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LIST OF ABBREVIATIONS

ABR	DESCRIPTION
UX	User Experience
UI	User Interface
GUI	Graphical User Interface
WCAG	Web Content Accessibility Guidelines
GLP	Gamified Lesson Plan
LMS	Learning Management System

EXECUTIVE SUMMARY

The Graphical User Interfaces (GUI) used in the Beaconing Platform form the front-end user experience (UX) for important Stakeholders such as the Teacher, Parents and Students. It is therefore vital that the GUI proposed is both functional, but also engaging, drawing the user into the whole experience of gamified anytime anywhere learning.

This document outlines the key concepts of UX and UI design. Requirements taken from D3.4 formed the basis of the GUI for students and teachers and provided us with a working prototype of the Beaconing Platform. However, ongoing background studies and feedback received from live workshops, such as the eLSE conference in Bucharest, revealed the shortcomings of the user interfaces. Most notably user experience was not satisfactory and there was a need for innovation to differentiate ourselves from the competition. With this in mind further research was undertaken to ascertain the exact requirements of our Beaconing Users and develop a unique blend of tools and navigable elements that positions Beaconing apart from similar enterprises.

This report sets out these refinements and illustrates how we went about implementing our findings from background studies and stakeholder research. Specific examples of the Teacher, Student & Learning Designer interfaces are detailed in this report, along with descriptions on how the platform can be best used to achieve the learning requirements for all involved. This does not just mean the learning outcomes of students on their journey of study, but also how teachers and learning designers can best learn to first navigate the platform and subsequently take advantage of the platform for their own requirements and goals.

Task 4.5 not only focusses on the creation of interactive visual interfaces, but also the very important aspect of making sure these are fully accessible to those with differing disabilities. Having content accessible to all is a challenge but one worth taking on, which in turn forms the basis of how Beaconing can be pioneering and innovative, yet different all at the same time.

In order to tackle this issue a structured approach of adhering to Web Content Accessibility Guidelines (WCAG) was needed, as well as framing these guidelines to our needs, to assure that content could be read and used by a variety of different assistive software such as screen readers. The second part of this issue was to create a set of specific tools that allowed users with disabilities to access and manipulate the interface directly to suit their needs. The direction decided upon was to develop a unique and innovative toolbar which incorporates tools such as Text to Speech, Magnification, Speech Recognition, font and colour adjustments, reading bars and screen overlays. This unique toolset covers a wide range of learning disabilities as well as Visual Impairment and physical impairment, all combined within a simple, discreet and fully accessible interface.

In light of this, working interfaces are in position for the start of small and large-scale piloting. It is noted that upon feedback from the pilot phase, interfaces will change accordingly and constantly evolve into a platform that is not only a pleasure to use but fulfils the needs of stakeholders and looks great too.

1. INTRODUCTION

The focus of task 4.5 is to provide the relevant users with a set of interfaces that provide a range of interactions and feedbacks. In order to achieve this, extensive research was undertaken in both UX and UI design. The design and implementation of that design for Beaconing sets us apart from other e-learning, gamified platform and social learning platforms in the sense that accessibility is at the forefront of our minds. The Beaconing interface and its content will be able to adapt to the user needs and disabilities, their learning style and progress. Beaconing's innovation goes further in that there are multiple interfaces working in harmony, each with their own set of guidelines and user experience to adhere to, but ultimately coming together with a common goal. To that end interface examples and their functionalities will be shown for the Teacher Interface, Student Interface, Accessibility Interface, Accessibility Profile Wizard and the Authoring Tool. The feedback from small and large-scale pilots will be pivotal in shaping the Beaconing GUI to fit with the perceived requirements from all user groups.

1.1 BACKGROUND

Learning through gaming, serious game platforms, LMS and gamification, authoring tools are not new concepts. That is why it was important to set a background study into what is currently on offer for gamed based learning, anytime, anywhere learning and authoring to outline what needs these systems address well or not well and position Beaconing ahead of the rest in terms of its functionality, innovation and uniqueness. Findings show that some systems are effective, but all have their flaws somewhere or another. Take for example the industry recognised LMS 'AbsorbLMS'. Where it is effective in its ability to have multiple interactive interfaces for different users, such as Admin, Author & Student, it falls down in its lack of accessibility to the content for disabled users and continuity of design throughout the differing log ins.

Beaconing draws upon this research to provide an experience not like any other with innovative tools for users with disabilities. These include a fully interactive toolbar interface called Accessabar which makes content accessible to users of all differing disabilities. A unique Accessibility Profile Wizard compliments this tool. Built into the account set up interfaces, the user will perform several simple exercises to determine whether certain accessibility features are needed in the main interface. Settings can be saved for individual user profiles. There will be differentiation but continuity in design between different user type portals, and the ability to switch in and out of roles within a single sign in account. For example, this allows a teacher to not only view and assign lesson plans within the Beaconing portal but also edit and configure them within the Authoring tool itself. Bring in the gamification, immersive gaming environment, compelling mini games and learning content of the highest quality and this is what sets Beaconing apart from the rest.

Initial research and findings resulted in work previously documented in D3.4 – Interface Design Specification - where elements of the teacher and Student Interfaces were laid out in Prototype form, but functionality was put forward for the creation of the screens going forward. The work presented in this deliverable draws upon D3.4, the feedback received from Interface Mock-ups, conferences and Interviews with Teachers and Students, and the drawing up of exact specifications for the workflow of screens in the Teacher and Student platform. The material presented for accessibility tools and interfaces is built on the results of D3.3 and D3.7 which outlined the most prevalent disabilities amongst our target age group within European educational institutions. Coupled with the experience and expertise of Partners working and

training with special needs, this has resulted in a solid framework for the tools created and illustrated herein.

1.2 ROLE OF THIS DELIVERABLE IN THE PROJECT

The Beaconing interface integrates the relevant components and allows the user to fully interact and navigate around the system. The back-end interface controls how the system communicates internally, and to the external requests. This deliverable places the focus specifically on the front end interfaces. The progress of the project going forward relies heavily on the work presented in this deliverable. The interface plays a key role in the small and large-scale pilots, allowing the users to test the platform properly and get the platform to perform the functions they require.

1.3 APPROACH

The work described in this deliverable has been a collaboration between partners involved with the teaching of material to students, teachers themselves to obtain requirements of the platform, students' expectations, users with differing disabilities in testing, and the technical capabilities of relevant parties to code the screens ready for deployment. Interviews and user experiences were initially led (documented in D3.4) to establish a base of requirements, and since then, they have been moulded and refined according to feedback received from teacher workshops, student presentations, reasonable expectations of the platform capabilities and an evolvment of the ideal thinking behind the Beaconing Platform itself. Specific protocols have been followed to create the best User Experience (UX). These include the five key pieces to a holistic UX process: strategy, research, analysis, design, and production. Adherences to best practices in UI design have been followed in order not to deviate too much from what a user is familiar with. Strict adherence to WCAG 2.0 has been upheld in the coding of screens, as well as the layout and positioning of menus and widgets, to make sure everything is accessible to assistive software and users of this software. User testing has been an important benchmark in improving the design and tools created but again, strict protocols were needed in differing countries to adhere to standards and policies in place. Specification sheets on functionalities have been followed as closely as possible in the coding but as Beaconing develops, concepts and modes of operations will evolve. With that in mind and based on the results of the pilots, the present screens within this deliverable may change.

1.4 STRUCTURE OF THE DOCUMENT

This document outlines the concepts of UX and UI design and illustrates the different interfaces created for Teachers, Students, Accessibility & Learning Designers. The document comprises of the following chapters:

Chapter 1 describes the background to this deliverable, the approach and the role this deliverable fills within the Beaconing Project

Chapter 2 outlines the best practices to follow in UI design, how these have been applied as well as the importance of following WCAG protocols in designing interfaces for accessibility.

Chapter 3 documents the differing interfaces in the Beaconing platform with specific examples of Teacher, Student and Accessibility Interfaces.

Chapter 4 evaluates the findings, progress so far, and suggests key improvements and developments for the future of the design process.

2. PRINCIPLES OF GOOD UX AND UI DESIGN

User Experience (UX) and User Interface (UI) design are both crucial roles in the development cycle of a product interface. Where UX Design is a more analytical and technical field, UI Design is closer to graphic design.

2.1 BEST PRACTICES IN UI DESIGN

User Interface (UI) Design focuses on anticipating what users might need to do and ensuring that the interface has elements that are easy to access, understand, and use to facilitate those actions. UI brings together concepts from interaction design, visual design, and information architecture. Everything stems from knowing your users, including understanding their goals, skills, preferences, and tendencies.

Best Practices in UI Design	
Know Your Audience	Provide a clear picture of what needs will bring people to the platform, and exactly how it will go about providing a design that will draw them in further.
Keep Things Simple and Consistent	The users of the Beaconing Platform should not need a map in order to navigate through everything. To do this, several elements such as colours, typography, feedback messages, and visual hierarchies can be used.
Implement a Visual Hierarchy	The most essential elements of an interface should be highlighted in order to make users focus on them. The simplest example of this technique could be to make an element bigger in order to turn it into a focal point. Other ways through which you can implement a visual hierarchy would be by using white space to highlight crucial parts of the interface.
Make Effective Use of Typography	Another way to establish a visual hierarchy is through the use of typography. Every font has a personality, and choices should be influenced by your audience. Size, of course, also plays a key component when using fonts in design. Important information such as headers are highlighted. Making use of reverse type to make text stand out, contrasting backgrounds to make text pop out.
Use Colour and Contrast Properly	Colours can be used to convey visual hierarchy, establish a relationship between elements, and generally elevate your designs and hold the attention of your users. Maintain some uniformity as to which colours you will be using to convey visual cues and keeping the colour scheme to a relative minimum is an important element to note. Contrasting colours can be used to great effect in order to draw user's attention. A good rule of thumb when choosing which colours to use in your interface is that darker colours tend to carry more visual weight, and these kinds of elements need to be balanced out with lighter colours.
Feedback	Always inform your users of location, actions, changes in state, or errors. The use of various UI elements to communicate status and, if necessary, next steps can reduce frustration for your user.
Choosing Interface Elements	Users have become familiar with interface elements acting in a certain way, so be consistent and predictable in your choices and their layout. Doing so will help with task completion, efficiency, and satisfaction.

	Create consistency and use common UI elements. By using common elements in your UI, users feel more comfortable and can get things done more quickly. It is also important to create patterns in language, layout and design throughout the site to help facilitate efficiency. Once a user learns how to do something, they should be able to transfer that skill to other parts of the site.
Be forgiving	<p>No matter how clear the design is, people will make mistakes. The UI should allow for and tolerate user error. Design ways for users to undo actions and be forgiving with varied inputs. Also, if the user does cause an error, use your messaging as a teachable situation by showing what action was wrong, and ensure that she/he knows how to prevent the error from occurring again.</p> <p>Now let us look at what we need to consider when designing for those with special needs.</p>

Table 1. Best Practices in UI Design

2.2 DESIGNING UI FOR THOSE WITH COGNITIVE AND PHYSICAL DISABILITIES

Often overlooked, but of significant importance, is the need for websites and website tools to be accessible. This means not only understandable in its content onscreen but also making sure that the information displayed is fully accessible for those using assistive software such as screen readers, text to speech, magnification, switch control and scanning. This presents many challenges.

Firstly, following on from the best practices in UI design, there are a number of secondary factors that need to be thought about in terms of making visual elements and text understandable and navigable for those with cognitive, physical and visual impairments. Making sure that language is clear, understandable, spaced properly and not ambiguous is very important. Having visual stimulation with images and videos, clear instructions on what is happening on screen is good practice.

Secondly, having the option to adjust settings on the page such as font size, character and line spacing, colour overlays and reading bars are essential in order to reach the widest audience and not exclude those with specific disabilities.

Therefore, there have been innovative interfaces and tools that have been developed in the project which tackle these issues head on and will be presented further on in this document.

To gain an understanding of the kinds of points to consider when designing websites and portals for those with cognitive and physical disabilities look at the following excerpts and Diagrams.

