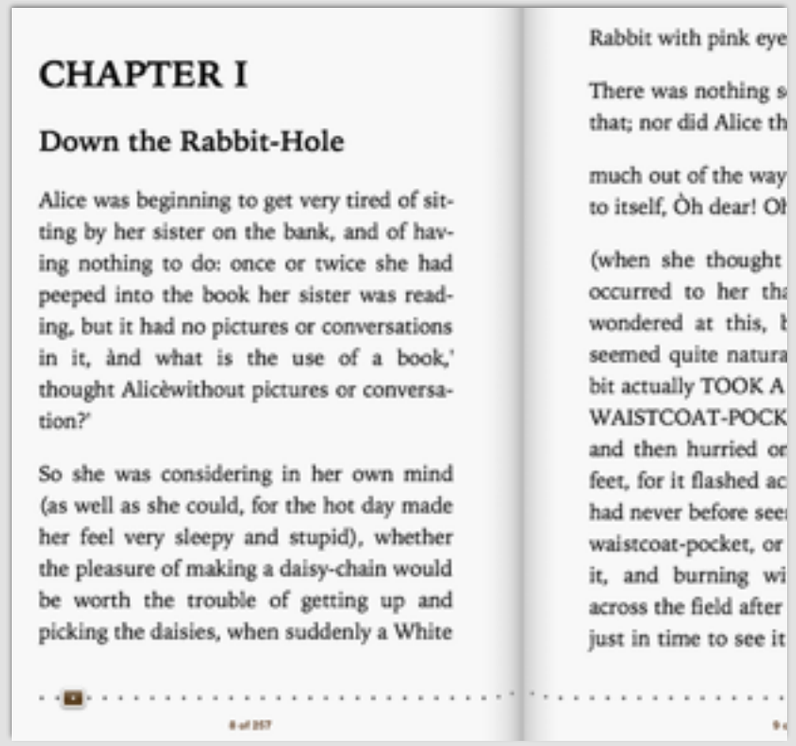
where N_{s_i} represents the total number of unique words within the snippet's title and summary, and f_{t_j} represents the number of occurrences of t_j within the snippet. Words in the snippet title or summary but not in the user's profile do not contribute towards the final score. This method is equivalent to taking the dot product between the user profile vector and the snippet vector.

Unique Matching

A second search snippet scoring option we consider involves counting each unique word just once:

$$score_{UM}(s_i) = \sum_{j=1}^{N_{s_i}} w(t_j) \quad (6)$$

Language Model



CHAPTER I

Down the Rabbit-Hole

Alice was beginning to get very tired of sitting by her sister on the bank, and of having nothing to do: once or twice she had peeped into the book her sister was reading, but it had no pictures or conversations in it, ànd what is the use of a book,' thought Alicèwithout pictures or conversation?'

So she was considering in her own mind (as well as she could, for the hot day made her feel very sleepy and stupid), whether the pleasure of making a daisy-chain would be worth the trouble of getting up and picking the daisies, when suddenly a White

Rabbit with pink eye

There was nothing s
that; nor did Alice th

much out of the way
to itself, Òh dear! Oh

(when she thought
occurred to her tha
wondered at this, b
seemed quite natura
bit actually TOOK A
WAISTCOAT-POCK
and then hurried or
feet, for it flashed ac
had never before see
waistcoat-pocket, or
it, and burning wi
across the field after
just in time to see it

HTML

High quality semantic HTML version of the content

Enhance original

Automatically inject fixes into the original document

Other alternative formats

ePub, audio, electronic braille, etc.

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Personalizing Web Search using Long Term Browsing History

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ABSTRACT

Personalizing web search results has long been recognized as an avenue to greatly improve the search experience. We present a personalization approach that builds a user interest profile using users' complete browsing behavior, then uses this model to rerank web results. We show that using a combination of content and previously visited websites provides effective personalization. We extend previous work by proposing a number of techniques for filtering previously viewed content that greatly improve the user model used for personalization. Our approaches are compared to previous work in offline experiments and are evaluated against unpersonalized web search in large scale online tests. Large improvements are found in both cases.

Categories and Subject Descriptors

H.3.3 [**Information Storage and Retrieval**]: Information Search and Retrieval

General Terms: Algorithms, Experimentation

Keywords: AlterEgo, Browsing History, Evaluation, Personalized Web Search, Interleaving, Ranking, User Profile

1. INTRODUCTION

Although web search has become an essential part of our lives, there is still room for improvement. In particular, a major deficiency of current retrieval systems is that they are not adaptive enough to users' individual needs and interests (e.g. [27]). This can be illustrated with the search query "ajax". This query will return results about Ajax based web development, about the Dutch football team Ajax Amsterdam, and websites about the cleaning product Ajax. Clearly, different users would prefer different results. Additionally, previous research has noted that the vast majority of search queries are short [22, 9] and ambiguous [4, 19]. Often, different users consider the same query to mean different things

Personalizing web search has received a lot of attention by the research community (e.g. [1, 2, 6, 7, 8, 11, 13, 14, 15, 16, 20, 21, 23, 25, 26, 28]). We improve upon this work in two key ways: First, we build an improved user profile for personalizing web search results. Second, we improve upon the evaluation methodology, by performing the first large online comparative evaluation of personalization strategies.

