

CSE4015: Human Computer Interaction

J-Component Final Report

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A2 + TA2

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Abstract

Learning system for blind students is a learning website portal, which is designed to help and fulfil the needs of the students with visual disabilities. E-learning system is the future of education as it provides the flexibility for students to access materials and learn on their own pace. It is cost effective as it reduces the travelling time and money, thereby making it convenient for the disabled students to learn from their home. The system uses various methods and techniques in order to provide an effective and efficient learning experience to students. It adopts technologies like text-to speech for helping the students to understand topics better. This allows students to effectively communicate with E – learning system in cases like answering questionnaires, MCQ and essays etc. This provides a safe environment for the disabled students to concentrate on their education and an effective way to learn.

Introduction

In a world where the role of education is becoming increasingly important, it has become essential for survival. Jobs that were once upon a time given to people with mere High School Diplomas are now demanding for at least a Top Score in the college Undergraduate level or completion of a higher education (Graduate/Post-grad). It is also important to realise that the level of awareness towards people with disabilities has increased tremendously. Now it has come to a point where individuals with disabilities are slowly coming to be respected and treated like equals.

This raises an important point, to improve the quality and ease of education for individuals with disabilities. Our project - Education For All (E4A) - focuses on providing an accessible platform for educating partially or fully blind students. In an ever-competing society, for these individuals with disabilities to be given a fair chance is something to be regarded with a high level of importance.

Requirement Analysis

Stakeholders:

People who visit the site are likely:

1. Students- Can Be blind people , or people with or without a disability.
2. Teachers – Add Material on the website
3. Admin: People who maintain the website
4. Designers: People who create the website

Requirements based on Profiles

1) Students-

- Use accounts for learning

- Use accounts for 2-4 hours a day
- Students can have disabilities/not (though, website is designed to cater to those with)
- Have stable internet connection
- Would prefer online learning
- Primary language would be English

2) Teachers-

- Add content to the website.
- Log in occasionally to make changes.
- Grades students if there are any assessments

3) Admin-

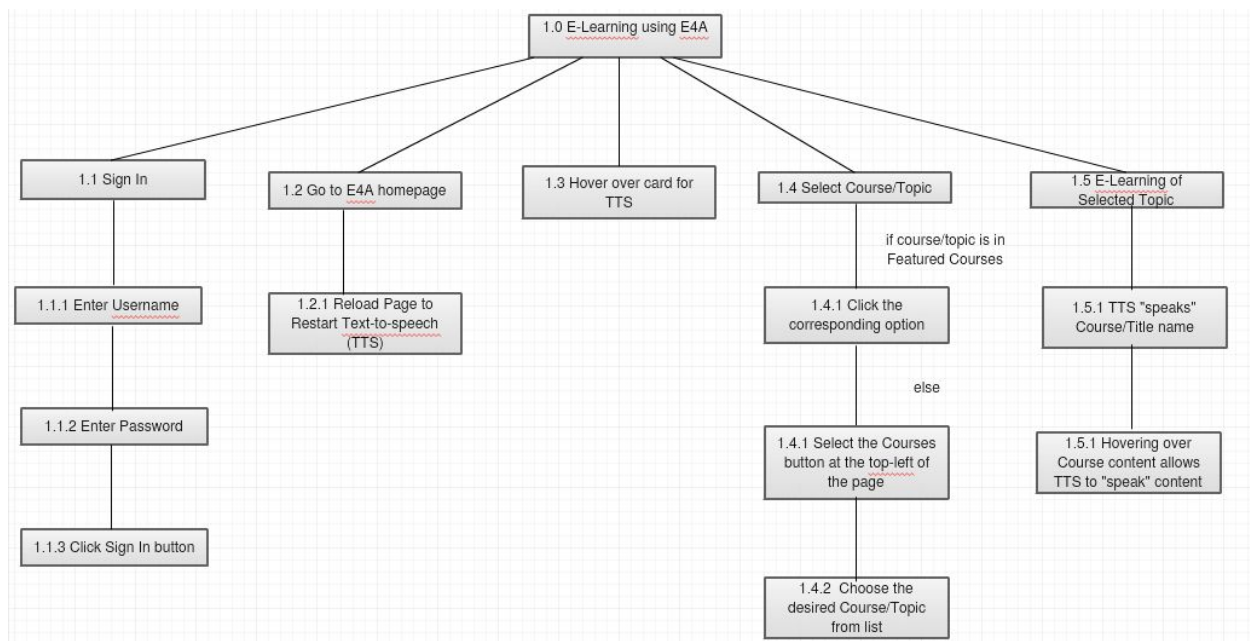
- Makes changes to the website when necessary, in case of errors , or for improving UI.
- Code from original Designers must be accessible