CHECKLIST

Easy read:

- easily understandable and clear language
- no foreign words
- no link texts such as «more» or «continue»

Readable font

- easily readable fonts in appropriate sizes
- option to adjust font size

- easily visible links

Clear content

- clearly structured content
- only essential content

Simple navigation and orientation

- easily viewable navigation area
- maximum 5 sub-items / menus
- pictograms for orientation
- navigation area with a «back» function
- help for orientation and scrolling

Interactive elements and help section

- easily understandable user guidance
- prompt help section and feedback
- error-tolerant and intelligent search system
- no CAPTCHAS

Simple design

- clear spatial separation
- one-colour background with sufficient contrast
- no unnecessary / distracting elements

Pictorial representation and other media

- as an illustration of the content
- as a support while reading
- use proven and generally known symbols
- pictograms / symbols for abstract terms
- photography for concrete places / people
- use video, audio and animation
- offer good language alternatives

Data protection

- conservative standard settings
- clear division between private /visible to other users

Responsive design - mobile / tablet first

Figure 1: Checklist for Designing Websites for those with Cognitive and Physical disabilities

MATRIX	REASONING	MEMORY	ATTENTION	RECOGNITION	LANGUAGE SKILL	COMMUNICATION
TEXT	Repetition allowed.				Easy read, short sentences, no jargon or foreign words.	
FONT	Minimal font size of 1 em to 1.2 em.		Easily readable fonts, adjustable font size, highly visible links.			
CONTENT		Short content. Benchmark: one page/screen per subject/article.	Clean, clear typeface, short paragraphs, important areas and content emphasised.			
NAVIGATION / ORIENTATION	Hierarchical navigation structures without too many options to select from. Orientation help on the pages (keyword: breadcrumb navigation) and regarding «back» functions.		Clear design, clear separation from other areas. Use of the common design conventions (positioning: top of the page and left aligned; nesting through indentation, etc.)			The navigation texts enhanced with pictograms.
INTERACTION / FORMS / SEARCH / ERROR MESSAGES / CAPTCHAS	User guidance: clear instructions and choice of options where interaction is expected.	Avoiding too many options to choose from.	User guidance: clear instructions and choice of options where interaction is expected. Clearly structured forms.		Error-tolerant, intelligent search functions (semantic search).	No use of CAPTCHAS.
DESIGN			Calm, consistent, balanced design: no patterns or images as background, clear spatial separation of the different content areas. No flashing or flickering.			
PICTORIAL REPRESENTATION / PICTOGRAMS AND PHOTOS / MULTIMEDIA / ANIMATION			Sparingly use of images and animation. Pictorial representation in a targeted way to draw attention to important content/areas.		Pictorial representation for the comprehension. Use of pictograms and speech output in the navigation, for buttons and links.	
HELP SECTION	Intelligent help tailored to the situation for all interactive functions.				A glossary or reference section explaining the most important terms and connections briefly and clearly in easy read.	
DATA PROTECTION	Standard settings for functions which are relevant to data protection as conservative as possible.					

Table 2: Matrix for Designing Websites for those with Cognitive and Physical Disabilities

As mentioned earlier the website or the portal itself needs to be accessible, not just the content within it. This means that access should be available to anyone using methods of control such as switches for navigation control, screen readers for text and navigation, keyboard shortcut control, text to speech utilisation, magnification aids, speech recognition, contrast ratio, etc.

This is a project in itself and requires the designer or coder to adhere to WCAG 2.0 guidelines on web accessibility. These are a comprehensive set of rules and guidelines that programmers should follow when coding screens and sites for accessibility. These guidelines have been implemented throughout the creation of screens for teacher and student interfaces as well as mini games.

A dedicated Accessibility Workshop was organised and delivered to relevant partners involved in the programming of interfaces and mini games to address these issues. This was held in Vila Real, Portugal at the University of UTAD. See *Appendix A* for a more detailed run through of WCAG checklists and ratings.

3. BEACONING USER INTERFACES

There are three distinct groups that will be using the Beaconing platform.

- ‘The Learning Designer’ – These are the people who are going to create the lesson plans, amend and create the mini games and narratives, that eventually get assigned to the students.
- The ‘The Teachers’ – The teachers need to know what gamified lesson paths they want to assign to their students, classes or groups.

They will need to be able to contact and message their students.

They will be needing to see what their students are doing in the Beaconing Platform and how they are progressing and performing through their missions.

This is essential to make sure that Beaconing is working to its full potential and that the students are achieving their individual goals.

- 'The Students' – The students are to be fully immersed into the Beaconing world and Meta Game as a whole.

They will be assigned lesson paths with missions and quests and play through these by completing challenges within the Metagame itself.

They will receive points, rewards and incentives for doing so, which will motivate them to continue their journey through Beaconing.

Students will be engaged, have fun and ultimately learn the STEM subjects, without even realizing they are doing it through pervasive gaming.

So, what do we propose for the interface of Beaconing?

For the teachers this needs to be an easy to follow and aesthetic layout. One that does not deviate too much from what they are used to in a LMS. However, it must provide a seamless and user-friendly experience without sacrificing any of the essential tools.

The student interface is something different altogether. This needs to be gamified. As Beaconing is learning through gaming, it needs to be immersive. It needs to be enticing. It needs, again to be user friendly and visually appealing so it pulls you in to use it.

Therefore, three different interfaces are needed. They all need to be made fully accessible to anyone with a disability or anyone who might already use assistive technology and software.

3.1 TEACHER INTERFACES

3.1.0 TEACHER LOGIN

Teacher login is handled using Single Sign-On provided by core services.

3.1.1 DASHBOARD

The Teacher Dashboard is a fine example of 'less is more'. A truly functional interface that has everything that the teacher wants to know in a snapshot.

A self-explanatory layout allows the teacher to view active lesson plans and recent activity whilst keep a watchful eye on the progress of their students and groups.

Elements are laid out so to focus the user on the important aspects in hand and for ease of navigation.

An innovative approach to customisation has been implemented which allows the teacher to re-arrange, add, remove items / widgets on the dashboard to their requirements. Widgets can also be brought onto the dashboard from many other parts of the UI.

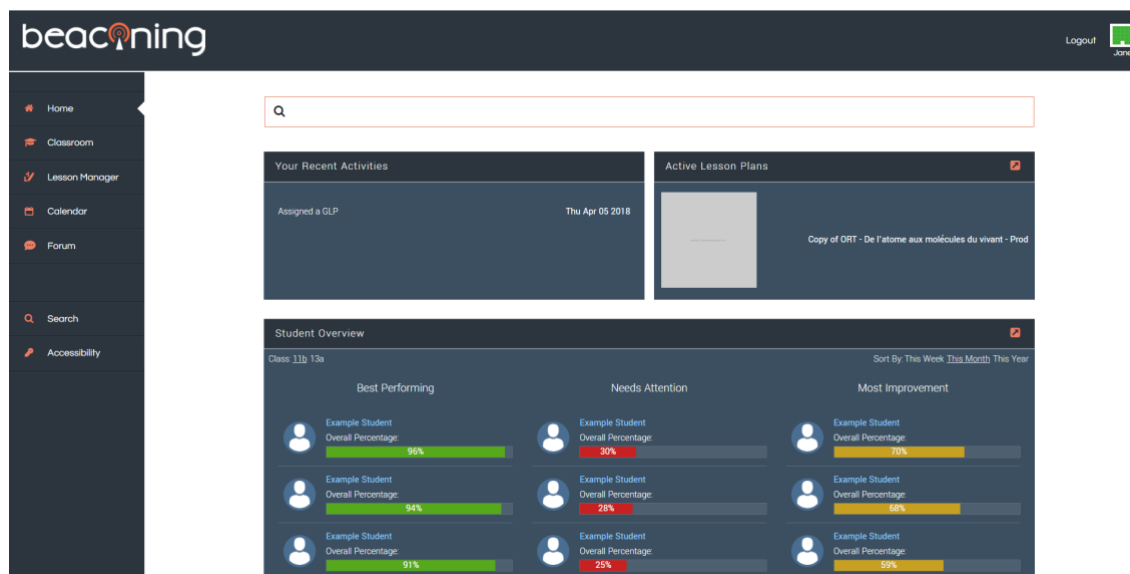


Figure 2: Teacher Dashboard

The platform is fully searchable from the dashboard using the search bar. This will return results for students, groups & GLPs.

Many areas of the UI are accessible from the dashboard using the dedicated shortcut buttons to areas such as 'active lesson plans' and 'classroom student overview'.

Communication is an important aspect in Beaconing between teacher and student. Although in many cases schools and institutions will be using their own dedicated forms of communication, Beaconing aims to provide an interactive discussion forum and basic instant chat window to aid productivity and creativity. This can be accessed via the 'Forum' button on the navbar, which includes buttons to all other areas and functionality of the UI. (see Appendix B)

3.1.2 LESSON MANAGER

If the teacher wants to browse for lesson plans and then assign them, this is available through the Lesson Manager via 'Library'.

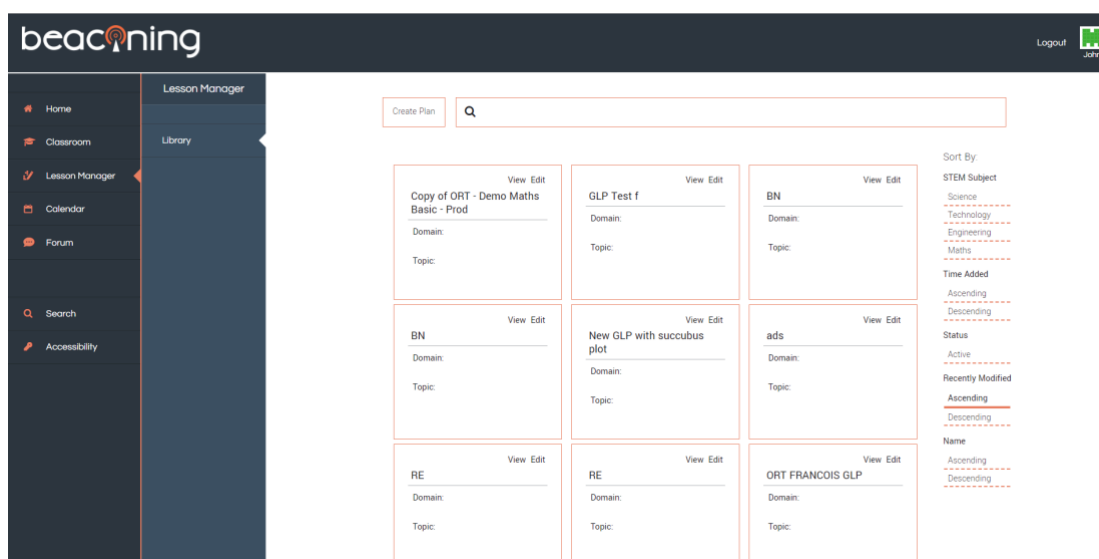


Figure 3: Browse for Lesson Plans

Lesson plans are fully searchable and sortable via subject or name. Teachers can view the description of the GLP, missions and quests. They can play through the GLP in the Meta Game to preview before assigning the GLP to students and groups. Scheduling of lesson plans can also be done from the Teacher Interface if a delay in activation is needed in the curriculum. (see Appendix B). Teachers can also edit the lesson plan by having direct access to the Authoring tool interface. This is accessed via the 'Edit' button available throughout the Lesson Manager section. Once activated the teacher will be taken directly into the Authoring Tool via a seamless transition. On the other hand, if the teacher wishes to create a new GLP from scratch they can do this from the UI quickly and easily without first having to access the authoring tool itself. (see Appendix B)

3.1.3 AUTHORING TOOL

The Authoring Tool is a highly complex tool allowing teachers and learning designers to create, edit and manipulate lesson plans, missions, quests and mini games. However, it is expertly integrated into the teacher UI.

Note that the interface design is a continuation of the teacher UI design to provide continuity and familiarity. The ability to switch roles within the Beaconing platform like this is an innovative part of the project and the user experience should flow naturally.

Here we see that the teacher can edit the Algebra lesson plan and bring in different mini games by dragging and dropping.