To successfully personalize search results, it is essential to be able to identify what types of results are relevant to users. Two alternatives are: (1) ask users to label documents as more personally relevant or not, and (2) infer personal relevance automatically. As the former approach requires extra effort from users, we opt for the latter. In particular, the content of all the web pages visited by users, along with the users' particular behavior on web search results, is used to build a user model. This data was collected using a Firefox add-on created for this purpose. The profile constructed is then used to rerank the top search results returned by a non-personalized web search engine. The key difference from previous work in the profiles we construct is that we parse web page structure, using term extraction and part of speech tagging to extract noun phrases to refine the user model. We show that this yields significant retrieval improvements over web search and other personalization methods, without requiring any effort on the user's part, and without changing the user's search environment.

Second, most previous work on search personalization has involved an evaluation using either (1) a small number of users evaluating the relevance of documents for a small set of search queries not representative of a real workload, (2) the TREC query and document collection, and simulating a personalized search setting, or (3) an after-the-fact log based analysis. Improvements found using these methods do not necessarily translate to actual improvements in user search experience on a real query workload. In this work, we start by using document judgments obtained from a small number of users for 72 queries to assess potential approaches. We then select three methods for complete online evalua-

In general, online metrics are harder to improve than offline metrics. First, bringing a relevant result to a position where it is not clicked has no effect: For example, a result moved up from rank 8 to rank 3 will have no effect if the user only selects the rank 1 result. Second, it measures performance on complete query workload, avoiding placing an emphasis on a small sample of typical queries. In consequence, such online methods provide a more reliable measurement as to whether personalization yields a real improvement.

4.1 Evaluation Design

This last online approach, interleaved evaluation, is most sensitive and reliable, and best reflects real user experience. It would thus be preferred for evaluating a personalized search system. However, our user profile generation and re-ranking steps both have a large number of parameters, and it is infeasible to perform an online evaluation for all of them. Hence, we start with an offline NDCG based evaluation to pick the optimal parameter configurations, that we then evaluate with the more realistic and harder online interleaved evaluation.

5. OFFLINE EVALUATION

We now describe how we collected relevance judgments for offline evaluation, and how these were used to identify the most promising personalization strategies to evaluate online.

5.1 Relevance Judgements

Six participants who had installed the AlterEgo plugin were recruited for an offline evaluation session. At that point, two months of browsing history had been recorded and stored for each. Mirroring the approach in [28], each participant was asked to judge the relevance of the top 50 web pages returned by Google for 12 queries according to the criteria in Table 3. The documents were presented in a random order, and required the users to look at the full web pages rather than the result snippets.

Participants were first asked to judge their own name (Firstname Lastname) as a warm-up exercise. Next, each participant was presented with 25 general queries in a random order, consisting of sixteen taken from the TREC 2009 Web Search track and nine other UK focused queries such as "football" and "cambridge". Each participant was asked to judge 6 of these. Next, each participant was presented with their most recent 40 search queries (from their browsing history) and were asked to judge 5 for which they remembered the returned results could have been better. Examples of selected queries of both types are shown in Table 4.

On average, each participant took about 2.5 hours to complete this exercise. Particularly interestingly, *all* participants mentioned that during the exercise they came across useful websites of which they were previously unaware, indicating that there is a potential for search personalization

Table 3: Offline relevance judgement guidelines

(a) Select *Not Relevant* if the document is not useful and not interesting to you.
(b) Select *Relevant* if the document is interesting to you, but is not directly about what you were hoping to find or if the document is somewhat useful to you, meaning that it touches on what you were hoping to find (maximum 1 paragraph), but not very extensively.
(c) Select *Very Relevant* if the document is useful or very interesting to you, i.e. it is what you were hoping to find.

Table 4: Some queries selected by study participants

Prepared Queries	History-Based Queries
Cambridge	Abbey Pool
GPS	BBC
Website design hosting	Titanium iPhone
Volvo	Vero Moda

The following reranking parameters were investigated:

- The four snippet weighting methods: Matching, Unique Matching, Language Model and PClick
- Whether or not to consider the original Google rank
- Whether or not to give extra weight to previously visited URLs. A weight of $v = 10$ was used because this appeared to give the best performance in early tests

For every profile and ranker combination, the mean personalized NDCG@10 was measured as follows:

$$NDCG@10 = \frac{1}{Z}\sum_{i=1}^{10}\frac{2^{rel_i}-1}{\log_2(1+i)} \quad (11)$$

where rel_i is the relevance judgement of the document (non-relevant = 0, relevant = 1 and very relevant = 2) and Z is such that the maximum NDCG for each query is 1. In all of these following results, we compare NDCG scores that have been averaged across all queries and all users.