4) Designers-

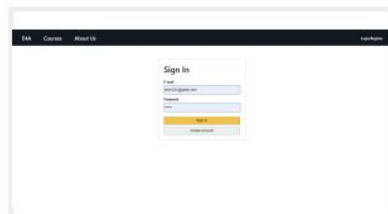
- Concept/ Idea for website
- Consumer base or target audience

Data Flow

Hierarchical Task Analysis

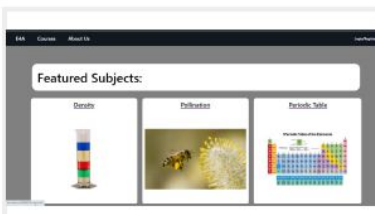


Storyboard



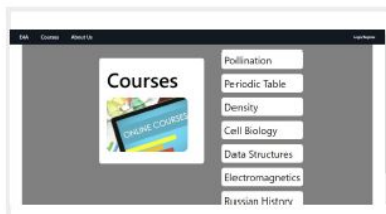
SCRIPT
Sign in to your Account

ACTION
Enter Username
Enter Password
Click Sign in



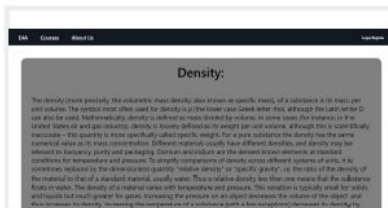
SCRIPT
Homepage

ACTION
Hover over cards for Text-to-Speech



SCRIPT
Courses

ACTION
Select desired course from list
Hover over card for Text-to-Speech



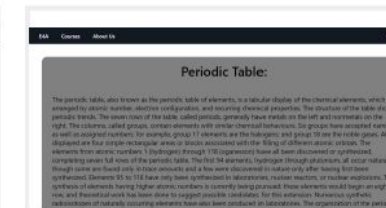
SCRIPT
Subject - Density

ACTION
Text-to-Speech of content when cursor hover



SCRIPT
Subject - Pollination

ACTION
Text-to-Speech of content when cursor hover



SCRIPT
Subject - Periodic Table

ACTION
Text-to-Speech of content when cursor hover

Design Screenshots

Sign in



Sign In

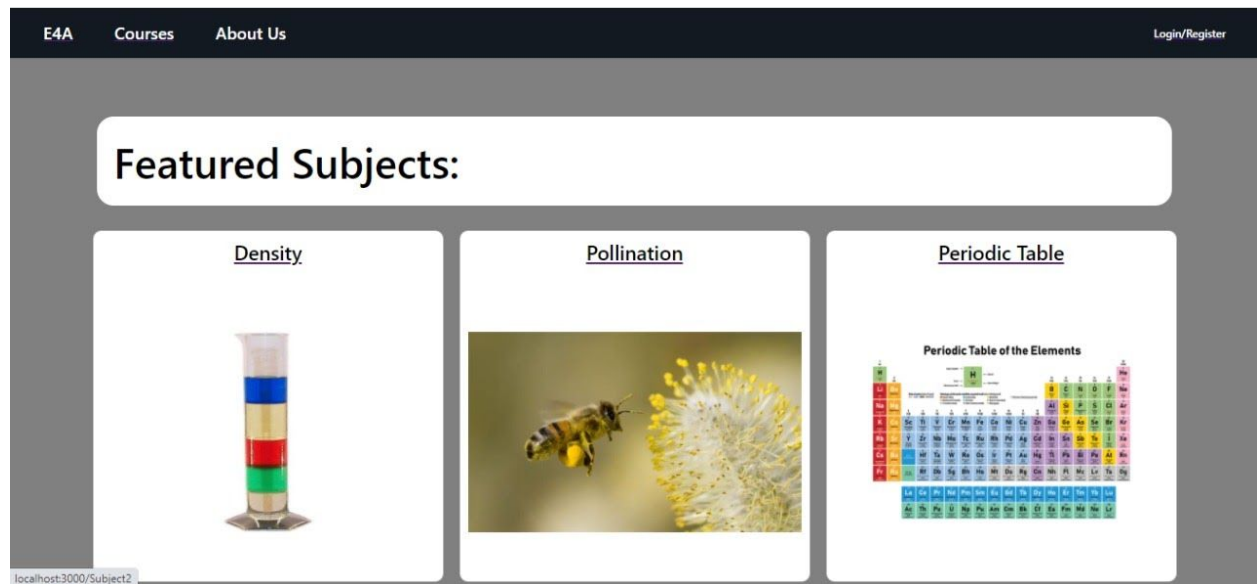
E-mail

Password

[Sign In](#)

[Create Account](#)

Homepage



Subject 1 - Density

Density:

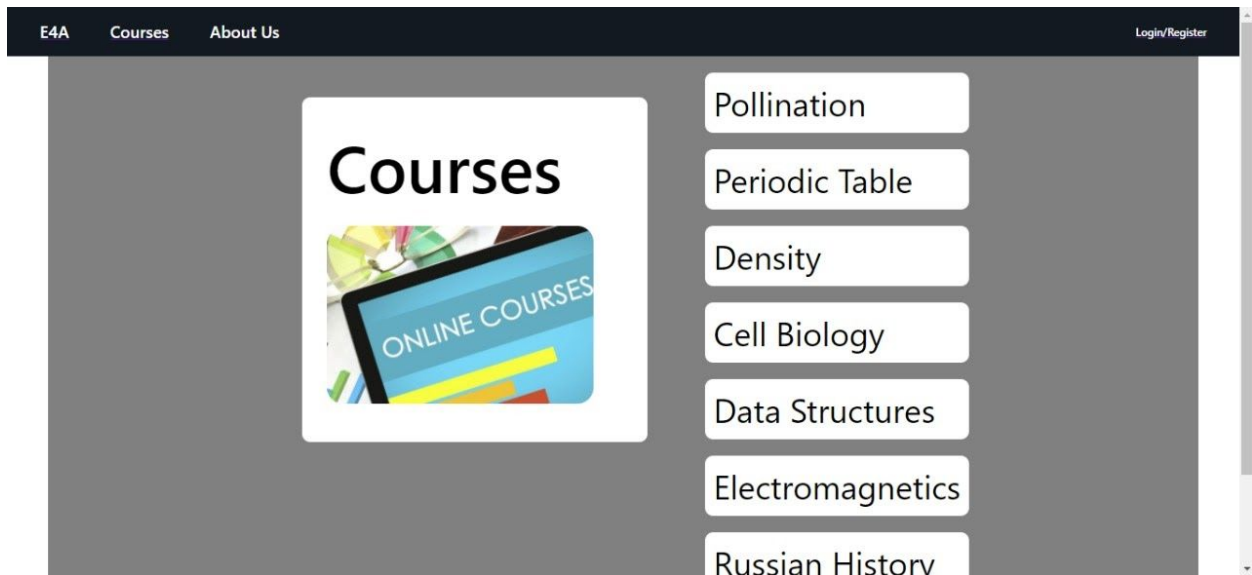
The density (more precisely, the volumetric mass density; also known as specific mass), of a substance is its mass per unit volume. The symbol most often used for density is ρ (the lower case Greek letter rho), although the Latin letter D can also be used. Mathematically, density is defined as mass divided by volume. In some cases (for instance, in the United States oil and gas industry), density is loosely defined as its weight per unit volume, although this is scientifically inaccurate – this quantity is more specifically called specific weight. For a pure substance the density has the same numerical value as its mass concentration. Different materials usually have different densities, and density may be relevant to buoyancy, purity and packaging. Osmium and iridium are the densest known elements at standard conditions for temperature and pressure. To simplify comparisons of density across different systems of units, it is sometimes replaced by the dimensionless quantity "relative density" or "specific gravity", i.e. the ratio of the density of the material to that of a standard material, usually water. Thus a relative density less than one means that the substance floats in water. The density of a material varies with temperature and pressure. This variation is typically small for solids and liquids but much greater for gases. Increasing the pressure on an object decreases the volume of the object and thus increases its density. Increasing the temperature of a substance (with a few exceptions) decreases its density by