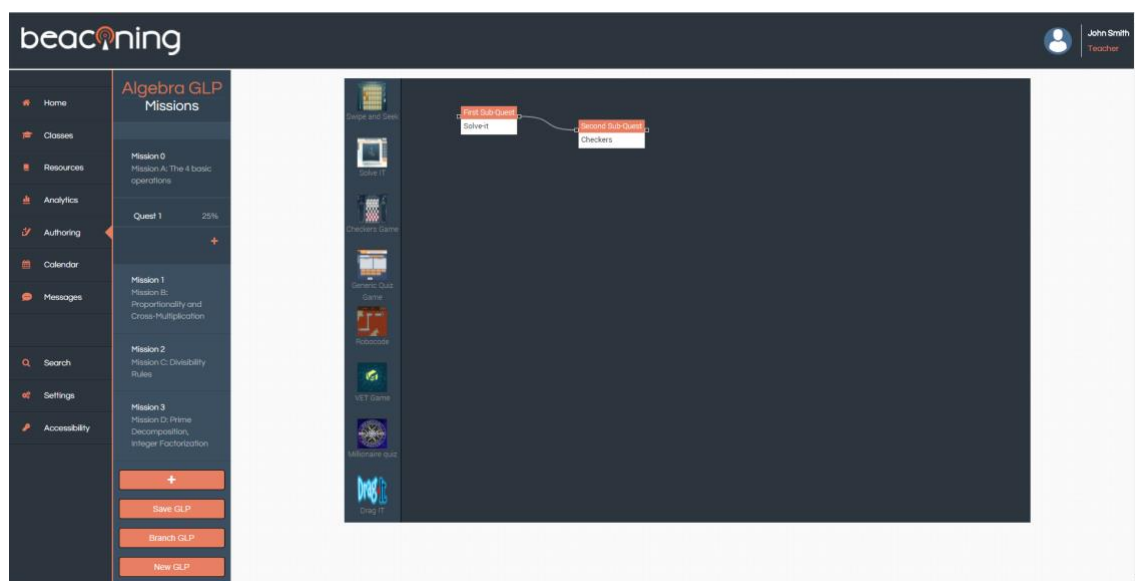


Figure 4: Authoring Tool Mission Edit

The teacher can alter the Gamified Lesson Plan (GLP) by deciding to add a new Mission, quest, mini game or configure existing ones to their needs. These will then be saved and available within the repository of GLP's to assign and deploy.

New GLP's can also be created from within the Authoring Tool by clicking on the relevant link.

The authoring tool interface is designed to provide the functionality needed for these complex tasks but laid out in an easy to follow structure, without too many options given at one time.

Features within the Authoring Tool interface are again fully accessible via the integrated Accessibility toolbar and implementation of WCAG 2.0 guidelines for web content accessibility.

Users will be returned automatically to the teacher UI after completing their tasks within the Authoring Tool and any changes made will be instantly available in the Beaconing Inventory.

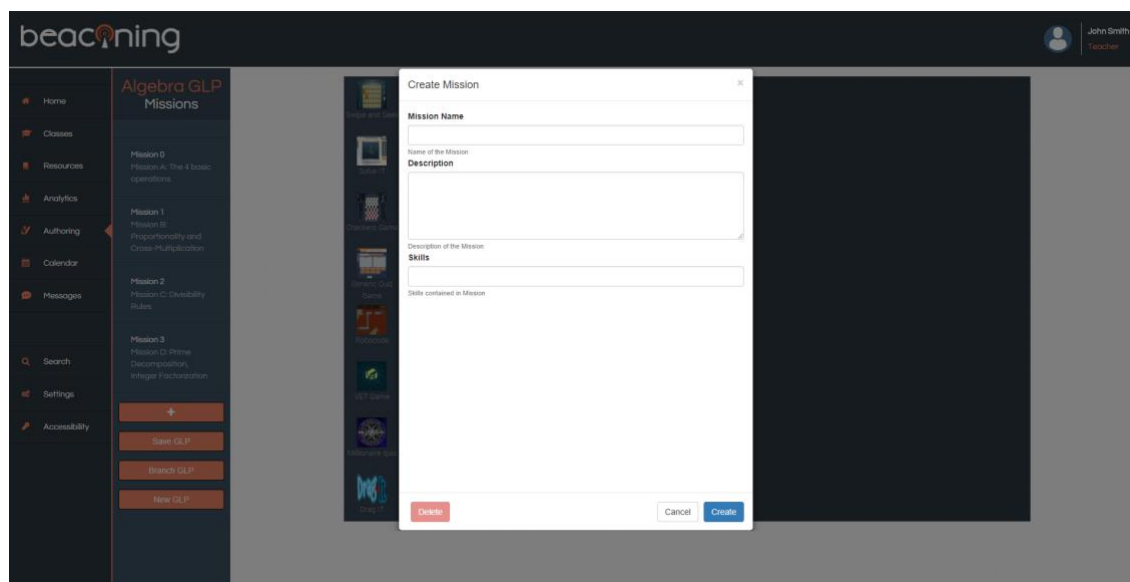


Figure 5: Authoring Tool Create Mission

3.1.4 ACTIVE LESSON PLANS

Teachers can view their Active Lesson plans directly from the dashboard as a snapshot or, by going into the Lesson Manager and Library, they can filter active lesson plans for a more detailed overview. Active lesson plans are also session based so the user will see entries relevant to them rather than all active plans from all users.

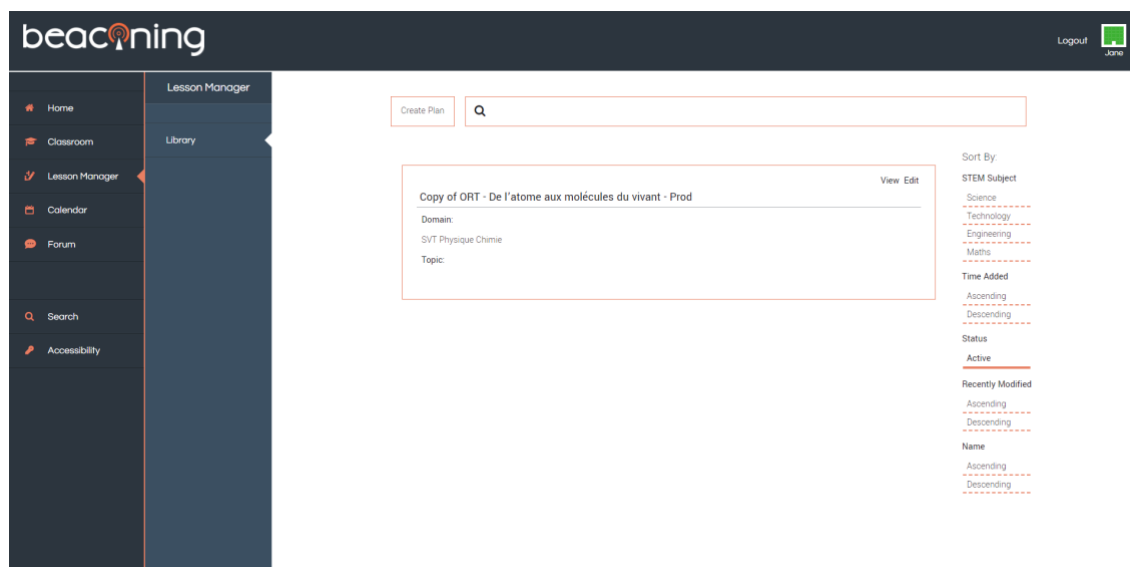


Figure 6: Lesson Manager / Active Lesson Plans

The user can then decide if they would like to view, edit, play or re-assign this active lesson plan to other students and groups. Teachers will also be able to keep track of assigned GLPs and their deadlines via the Calendar tool, which will also provide notifications of upcoming review dates.

3.1.5 CLASSROOM / ANALYTICS

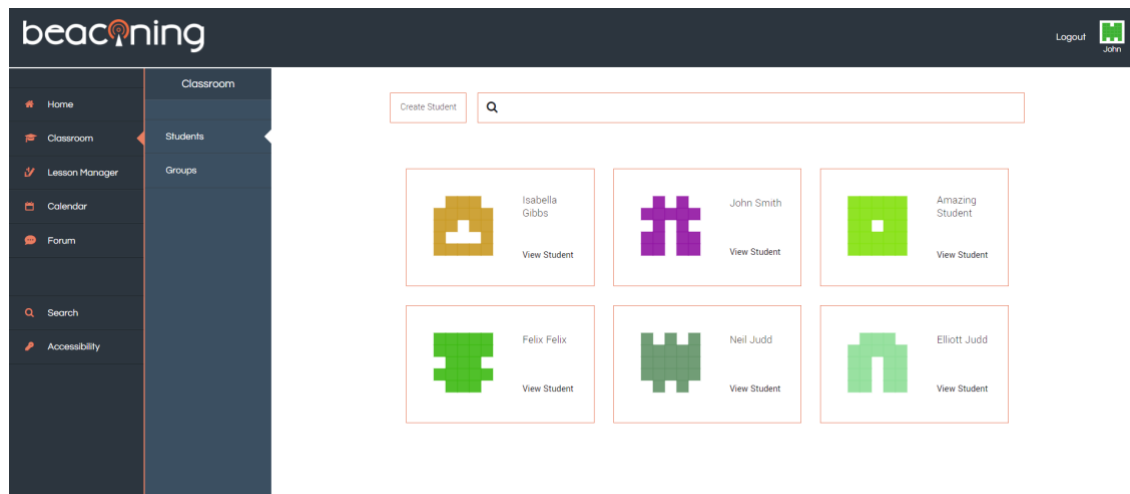


Figure 7: Student Overview

The Classroom section of the UI has two main functionalities.

The first is regarding student and group management. From within the classroom tab you can easily create and add new students to the database, as well as groups categorised into courses, class or another sub category. (see Appendix B)

Students can be added into groups and once set up, GLPs can be assigned directly to these groups or individual students via the Lesson Manager.

Teachers are first presented with an overview of their current students or groups.

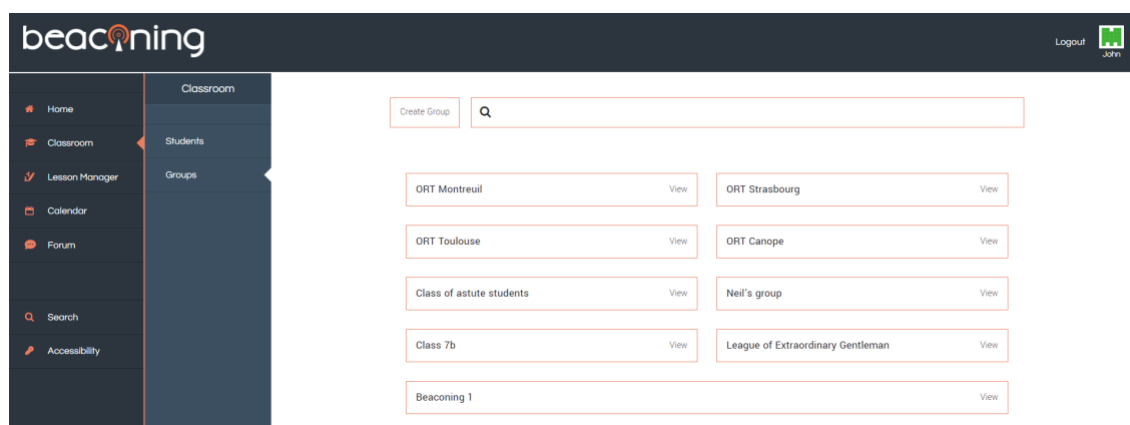


Figure 8: Group Overview

The second part of Classroom is regarding the analysis of data. Teachers will be able to view student's and Groups assigned GLPs and track their progress within them with dedicated data dashboards. (see Appendix B)

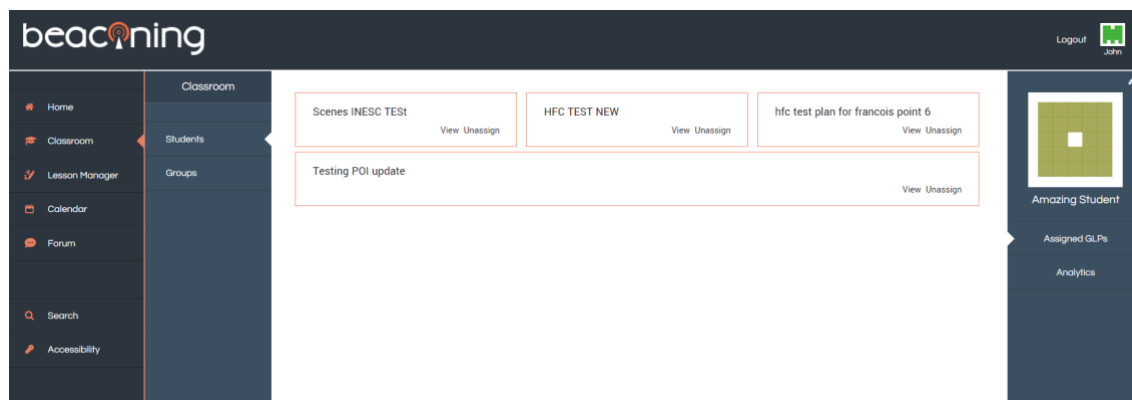


Figure 9: Student Assigned GLPs

Analysis of data is an integral part of the Beaconing process. Teachers, students and parents will want to know the progress achievement and compare this with others. Conclusions can then be drawn from this visualisation of data which could result in the need to alter lesson plans, alter individual learning objectives and provide rewards and incentives.