5.2.1 *Reranking Performance*

We selected four user profile and re-ranking parameter settings to evaluate further, summarized in Table 5. We compared these with several baselines. Our results are summarized in Table 6. All reported significance figures were obtained using a two-tailed t-test.

We compare the performance of our approach against are the default (non-personalized) Google ranking, term reweighting as proposed by Teevan et al. [28] and the PClick method [7]. These results agree with previously published results,

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Personalizing Web Search using Long Term Browsing History

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1. INTRODUCTION

Although web search has become an essential part of our lives, there is still room for improvement. In particular, a major deficiency of current retrieval

5.2 Results and Discussion

The following parameters were investigated for profile generation, representing the different steps shown in Figure 1:

- All combinations of the six different input data sources with three possible values for α (0, 1 and normalized)
- Three term weighting methods: TF, TF-IDF and pBM25

Table 3: Offline relevance judgement guidelines

a. Select Not Relevant if the document is not useful and not interesting to you.
b. Select Relevant if the document is interesting to you, but is not directly about what you were hoping to find or if the document is somewhat useful to you, meaning that it touches on what you were hoping to find (maximum 1 paragraph), but not very extensively.
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(11)
where reli is the relevance judgement of the document (nonrelevant = 0, relevant = 1 and very relevant = 2) and Z is such that the maximum NDCG for each query is 1. In all of these following results, we compare NDCG scores that have been averaged across all queries and all users.

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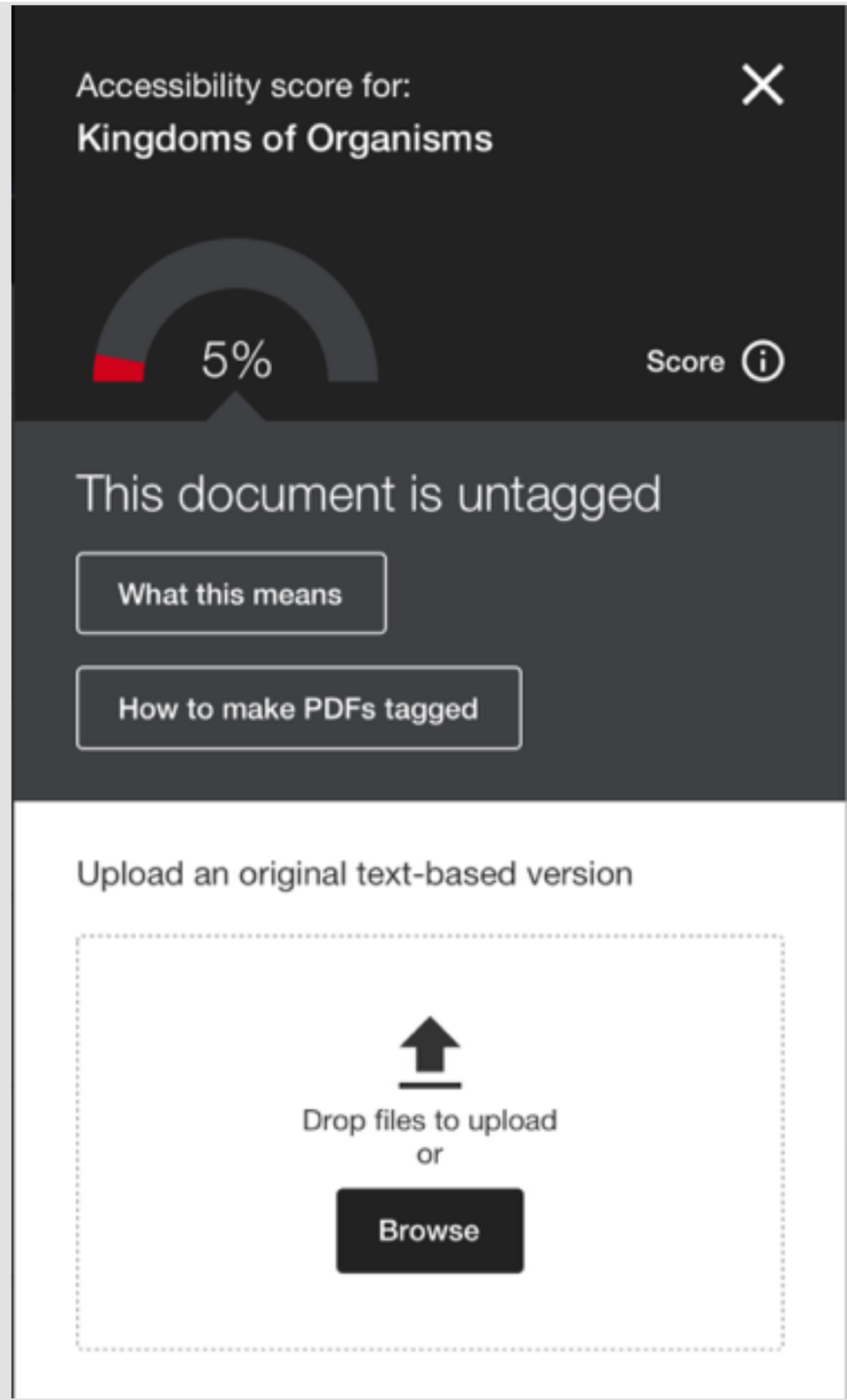
- Provide guidance on how to fix accessibility issues