Subject 3 - Periodic Table

Periodic Table:

The periodic table, also known as the periodic table of elements, is a tabular display of the chemical elements, which are arranged by atomic number, electron configuration, and recurring chemical properties. The structure of the table shows periodic trends. The seven rows of the table, called periods, generally have metals on the left and nonmetals on the right. The columns, called groups, contain elements with similar chemical behaviours. Six groups have accepted names as well as assigned numbers: for example, group 17 elements are the halogens; and group 18 are the noble gases. Also displayed are four simple rectangular areas or blocks associated with the filling of different atomic orbitals. The elements from atomic numbers 1 (hydrogen) through 118 (oganesson) have all been discovered or synthesized, completing seven full rows of the periodic table. The first 94 elements, hydrogen through plutonium, all occur naturally, though some are found only in trace amounts and a few were discovered in nature only after having first been synthesized. Elements 95 to 118 have only been synthesized in laboratories, nuclear reactors, or nuclear explosions. The synthesis of elements having higher atomic numbers is currently being pursued: these elements would begin an eighth row, and theoretical work has been done to suggest possible candidates for this extension. Numerous synthetic radioisotopes of naturally occurring elements have also been produced in laboratories. The organization of the periodic

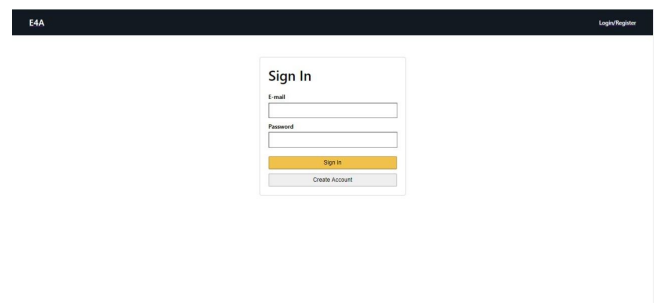
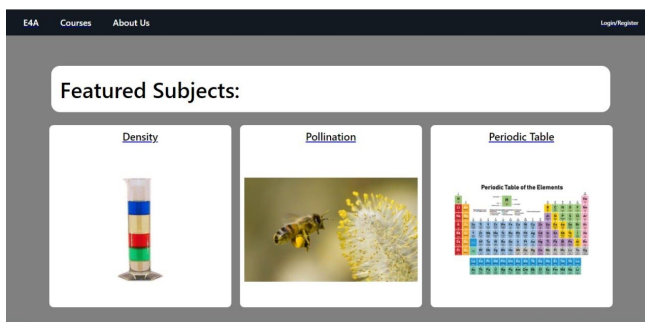
All Courses