Figure 10: Student Analytics

3.2 ACCESSIBILITY INTERFACES

Some of the most innovative parts of the Beaconing interface are provided by the accessibility interfaces on offer. These interfaces provide a way of making content accessible to those with differing disabilities whether they be cognitive, physical or visual.

3.2.1 ACCESSABAR

Accessabar is an accessibility tool which presents itself within the Beaconing Platform itself.

The toolbar is discreet and is accessed via the Accessibility link in the main navigation panel.

A series of tools are presented in the toolbar all with their unique features which can manipulate text and objects on the screen making them accessible to all.

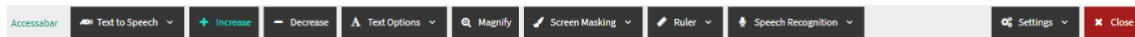


Figure 11: Accessabar

Once accessed, Accessabar presents itself at the top of the page within the Beaconing interface.

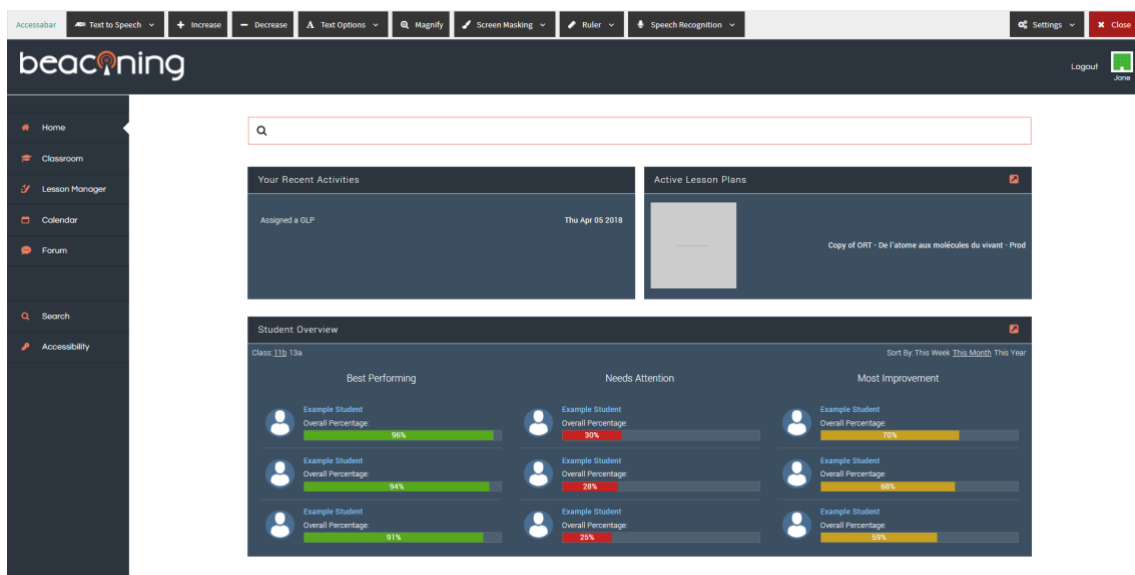


Figure 12: Accessabar within the Beaconing Interface

Screenshots of Accessabar functionality can be found in Appendix C.

Below is a table outlining the differing tools available in Accessabar for a user:

Function	Description
Text to Speech	<p>Text to speech is provided for users if they require oral feedback of what is displayed on the screen. Users can either select text to be read out or hover over text and items on the page.</p> <p>This feature is particularly useful for those with Dyslexia who find it difficult to read and process information. Visually impaired users will also benefit from this too, aiding navigation.</p>

Increase Font Size	The ability to effortlessly increase or decrease the font size of all text on the page is useful for everyone but vital for those with visual impairments.
Font Style	<p>Fonts on the page can also be changed easily with Accessabar. Several Dyslexia friendly fonts are available as well as those that offer more contrast such as Arial Black.</p> <p>Other options include changing the line spacing and character spacing of text on the page. This is particularly effective for those with Dyslexia, cognitive disabilities and visual impairments.</p>
Text Colour	Text colour can be altered to suit individual preferences. Another effective feature for those with Dyslexia and associated conditions.
Magnify	An essential tool for those with visual impairments is magnification. Accessabar gives magnification in an adjustable lens window with adjustable magnification levels. The lens window can then be moved around the screen as desired.
Screen Tinting	Screen tinting is very effective not just for those with visual impairments but for those with Dyslexia and associated conditions.
Background Theme	Certain eye conditions, acuteness to colour, colour blindness and visual impairments may need themes to be applied to the content on the screen in order for users to read it properly. Accessabar provides several set background themes to combat this issue.
Reading Bar	Focussing on where you are on the page can be difficult for those with Dyslexia and cognitive disabilities. The reading bar allows users to track their position on the page with an underlining bar that can be adjusted in size to suit preferences.
Overlay Bar	The Overlay Bar blackens out the content of the page except what you are focussing on within the overlay bar. The colour of the overlay bar can also be tinted to your preferred choice.
Speech Recognition	<p>For those with physical impairments it will be hard to input information into the platform and navigate around the page. That is why Accessabar implements voice recognition. In over 40 different languages this is truly ground breaking. Dictated speech is turned into text and then can be inputted into the Beaconing interface. Accuracy is fantastic.</p> <p>Speech recognition is particularly effective for those with Dyslexia and cognitive disabilities, too as getting thought onto the page by typing is often a stumbling block.</p>
Settings	In the settings tab of Accessabar users can adjust the text to speech voices, pitch and speed. Future updates to the interface will see settings to include those from magnification and speech recognition.

Table 3: Accessabar Functions

3.2.2 ACCESSIBILITY PROFILE WIZARD

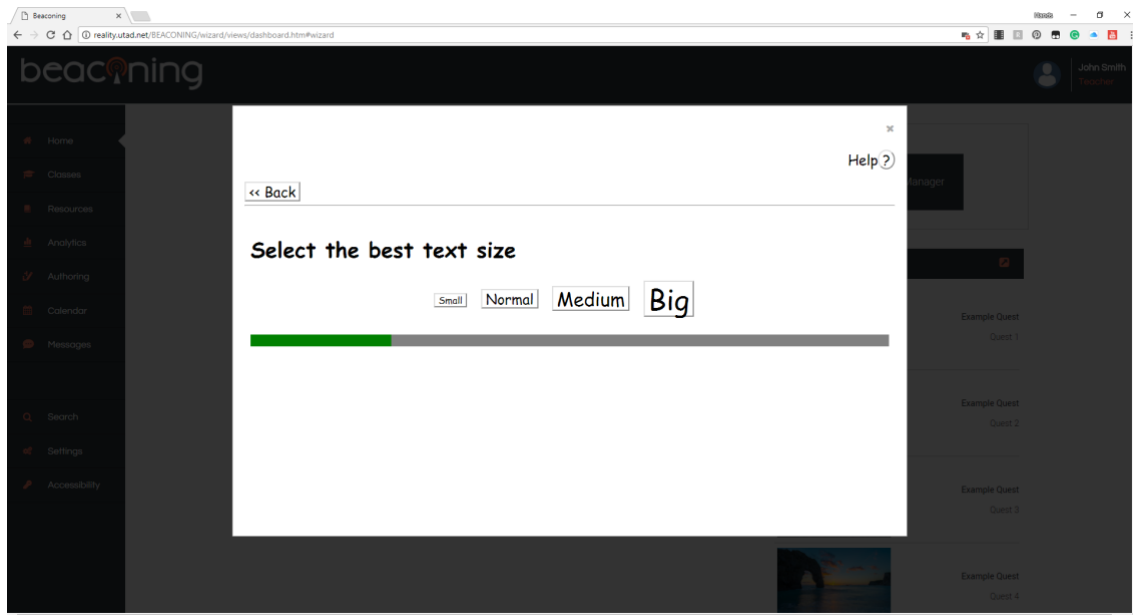


Figure 13: Accessibility Profile Wizard

The Beaconing proposal stresses that the Beaconing Interface needs to adapt to the individual disabilities and needs of its users. To do this we need to know what the needs and requirements of our users are. There needs to be a process involved within the interface that can collect this data and ultimately re shape the interface and its functionality accordingly.

An ingenious method has been created in the form of the Accessibility Profile Wizard. When a new user clicks on the Accessibility link for the first time they will be taken into a series of small tests / exercises to determine their needs for Accessabar.

These tests do not ask the user for any sensitive information regarding their disability, but the resulting actions can help determine whether they may have Dyslexia, cognitive issues, Physical Impairment or Visual Impairment. This data can be saved to the individual profiles and trigger certain functions of Accessabar to be active or not within the Beaconing interface and therefore becoming an interactive and adapting interface to individual's needs.

For a full run through of the Accessibility Wizard functions please refer to Appendix D.

3.3 STUDENT INTERFACES

As previously mentioned the student interface needs to be immersive, enticing but still user friendly and intuitive. We should not make the mistake of creating the interface to look purely like a game and to be too graphic dependent. This can reduce the flow of Beaconing, especially on lower spec machines and can make the interface too busy in terms of it elements and draw the focus away of the learning objectives. Instead we need to strike a balance between a gamified experience and a functional learning platform as well as to consider accessibility in design and usability.

Therefore, the student interface has a more gamified dashboard to reflect anytime anywhere learning but keeps the structure of a traditional layout as seen in the teacher interface as it is backbone to functionality.

3.3.1 STUDENT LOGIN

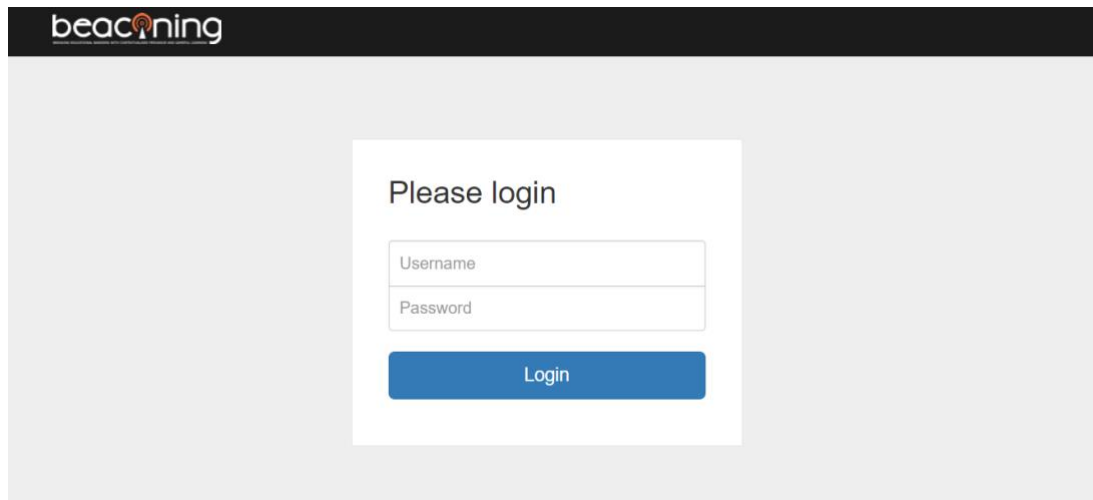


Figure 14: Student Login

3.3.2 STUDENT HOME SCREEN

The student home screen gives an impression of anytime anywhere learning in a 3D backdrop of the Beaconing virtual world. From the home page, the student will be able to access chat functions, see their current progress and recent activity. When they are ready to view their pending missions, exercises and resources, they can access the backbone of the interface by selecting the desired option in the navigation panel.