- Aims to generate change in behavior over time



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Personalizing Web Search using Long Term Browsing History

Biofuel Production Cycle

Adaptations to the environment

Kingdoms of Organisms

Adaptative Radiation in Galapagos Finches

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General Terms: Algorithms, Experimentation

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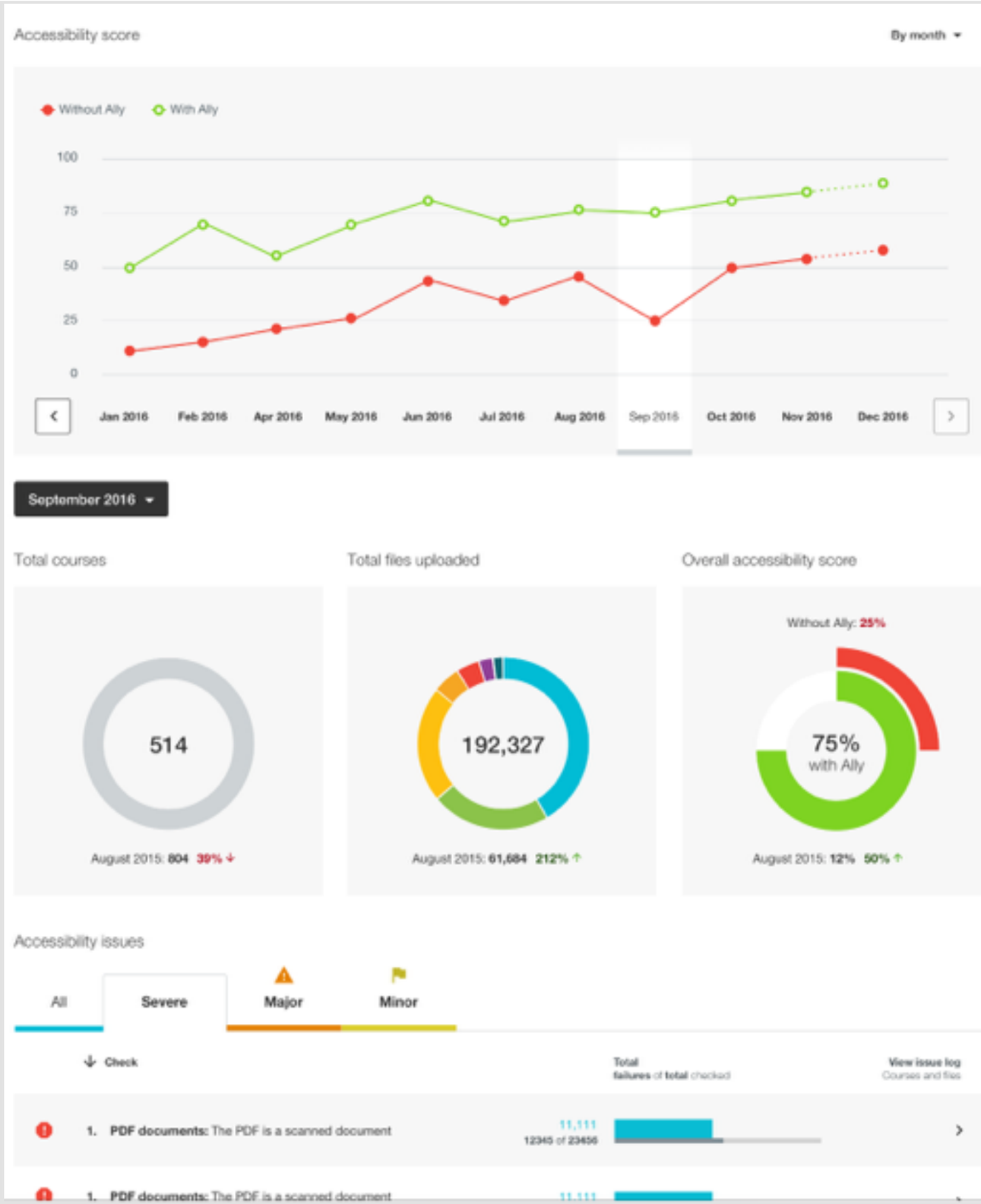