Sneiderman's 8 Golden Rules in our Website

1. Strive for Consistency

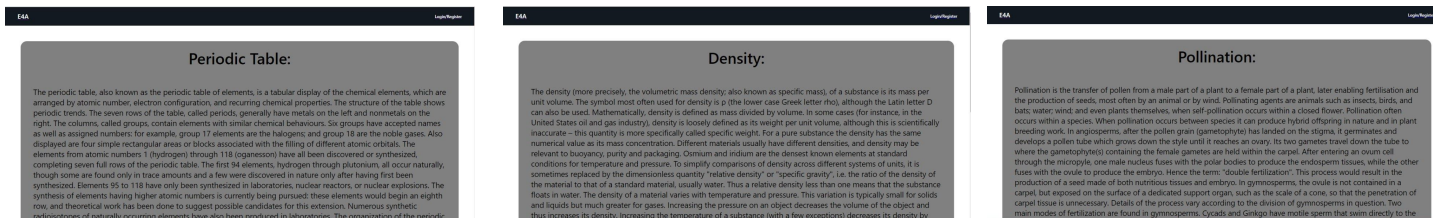
- Every page has the same scheme of color and font
- Design is more simple and large-sized compared to normal e-learning platforms to cater to the clicking accuracy error for blind individuals (easier to click bigger options)



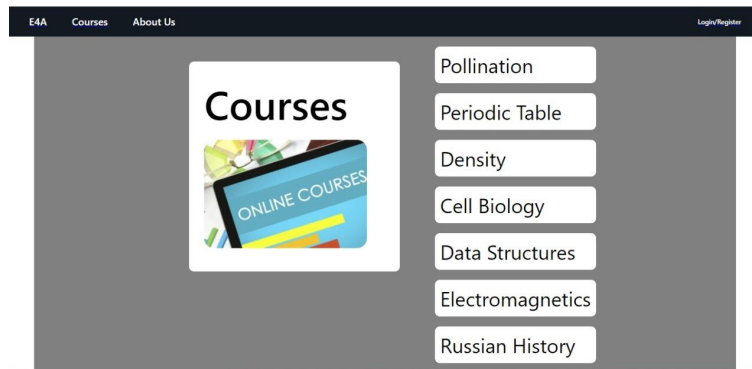
2. Enable Frequent Users to use Shortcuts

- Although visually impaired, over the course of time, blind individuals have an understanding of the layout of a QWERTY keyboard (or whichever keyboard they have used) to a great extent through experience
- To use this to our advantage we will work on creating shortcuts for some functions
- For now, the logo is a shortcut to access the homepage

- Future shortcuts might include, ctrl + alt + h for help, ctrl + alt + s for speech (read text on screen), etc
3. Offer Informative Feedback
 - System uses audio to inform the user on the status, and also to help the user navigate through each necessary step to be carried out
 4. Design Dialog to Yield Closure
 - As the platform is an educational one, the amount of guessing to be done by the user is minimal. Especially with aid of the speech function.
 - As mentioned before, the system uses audio to inform the user of his/her status
 5. Offer Simple Error Handling
 - The only error that can happen is that of login, and in this case there will be a pop-up notification alerting the user of the error
 6. Permit Easy Reversal of Actions
 - The platform is for e-learning therefore the major actions will be user going to a new page. Reversing this can be done normally through using the “Previous Page” option on any browser.
 - Additionally, a shortcut can be added to make this easier for the users.
 7. Support Internal Locus of Control
 - Being an E-learning platform, internal locus of control is a given for the users. Their actions will affect which page is shown, whether or not the information is read, which topic is selected, and so on.