In the top menu, students' have the ability to check notifications and search within the platform. Furthermore, they can check the online help and enable/disable the Accessabar module. When enabled, the Accessabar module will be displayed on the top.



Figure 15: Accessabar module enabled

3.3.3 USER PROFILE

Once the student enters the main interface, they will be presented with many functions. Within the user profile, they can edit personal details and set preferences.

It is important to note the similarity in design to the teacher UI in terms of layout, usability, accessibility options and access. This keeps the continuity in Beaconing across differing stakeholder log ins and makes sure it is not viewed as a separate entity. On the other hand, there are subtle differences in color and icons to enhance concentration and learning, appeal to a younger audience, promote gamification and competition and anticipation in what is to come when launching the gamified meta game learning experience.

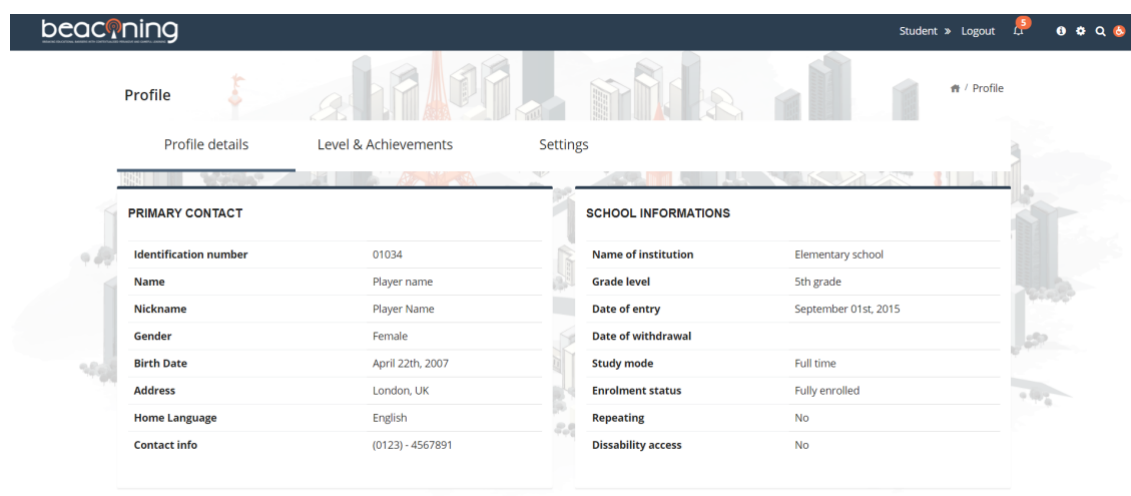


Figure 16: User Profile page

3.3.4 LEVEL & ACHIEVEMENTS

For gamification of the platform students can strive to obtain badges by completing missions and exercises. Unlocking extra levels is also an effective reward technique.

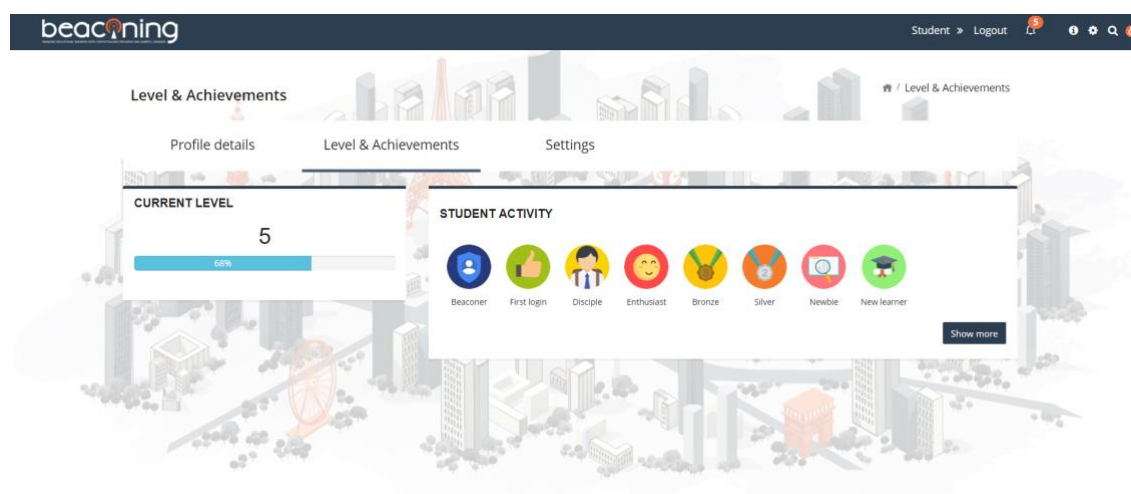


Figure 17: Student Level & Achievements

In this page, the student can check the current level and the badges obtained for all his/her activities within the platform.

To check the info for each badge obtained users can click on the badge image/badge title and a popup window will display information according to the badge selected.

3.3.5 SETTINGS

Settings can be changed within the UI and preferences saved to their individual profile.

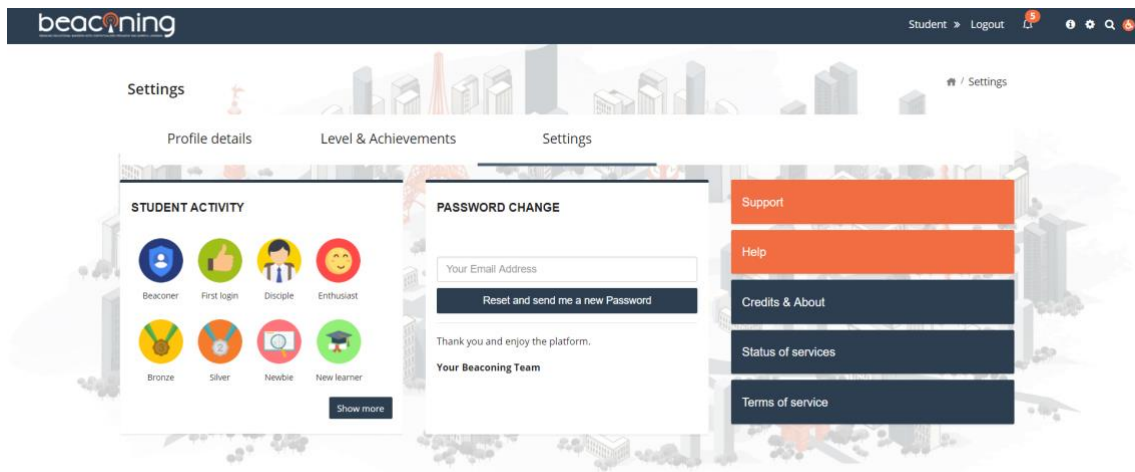



Figure 18: Student Settings

3.3.6 USER HELP

The Student UI interface contains two types of help options:

- Interactive Help - Users can check, in each page, the functionalities of all panel boxes/buttons; The interactive Help is customized for each page of the interface and can be accessed by clicking on the icon  from the Top menu;

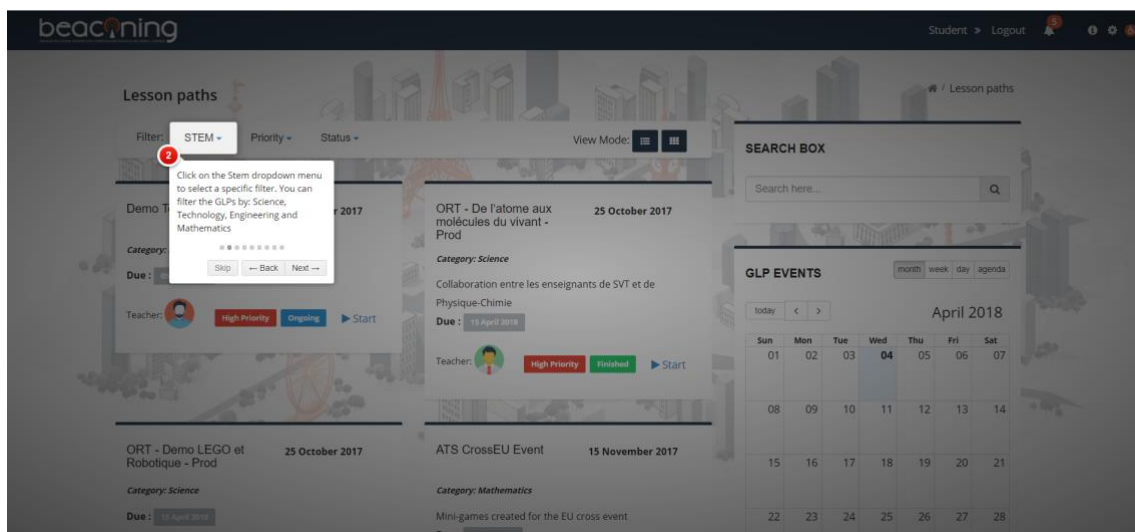


Figure 19: Example of Interactive Help module enabled

- Static Help which is represented by a page that can be accessed from the Setting page. The static help contains five tabs where the panel box/buttons from the interface are explained using screen captures;

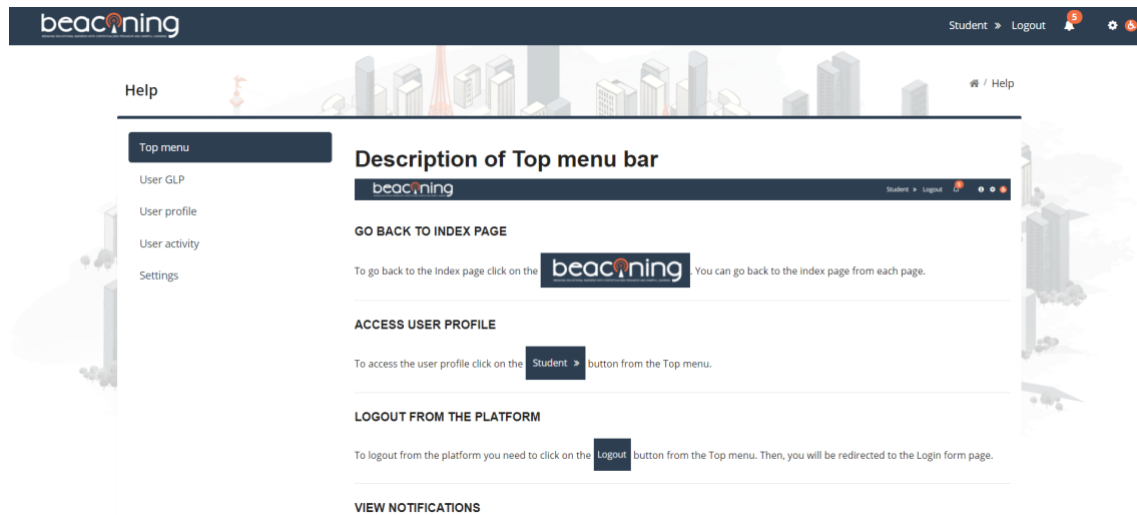


Figure 20: Example of Help page with Top menu tab as opened

3.3.7 GLP LIST

The intelligent aspect of the student UI is the integration between the Teacher UI and Beaconing Meta Game. It is possible for students to instantly receive notification that they have new GLP's assigned to them waiting to be played. The below example illustrates a new GLP being alerted via the left navigation panel. Once clicked on, new and ongoing missions can be viewed and launched catapulting the user into the immersive world of Beaconing anytime anywhere learning.