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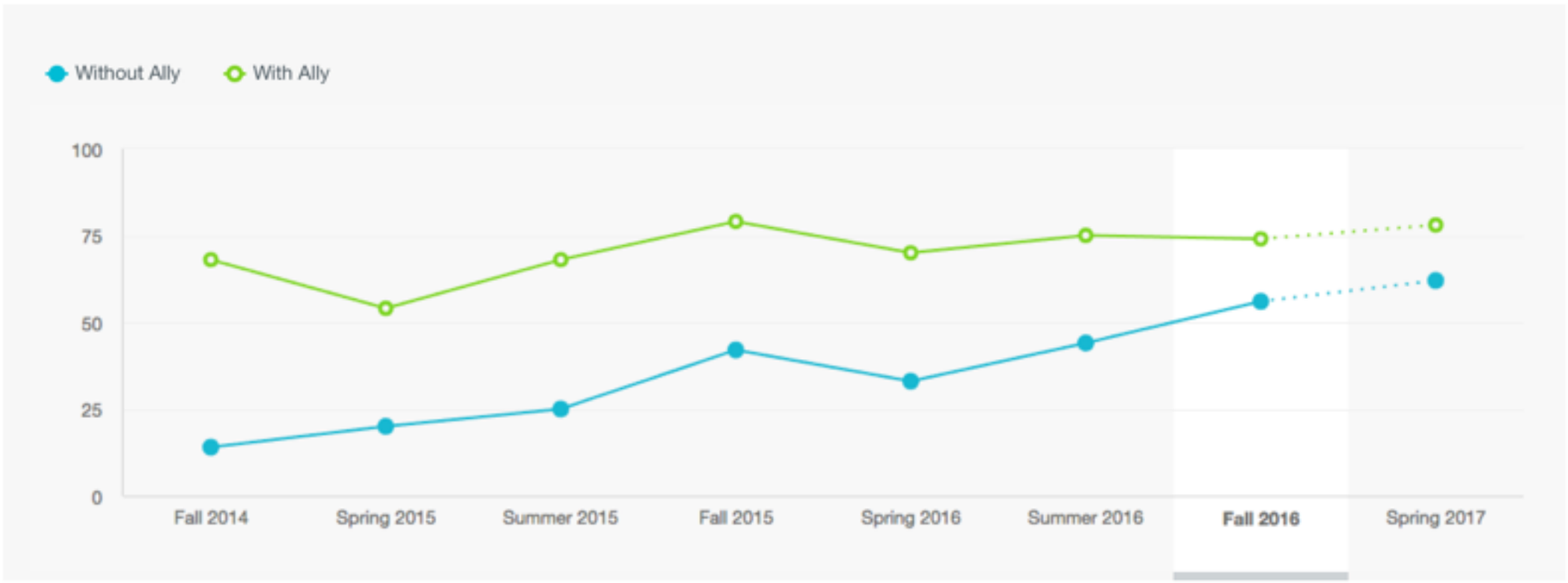

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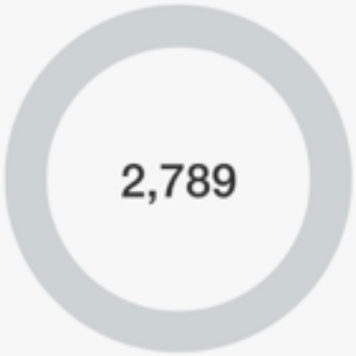
Overall accessibility score

Total courses



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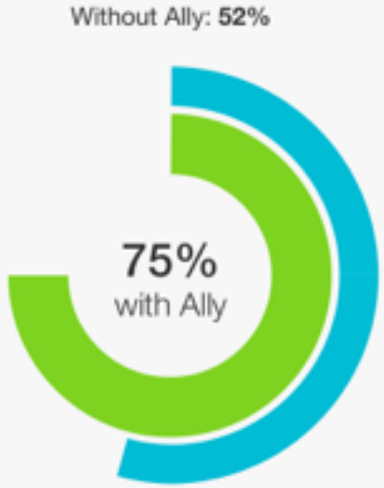

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All | **Severe** | **Major** | **Minor**