8. Reduce Short-Term Memory Load
 - This can primarily be achieved by prioritising Recognition over Recall
 - The website has no requirement to Recall apart from login details, and even those can be autosaved to make things easier
 - The user has no need of remembering any long or tedious processes for navigating the website



Testing

Usability Test

Positives observed by a person when accessing the website with both eyes closed :

- The explanation about each and every component was clear, which makes it easy to use the website while hovering over the icons.
- The structure of the website is very simple and gaps are provided for all the icons.
- The icons' sizes are big enough to avoid the audio of one icon getting mixed with the other icon's audio.
- The steps to be followed for accessing the lesson are simple, so the user won't get tired or irritated easily.
- When using the website if the user hovers from the explanation of one topic to another and comes back, the audio will continue from where it was paused .

Negatives observed by a person when accessing the website with both eyes closed

- There is no remember me option in the login page which makes the user to enter credentials every time while accessing the website.
- When hovering from another icon the explanation continues from where it was paused making the user wait until the explanation is complete.
- If the user unexpectedly presses the reload then all the explanations will start from the beginning.
- No login for blind people.

How to solve the problems:

- Making some sort of login for the blind.
- In the login, having a remember me option so that credentials are saved for next time.
- Option to save where you left off while learning.

- More content has to be there, especially interactive. So in the future, text to speech can be used for assignments

Interface Testing

Test Case for Login page

Test Case ID	Test Scenario	Test steps	Test Data	Expected Results	Actual Results	Pass/Fail
1	No login credentials Provided	Press login button		Error	Error	Pass
2	Wrong login Credentials	Enter wrong credentials and press login button		Error	Error	Pass
3	Wrong username and correct password	Enter the wrong username and correct Password and press login button		Error	Error	Pass
4	Correct username and wrong password	Enter wrong username and correct password and press login button		Error	Error	Pass

5	Correct credentials	Enter correct username and password and press login button		Redirected to homepage	Redirected to homepage	Pass
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Test Cases for Homepage:

Test Case ID	Test Scenario	Test steps	Test Data	Expected Results	Actual Results	Pass/Fail
1	Hover over the header	Move the mouse over the header section of the page		Audio related to each component of the header part	Each component speaks out	Pass
2	Hover over the subject icons	Move the mouse over the subject icons		Audio related to each subject name	Audio is present	Pass
3	Reloading the page	Press reload button		Instructions are to be repeated	Instructions are repeated	Pass
4	Hover again over the icon whose audio has already been played	Move the mouse over the icon whose audio has		The audio of the icon should repeat again	The audio of the icon repeats again	Pass