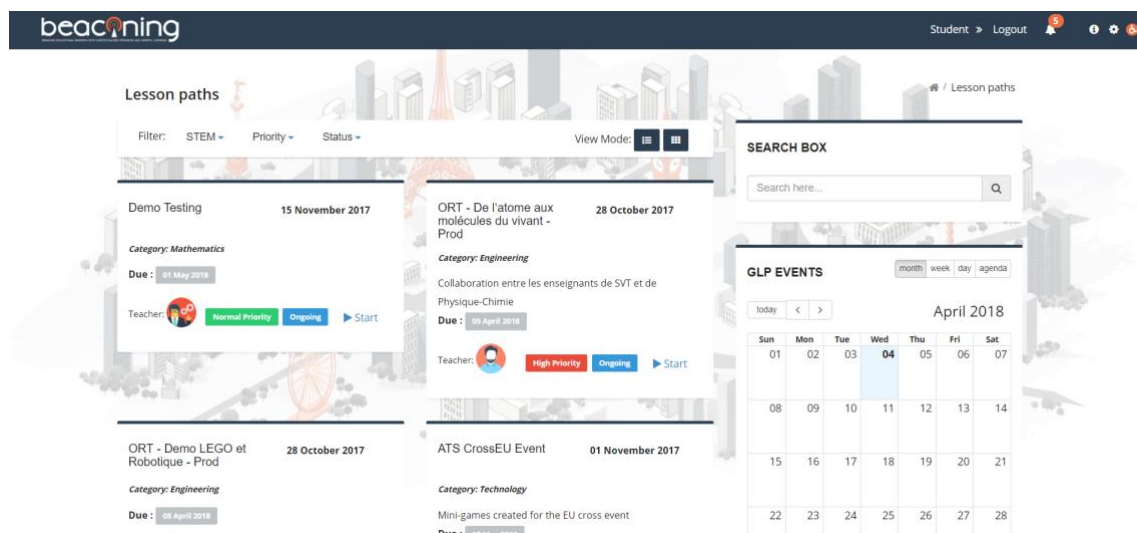


Figure 21: Student GLP List

GLP FILTERING/SORTING

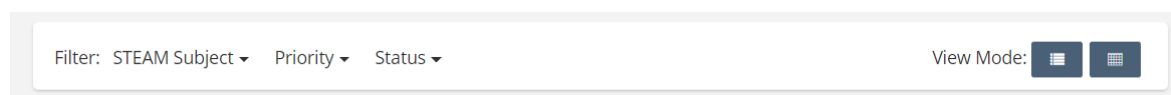
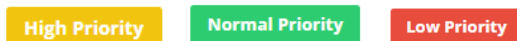


Figure 22: GLP filter module

- Click on the **STEAM Subject button** from the filter bar to see the glp filtered by STEAM Subject chosen: Science, Technology, Engineering or Mathematics
- Click on the **Priority button** from the filter bar to see the GLP filtered by Priority tag. In the box of each glp, students can see the label for each priority set by the teacher:



- Click on the Status button from the filter bar to see the GLP filtered by Status. In the box of each glp, students can see the label for each status according the actions made on the glp: **Ongoing** (blue), **Finished** (green),

GLP SEARCH

In this page, student has the possibility to search for a specific GLP by its name, using the search module from the right panel.

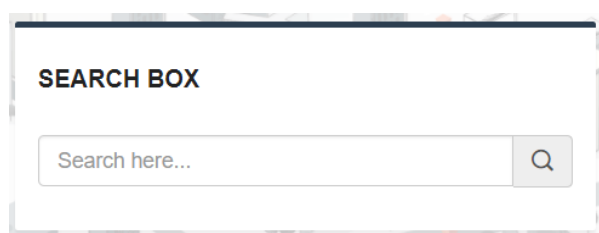


Figure 23: GLP search module

GLP NOTIFICATIONS

In addition, in this page, students can check in the calendar from the right panel the notifications related to the addition of a new GLP. If the student clicks on the title of the notification, a popup window will be displayed with specific content related to the GLP.

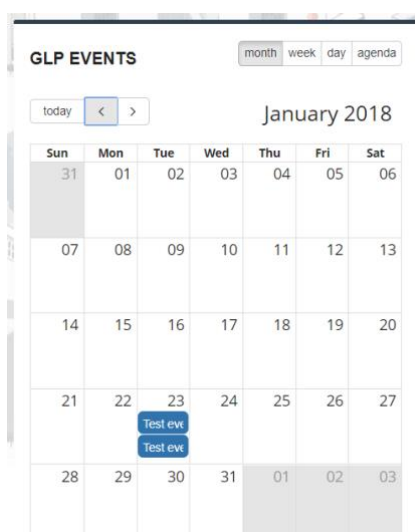


Figure 24: GLP calendar notification module

PLAY GLP

The student has the possibility to play the GLP assigned by the teacher by accessing the button

▶ **Start** from the overview panel box of a certain GLP.

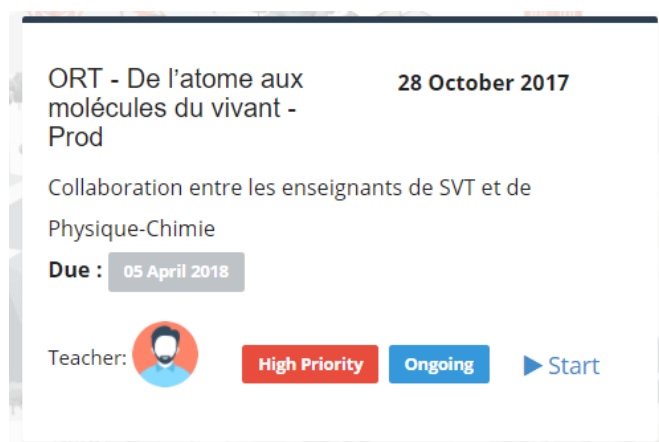


Figure 25: Accessing a GLP gameplot

As the piloting phase progresses, further functionality within the student UI will become available such as a fully interactive forum and mailbox. A more in-depth analytics portal is necessary but specific requests for analytics and options for the UI will become apparent as feedback is received.

4. CONCLUSION

This document brought together the best practices in UI design and illustrated how the Beaconing project used these guidelines to devise a framework for the design of the different user interfaces needed for the Beaconing platform. It further drew attention to the importance of accessibility guidelines when creating interfaces for those with impairments and how, by implementing slight changes, you can make your product stand out from the rest in terms of innovation and access.

Thinking of innovative ideas to give access to the content of Beaconing to all has been key in the project and has formed our individual uniqueness against our competitors. The driving innovative elements of accessibility design in the dashboard and associative tools with Accessabar show we are leading the way in anytime, anywhere learning for anyone, regardless of disability.

The Beaconing proposal documents the need for the interface to adapt to individual requirements and disabilities. This has been achieved through the ground-breaking design of the Accessibility Profile Wizard interface where individual results can be saved to a user profile which in turn control the accessibility tools offered by Accessabar.

As the pilots start and user feedback is received, the effectiveness of what has been achieved so far can be gauged. The implementation of WCAG within the interfaces will be put to the test and provide us with valuable information into how we can shape the guidelines to form our unique Beaconing accessibility guidelines checklist for others to follow.

UI design should not be taken as a secondary measure to functionality. Everything goes hand in hand to provide the best user experience possible. It has been proven in the UI development process that you can have all the functionality you ever desired but without the ability to find

and control it effectively the project falls flat. Functionality elements were drawn from D3.4 and extensive progress has been made with the design of interfaces shown throughout this document. Again, time will tell if the implementation of best practices has been successful for UX and UI with feedback received from the piloting stage. Continuous updating of the interfaces will prevail to make sure it meets the requirements of its user base.

Continuity of design has been shown to be of importance across different stakeholders to provide effective UX as well as not to deviate from user requirements. After all we want the end users to continue to use the product again and again and the Beaconing community to keep on growing. This is why user analysis and research were so important in the early stages of UI development.

This document has provided not just an insight into the visual highlights of the interfaces but also how to use them to their best advantage to achieve learning outcomes for both students and teachers.

It is hoped that students will be engaged, have fun and ultimately learn the STEM subjects, without even realising they are doing it through pervasive gaming.

As the project winds into its next development phase, this will become apparent both through the interface interaction and through the development of parallel tasks heavily dependent on the UI such as learning analytics, core services and game integration.

5. APPENDIX A: WCAG CHECKLIST

Accessibility Checklist 2.0

Based on the "Web Content Accessibility Guidelines (WCAG 2.0)"
Implementation of each success criterion in the document: "Explanations".

Original: <http://www.w3.org/TR/WCAG20/>
 Reference: <http://www.access-for-all.ch/checklist/>
 Version: Version 2.10

Application

The Accessibility Checklist 2.0 can be used to assess the accessibility of websites. The structure of the original WCAG 2.0 guidelines has been maintained.

The checklist is numbered and the success criteria for accessibility can be evaluated either as fulfilled ("Yes"), not fulfilled ("No") or not applicable ("n.a.") if the relevant elements are not present. To reach the desired level of conformity, all applicable criteria must be fulfilled. For optimal accessibility, you should aim for WCAG 2.0 AA conformity. This requires all A and AA criteria to be tested.

Some requirements are divided into several success criteria (SC) in the original. This makes it possible for several aspects to be examined in detail. Cross-references are indicated with a parenthetical comment, e.g., (see also SC 1.2.1).

Website name:

URL:

Website operator:

Website author(s):

Tester (name, organization):

Test date:

Level of conformity: WCAG 2.0 A ____ WCAG 2.0 A A ____ WCAG 2.0
 AAA ____

Accessibility Support

For conformity with the WCAG 2.0 guidelines, web technologies that support accessibility should be utilized. Any further technologies that are used must not interfere with accessibility.

This website is based on the following web technologies to support accessibility:

a) W3C technologies: (X)HTML _____ , CSS _____ .

b) Non-W3C technologies: JavaScript: No _____ , Yes _____ ; PDF No _____ , Yes _____ .

b) Other non-W3C technologies: _____

1. PRINCIPLE: PERCEIVABLE

Information and user interface components must be presentable to users in ways they can perceive.

1.1. TEXT ALTERNATIVES

1.1.1. Non-text Content (Level A)

- There is a meaningful and equivalent alternative for all non-text content, such as images, graphics, objects, graphic controls in forms and hotspots in image maps.

Rating: n.a. ____ ; No ____ ; Yes ____

- If the alternative text is not sufficient for the text alternative, a long description is prepared and is referred to in the alternative text.

Rating: n.a. ____ ; No ____ ; Yes ____

- Decorative graphics or layout graphics have empty alt attributes or they are concealed from assistive technologies (e.g., screen readers) in some other way.

Rating: n.a. ____ ; No ____ ; Yes ____

- There are no graphic CAPTCHAs or an alternative is present.

Rating: n.a. ____ ; No ____ ; Yes ____

1.2. TIME-BASED MEDIA: PROVIDE ALTERNATIVES FOR TIME-BASED MEDIA

1.2.1. Audio-only and Video-only (Prerecorded) (Level A)

If audio or video media are not an alternative to the content, the following applies:

- There are text transcripts for prerecorded audio media.

Rating: n.a. ____ ; No ____ ; Yes ____

- There are text transcripts for prerecorded video media or

Rating: n.a. ____ ; No ____ ; Yes ____

- Prerecorded video media have text transcriptions or audio descriptions.

Rating: n.a. ____ ; No ____ ; Yes ____

1.2.2. Captions (Prerecorded) (Level A)

- Prerecorded video content has simultaneous subtitles.

Rating: n.a. ____ ; No ____ ; Yes ____

1.2.3. Audio Description or Media Alternative (Prerecorded) (Level A)

- Prerecorded audio media (e.g., podcasts) have written text transcripts.

Rating: n.a. ____ ; No ____ ; Yes ____

- Prerecorded video media have written text descriptions or audio descriptions.

Rating: n.a. ____ ; No ____ ; Yes ____

1.2.4. Captions (Live) (Level AA)

- Live audio media have simultaneous subtitles.

Rating: n.a. ____ ; No ____ ; Yes ____

1.2.5. Audio Description (Prerecorded) (Level AA)

- Prerecorded video media have audio descriptions of visual content that is not described in the standard audio description (SC 1.2.1).

Rating: n.a. ____ ; No ____ ; Yes ____

1.2.6. Sign Language (Prerecorded) (Level AAA)

- Sign language videos are provided for all prerecorded audio content.

Rating: n.a. ____ ; No ____ ; Yes ____

1.2.7. Extended Audio Description (Prerecorded) (Level AAA)

- An extended audio description is prepared for video media if the pauses are not sufficient to communicate the meaning of the video content.

Rating: n.a. ____ ; No ____ ; Yes ____

1.2.8. Media Alternative (Prerecorded) (Level AAA)

- There is an alternative for all prerecorded video media, containing information that is spoken and/or shown simultaneously.

Rating: n.a. ____ ; No ____ ; Yes ____

1.2.9. Audio-only (Live) (Level AAA)

- An alternative is provided for all live audio media.