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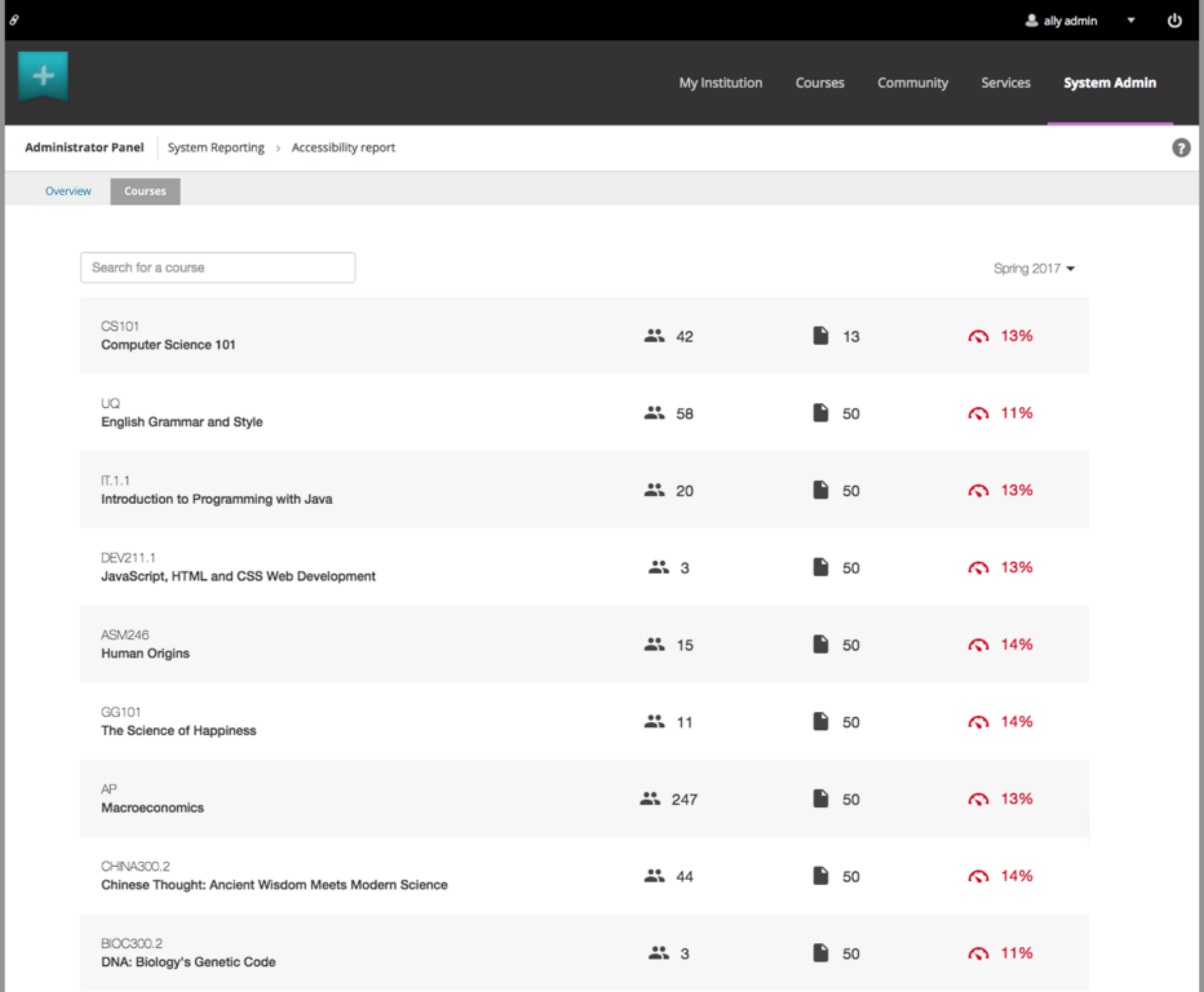
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Computer Science 101

4 Go to course

Total files uploaded

Overall accessibility score

Accessibility issues

All | **Severe** | **Major** | **Minor**

Check

Total failures of **total** checked

1. **Image:** The image does not have an alternative description — 7 of 7

Accessibility issues

All | **Severe** | **Major** | **Minor**

Check	Total failures of total checked
1. **Image:** The image does not have an alternative description	7 of 7
2. **Document:** The document does not have a language set	5 of 7
3. **Document:** The document is untagged	4 of 7
4. **Image:** The image can induce seizures	2 of 7
5. **Document:** The document is scanned	2 of 7
6. **Document:** The document has contrast issues	1 of 7
7. **Document:** The document does not have any headers	1 of 7