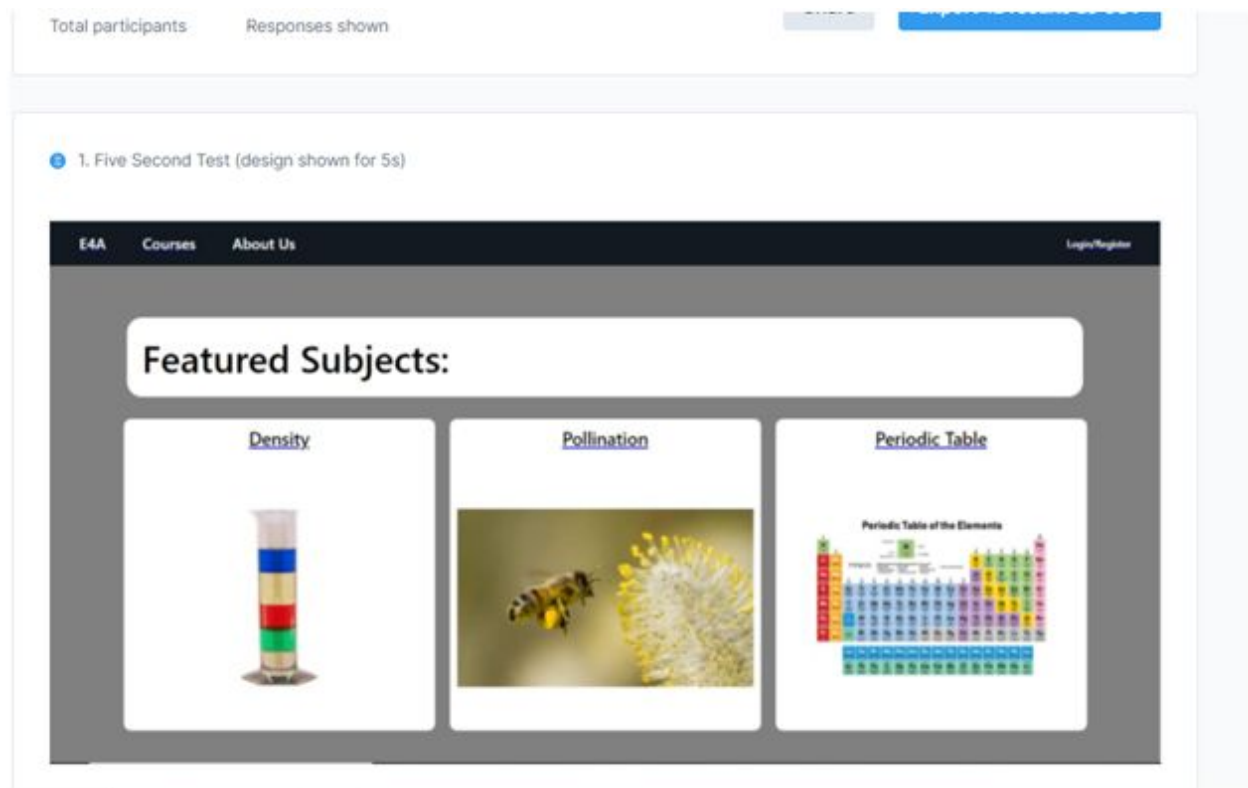
		been played				
5	Press the icon	Press any icon		It should redirect to page to which the icon has been linked	Redirected to page	Pass

Test Cases for particular subject:

Test Case ID	Test Scenario	Test steps	Test Data	Expected Results	Actual Results	Pass/Fail
1	As the subject page is loaded	Nothing is to be done		Audio should be played about steps to be taken.	Nothing is done	Fail
2	Hover over the matter	Move the mouse over the matter		Audio should start playing about the matter	Audio plays	Pass
3	Hover over the header of the page	Move the mouse over the header section		Audio about each component of header section	Each component speaks out	Pass
4	Connection to the page	Close the website and open it again		The user should be logged in the page	User is not logged in	Fail

5	Hovering again over the matter	Move the mouse over the matter whose audio has been already played		The audio should play from the part where the audio is paused	The audio continues from where stopped	Pass
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Acceptance Testing — 5 Second test



13 of 14

FiltersParticipants

Answers1

Country

☐ India10
 ☐ United Arab Emirates2

Gender1

Age range1

Education level1

Employment status1

1b. Short text question

Would audio while clicking the websites, for people with visual disabilities, be an improvement to the website.

Answers 12
 Tags 0
 Word cloud

☐ Select all
 Search responses
 Add/edit tags

☐ Yes

☐ Yes definitely!!

☐ Yes

☐ Yes

☐ Yes

☐ Yes

☐ Yes

☐ Yes

☐ Yes

☐ Yes

☐ Yes

☐ Yes

☐ Yes

☐ Yes, very helpful

☐ Yes, would definitely make it better.

☐ Maybe

☐ Yes

☐ Yes

Collapse

Conclusion

This project certainly raises the level of education standards for individuals with disabilities which is going to be a vital step for the progression of humanity. For mankind to improve as a collective society, it is integral for the improvement to include individuals from all walks of life. E4A (Education for All) serves to ameliorate the educational system towards this inclusion. With awareness of disabilities increasing every day, these kinds of platforms, designed to cater to specific disabilities are slowly bound to become important. Although this project is not the perfect educational platform for blind individuals, it certainly goes a long way. With small improvements, this can lead to a paradigm shift in the educational platforms used in the future.