Rating: n.a. ____ ; No ____ ; Yes ____

1.3. ADAPTABLE: CREATE CONTENT THAT CAN BE PRESENTED IN DIFFERENT WAYS (FOR EXAMPLE SIMPLER LAYOUT) WITHOUT LOSING INFORMATION OR STRUCTURE.

1.3.1. Info and Relationship (Level A)**A. Headings**

- Headings make the structure of the document clear.

Rating: No ____ ; Yes ____

- Headings are marked up using the heading element (h1, h2, ... , h6).

Rating: No ____ ; Yes ____

B. Lists

- Listed information is formatted as a list (ul, ol, dl).

Rating: n.a. ____ ; No ____ ; Yes ____

C. Forms

- In forms with multiple parts, the parts are grouped by content into information blocks.

Rating: n.a. ____ ; No ____ ; Yes ____

- Labels and related form input fields are logically linked.

Rating: n.a. ____ ; No ____ ; Yes ____

D. Data tables

- Data tables are formatted with the necessary markup, e.g., headings for columns; rows and tables are clearly labeled, and headings and summaries are present.

Rating: n.a. ____ ; No ____ ; Yes ____

- Data tables can be read serially and are not used for layout purposes.

Rating: n.a. ____ ; No ____ ; Yes ____

E. Use of symbols

- Special text is correctly formatted, e.g., citations with `cite` and long quotations with `blockquote`

Rating: n.a. ____ ; No ____ ; Yes ____

1.3.2. Meaningful Sequence (Level A)

- The logical order is retained for screen readers and when CSS is turned off.

Rating: n.a. ____ ; No ____ ; Yes ____

- Contents in tables are correctly linearized and no empty cells are used to create space in the layout.

Rating: n.a. ____ ; No ____ ; Yes ____

- No character spaces are used to create space in the layout; CSS is used instead.

Rating: n.a. ____ ; No ____ ; Yes ____

- There is no contextual confusion caused by content positioned with CSS.

Rating: n.a. ____ ; No ____ ; Yes ____

1.3.3. Sensory Characteristics (Level A)

- There are no instructions that are solely optical or acoustic, e.g., "Press the green button on the left".

Rating: n.a. ____ ; No ____ ; Yes ____

1.4. DISTINGUISHABLE: MAKE IT EASIER FOR USERS TO SEE AND HEAR CONTENT INCLUDING SEPARATING FOREGROUND FROM BACKGROUND.

1.4.1. Use of Color (Level A)

- Information is not communicated solely based on color.

Rating: n.a. ____ ; No ____ ; Yes ____

- If color alone is used for differentiation, e.g., for links in a text, the links have a contrast ratio to the surrounding running text of at least 3:1.

Rating: n.a. ____ ; No ____ ; Yes ____

1.4.2.Audio Control (Level A)

- If audio plays automatically for more than 3 seconds, a stop button is provided.

Rating: n.a. ____ ; No ____ ; Yes ____

1.4.3.Contrast (Minimum) (Level AA)

- The contrast ratio of the font color to the background color is at least 4.5:1.

Rating: No ____ ; Yes ____

- The contrast ratio of the font color of large fonts (at least 18 pt or 14 pt for bold text) to the background color is at least 3:1.

Rating: No ____ ; Yes ____

- This applies to all text and tips, as well as to the borders around input fields and texts in information graphics. Does not necessarily apply to logos, logotypes or purely decorative graphics.

Rating: n.a. ____ ; No ____ ; Yes ____

1.4.4.Resize Text (Level AA)

- The font size is defined in the CSS in terms of % or em.

Rating: n.a. ____ ; No ____ ; Yes ____

- It is possible to enlarge either the contents of the entire page or the text alone using the browser's "zoom" function.

Rating: n.a. ____ ; No ____ ; Yes ____

1.4.5.Images of Text (Level AA)

Text is used instead of text graphics for content.

Exceptions:

- The display size of content can be scaled, and the content can be read without CSS.

Rating: n.a. ____ ; No ____ ; Yes ____

- The content is necessary, such as a logo or brand name (e.g., if a particular graphical form is required). They can be described either with alt attributes or title attributes.

Rating: n.a. ____ ; No ____ ; Yes ____

1.4.6.Contrast (Enhanced) (Level AAA)

- The contrast ratio of the font color to the background color is at least 7:1.

Rating: n.a. ____ ; No ____ ; Yes ____

- The contrast ratio of the font color of large fonts (at least 18 pt or at least 14 pt for bold text) to the background color is at least 4.5:1.

Rating: n.a. ____ ; No ____ ; Yes ____

- This applies to all texts and tips, as well as to the borders around input fields and texts in information graphics but does not necessarily apply to logos, logotypes or purely decorative graphics.

Rating: n.a. ____ ; No ____ ; Yes ____

1.4.7. Low or No Background Audio (Level AAA)

- Prerecorded speech has almost imperceptible background noise or none at all, or the audio can be switched off.

Rating: n.a. ____ ; No ____ ; Yes ____

1.4.8. Visual Presentation (Level AAA)

For visual presentation of blocks of text, the following is possible:

- The user can select foreground and background colors.

Rating: n.a. ____ ; No ____ ; Yes ____

- The width is not more than 80 characters.

Rating: n.a. ____ ; No ____ ; Yes ____

- Text is not justified (it is either left-aligned or right-aligned).

Rating: n.a. ____ ; No ____ ; Yes ____

- The line spacing is at least 1.5 within paragraphs and the paragraph spacing is at least 1.5 times as large as the line spacing.

Rating: n.a. ____ ; No ____ ; Yes ____

- The text size can be scaled up to 200 percent without assisting technology (without scrolling).

Rating: n.a. ____ ; No ____ ; Yes ____

1.4.9. Images of Text (No Exception) (Level AAA)

Text is used instead of text graphics for content.

Exceptions:

- The contents are essential for a piece of information that cannot be communicated without text graphics (e.g., logo).

Rating: n.a. ____ ; No ____ ; Yes ____

2. PRINCIPLE: OPERABLE

User interface components and navigation must be operable.

2.1. KEYBOARD ACCESSIBLE: MAKE ALL FUNCTIONALITY AVAILABLE FROM A KEYBOARD**2.1.1. Keyboard (Level A)**

The following can be navigated and operated using the keyboard (tab key):

- All page functions and elements.

Rating: No ____ ; Yes ____

- All form input fields, controls and switches.

Rating: n.a. ____ ; No ____ ; Yes ____

- No particular timing of individual keystrokes is needed for operation.

Rating: n.a. ____ ; No ____ ; Yes ____

2.1.2.No Keyboard Trap (Level A)

- The keyboard focus is not blocked for any element of the website.

Rating: No ____ ; Yes ____

- The user can move focus to and from every element using the keyboard.

Rating: No ____ ; Yes ____

- The user is advised if keyboard keys other than the conventional ones are used (tab key, arrow keys).

Rating: n.a. ____ ; No ____ ; Yes ____

2.1.3.Keyboard (No Exception) (Level AAA)

- All functionalities can be operated using the keyboard, without exception.

Rating: No ____ ; Yes ____

- No particular timing of individual keystrokes is necessary for operation.

Rating: n.a. ____ ; No ____ ; Yes ____

2.2. ENOUGH TIME: PROVIDE USERS ENOUGH TIME TO READ AND USE CONTENT**2.2.1.Timing Adjustable (Level A)**

There is no time limit for pages.

Exceptions:

- The user can turn off the time limit before encountering it.

Rating: n.a. ____ ; No ____ ; Yes ____

- The user can adjust the time limit before encountering it.

Rating: n.a. ____ ; No ____ ; Yes ____

2.2.2.Pause, Stop, Hide (Level A)

The following applies to any auto-updating, moving or flashing information that starts automatically and is presented in parallel with other content for longer than 5 seconds:

- The user can use some mechanism to stop, close or hide the information.

Rating: n.a. ____ ; No ____ ; Yes ____

- A mechanism is provided for automatic updates, so that the user can stop or hide the update or control its frequency.

Rating: n.a. ____ ; No ____ ; Yes ____

2.2.3.No Timing (Level AAA)

- No time constraint is necessary when processing the content.

Rating: n.a. ____ ; No ____ ; Yes ____

2.2.4.Interruptions (Level AAA)

- Interruptions such as advisories can be postponed or suppressed by the user, except interruptions involving an emergency.

Rating: n.a. ____ ; No ____ ; Yes ____

2.2.5.Re-Authenticating (Level AAA)

- If an authenticated session is in progress, the user can continue an action after re-authenticating without loss of data.

Rating: n.a. ____ ; No ____ ; Yes ____

2.3. SEIZURES: DO NOT DESIGN CONTENT IN A WAY THAT IS KNOWN TO CAUSE SEIZURES**2.3.1.Three Flashes or Below Threshold (Level A)**

- Websites contain nothing that flashes more than three times a second on an ongoing basis, or the flash is below a defined limit for flashes.

Rating: No ____ ; Yes ____

2.3.2.Three Flashes (Level AAA)

- Websites contain nothing that flashes more than three times per second on an ongoing basis.

Rating: No ____ ; Yes ____

2.4. NAVIGABLE: PROVIDE WAYS TO HELP USERS NAVIGATE, FIND CONTENT AND DETERMINE WHERE THEY ARE

2.4.1. Bypass Blocks (Level A)

- Skip links are made available to avoid repeated blocks of information
- Repeated blocks of information are grouped or labeled using headings.

Rating: n.a. ____ ; No ____ ; Yes ____

2.4.2. Page Titled (Level A)

- Web pages have a title (title tag in the meta area) that describes the topic or purpose.

Rating: No ____ ; Yes ____

2.4.3. Focus Order (Level A)

- The order of links in the navigation and in the content is logical.

Rating: n.a. ____ ; No ____ ; Yes ____

2.4.4. Link Purpose (In Context) (Level A)

- Link texts can be understood either alone or based on the context.

Rating: n.a. ____ ; No ____ ; Yes ____

- A change in format is indicated by the link text or the context.

Rating: n.a. ____ ; No ____ ; Yes ____

2.4.5. Multiple Ways (Level AA)

In addition to navigation, the website presents at least one other method for accessing content:

- A search function or

Rating: n.a. ____ ; No ____ ; Yes ____

- A sitemap / table of contents or both

Rating: n.a. ____ ; No ____ ; Yes ____

2.4.6. Headings and Labels (Level AA)

Informative page headings and labels are used:

- The website has headings that group the content.

Rating: n.a. ____ ; No ____ ; Yes ____

- The headings describe the subsequent section of content concisely and meaningfully.

Rating: n.a. ____ ; No ____ ; Yes ____

- Descriptive labels are present in forms.

Rating: n.a. ____ ; No ____ ; Yes ____

- The functions or instructions are labeled, and active zones can be recognized on image maps and maps.

Rating: n.a. ____ ; No ____ ; Yes ____

2.4.7.Focus Visible (Level AA)

- Elements with focus are visibly emphasized when they are activated using the keyboard.

Rating: n.a. ____ ; No ____ ; Yes ____

- Skip links become visible when they receive keyboard focus.

Rating: n.a. ____ ; No ____ ; Yes ____

2.4.8.Location (Level AAA)

- The current position of the user within the website or a process is indicated.

Rating: n.a. ____ ; No ____ ; Yes ____

2.4.9.Link Purpose (Link Only) (Level AAA)

- The purpose of each link can be identified from the link text alone. Link texts describe the target or the purpose and change of format.

Rating: n.a. ____ ; No ____ ; Yes ____

2.4.10. Section Headings (Level AAA)

- Headings introduce all sections of content.

Rating: n.a. ____ ; No ____ ; Yes ____

3. PRINCIPLE: UNDERSTANDABLE

Information and the operation of user interface must be understandable.

3.1. READABLE: MAKE TEXT CONTENT READABLE AND UNDERSTANDABLE**3.1.1.Language of Page (Level A)**

- Every web page has a correct language declaration.

Rating: No ____ ; Yes ____

3.1.2.Language of Parts (Level AA)

- Sections of text in languages other than the default language are marked up using the `lang` attribute.

Rating: n.a. ____ ; No ____ ; Yes ____

- Individual words in another language that could be understood incorrectly or not at all are marked up using the `lang` attribute.

Rating: n.a. ____ ; No ____ ; Yes ____

3.1.3.Unusual Words (Level AAA)

- Unusual words, technical terms and foreign words are explained in a glossary or with some other mechanism.