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CS 101

Computer Science 101

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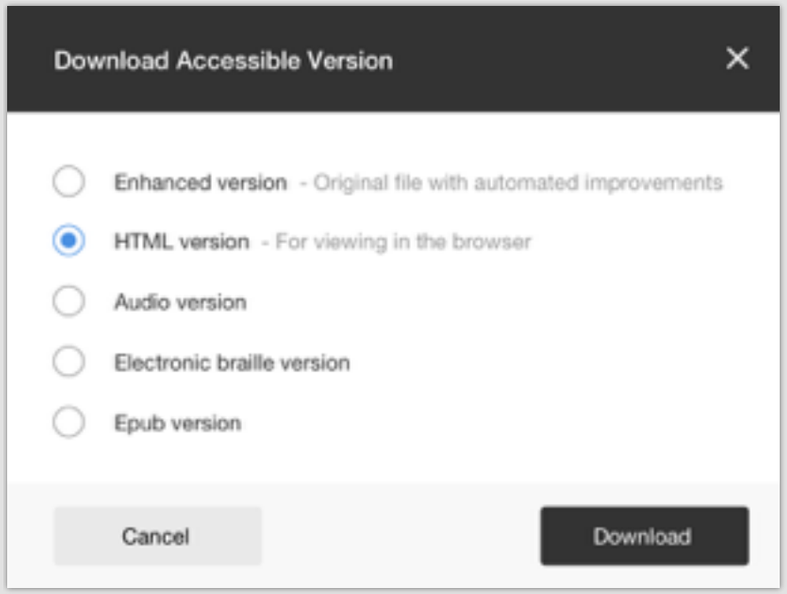
Image:

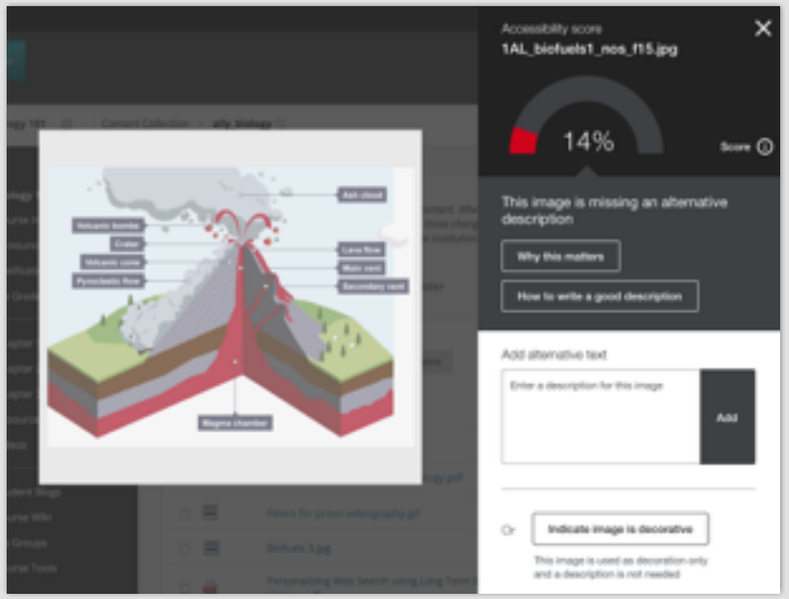
The image does not have an alternative description

These images do not have a description or alternate text. People with screen readers or other assistive devices rely on this description to understand the image's contents and purpose. Having a clear description for an image can help everyone better understand the content of the image and how it relates to the context.

Items with this accessibility issue

seizure_inducing.gif	0%
out_000.jpg	25%
out-13.jpg	25%
ally-db.png	25%





Alternative Accessible Versions

Automatically checks for accessibility issues and generates alternative accessible formats

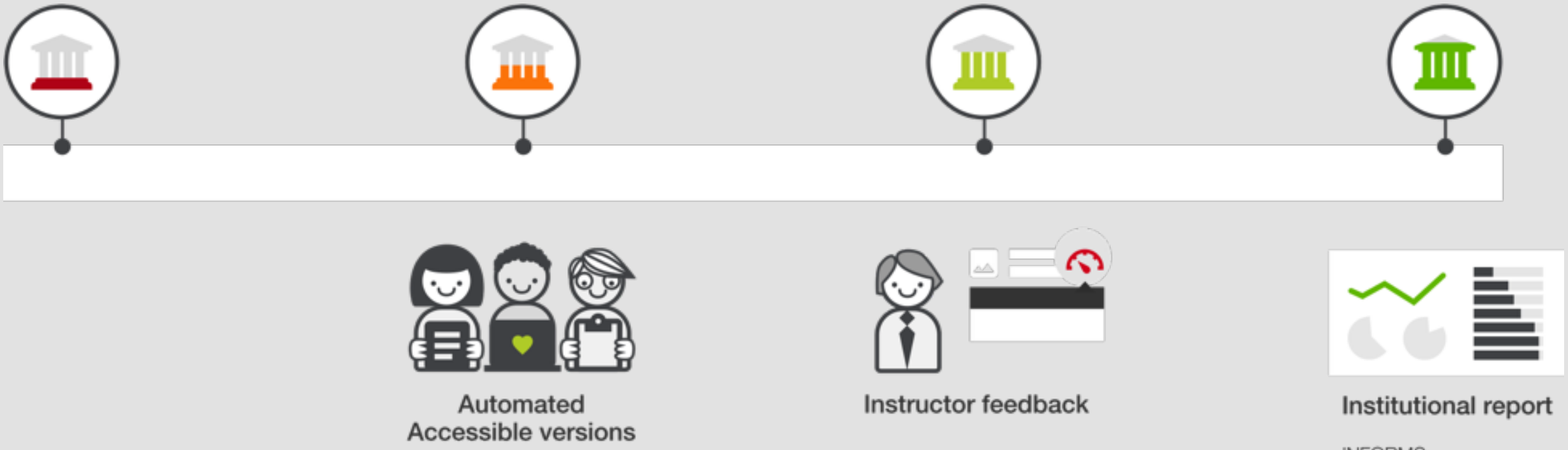
Instructor feedback

Guides instructors on how to improve the accessibility of their course content and alters future behavior

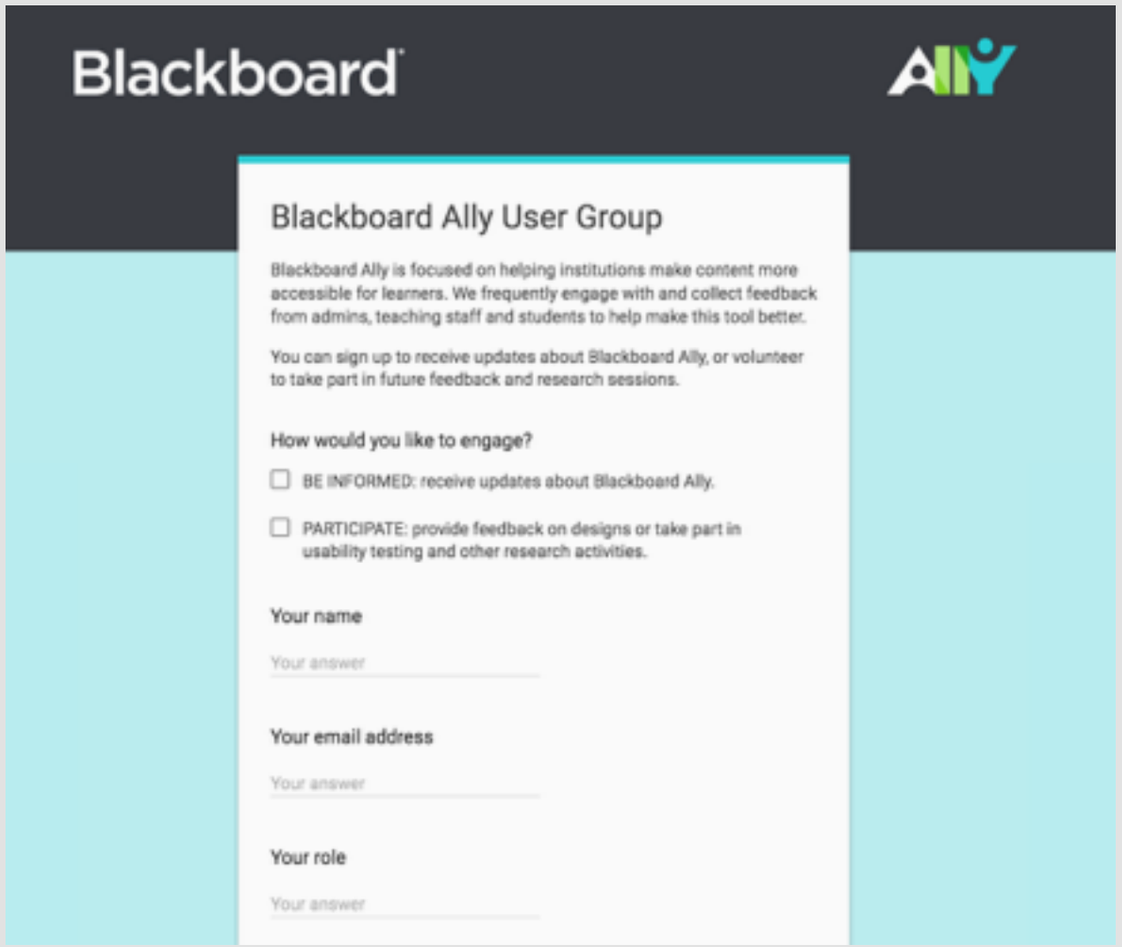
Institutional report

Provides detailed data and insights to help further improve course content accessibility at the institution

Accessibility Spectrum



Ally User Group



- Receive updates about Blackboard Ally
- Participate in UX research, usability testing, early access, etc.

Sign up at http://tinyurl.com/blackboard-ally-user-group

Blackboard®

Making course content accessible