Rating: n.a. ____ ; No ____ ; Yes ____

3.1.4.Abbreviations (Level AAA)

- Abbreviations are explained in a glossary or

Rating: n.a. ____ ; No ____ ; Yes ____

- Abbreviations are explained with some other mechanism.

Rating: n.a. ____ ; No ____ ; Yes ____

3.1.5.Reading Level (Level AAA)

- Summaries or alternatives are made available for texts that are too complicated to be understood by people with a basic education (9 years of school).

Rating: n.a. ____ ; No ____ ; Yes ____

3.1.6.Pronunciation (Level AAA)

- A mechanism is provided to detect the pronunciation of content if this is necessary to distinguish between options.

Rating: n.a. ____ ; No ____ ; Yes ____

3.2. PREDICTABLE: MAKE WEB PAGES APPEAR AND OPERATE IN PREDICTABLE WAYS

3.2.1. On Focus (Level A)

- Context does not change when a section of the page receives focus.

Rating: n.a. ____ ; No ____ ; Yes ____

3.2.2. On Input (Level A)

- Changing the setting of any user interface component does not automatically cause a change of context unless the user has been advised beforehand.

Rating: n.a. ____ ; No ____ ; Yes ____

3.2.3. Consistent Navigation (Level AA)

- Navigation within a website is structured and arranged consistently.

Rating: n.a. ____ ; No ____ ; Yes ____

3.2.4. Consistent Identification (Level AA)

- Elements with the same function are identified consistently within a website.

Rating: n.a. ____ ; No ____ ; Yes ____

3.2.5. Change on Request (Level AAA)

- The context is only changed upon receiving confirmation from the user.

Rating: n.a. ____ ; No ____ ; Yes ____

3.3. INPUT ASSISTANCE: HELP USERS AVOID AND CORRECT MISTAKES

3.3.1. Error Identification (Level A)

- If input errors are automatically detected, the error is clearly described in text form in the error message.

Rating: n.a. ____ ; No ____ ; Yes ____

3.3.2. Labels or Instructions (Level A)

- Labels or instructions are given when user inputs are required.

Rating: n.a. ____ ; No ____ ; Yes ____

3.3.3. Error Suggestion (Level AA)

- Suggested corrections are made in case of input errors.

Rating: n.a. ____ ; No ____ ; Yes ____

3.3.4.Error Prevention (Legal, Financial, Data) (Level AA)

- It must be possible to check, change, delete or confirm inputs that have legal or financial consequences before sending.

Rating: n.a. ____ ; No ____ ; Yes ____

3.3.5.Help (Level AAA)

Help is available when:

- Specific inputs must be entered in a form;

Rating: n.a. ____ ; No ____ ; Yes ____

- Inputs must be made in a particular format.

Rating: n.a. ____ ; No ____ ; Yes ____

3.3.6.Error Prevention (All) (Level AAA)

- It must be possible to check, change, delete or confirm all inputs before sending.

Rating: n.a. ____ ; No ____ ; Yes ____

4. PRINCIPLE: ROBUST

Content must be robust enough that it can be interpreted reliably by a wide variety of user agents, including assistive technologies.

4.1. COMPATIBLE: MAXIMIZE COMPATIBILITY WITH CURRENT AND FUTURE USER AGENTS, INCLUDING ASSISTIVE TECHNOLOGIES**4.1.1.Parsing (Level A)**

- The markup language used, HTML or XHTML, conforms to standards and is free of errors.

Rating: n.a. ____ ; No ____ ; Yes ____

4.1.2.Name, Role, Value (Level A)

- In case of generated and self-programmed content, markup is used in a way that supports accessibility.

Rating: n.a. ____ ; No ____ ; Yes ____

APPENDIX B: TEACHER UI SCREENSHOTS

Lesson Manager

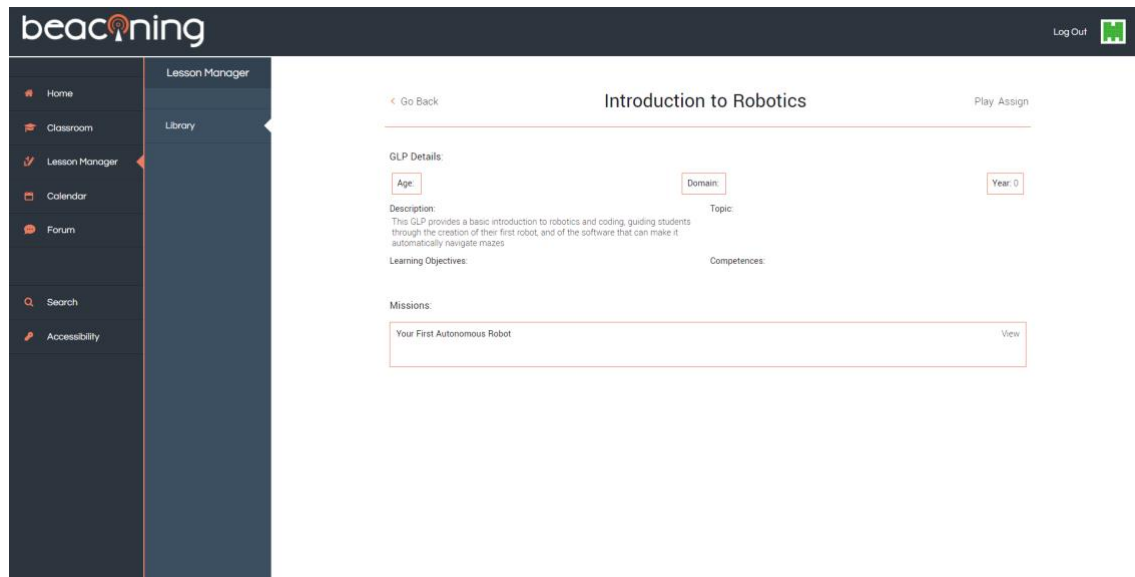


Figure 26: Viewing GLP overview and Missions

Teachers can view the GLP, it's missions and quests in more detail. From the viewing screen they can even preview playing the game in the Beaconing platform via the 'Play' Button. Once happy they can assign the GLP to students and groups.

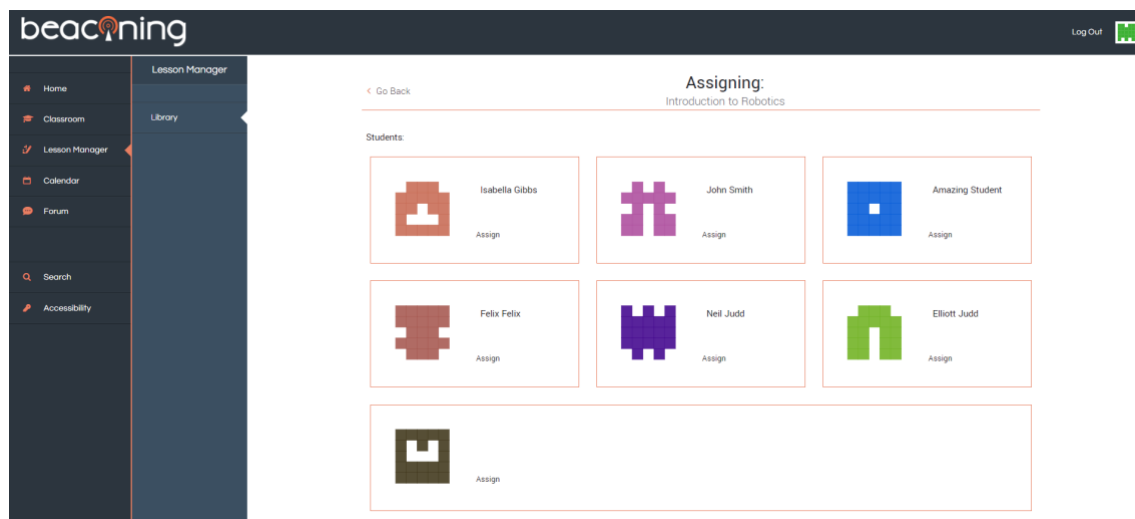


Figure 27: Assigning GLP to Students

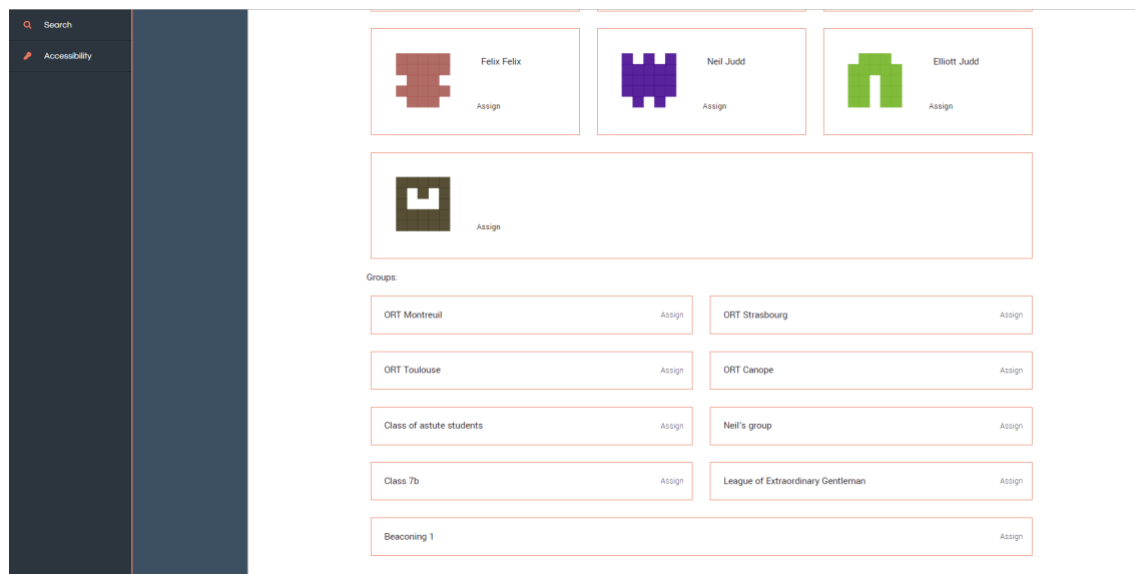


Figure 28: Assigning GLP to Groups

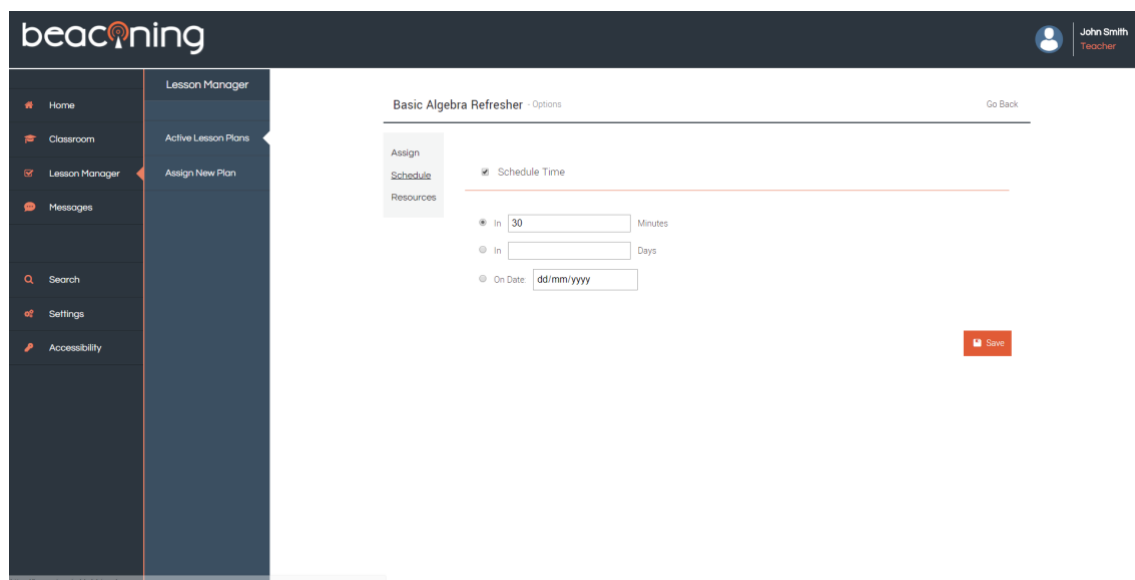
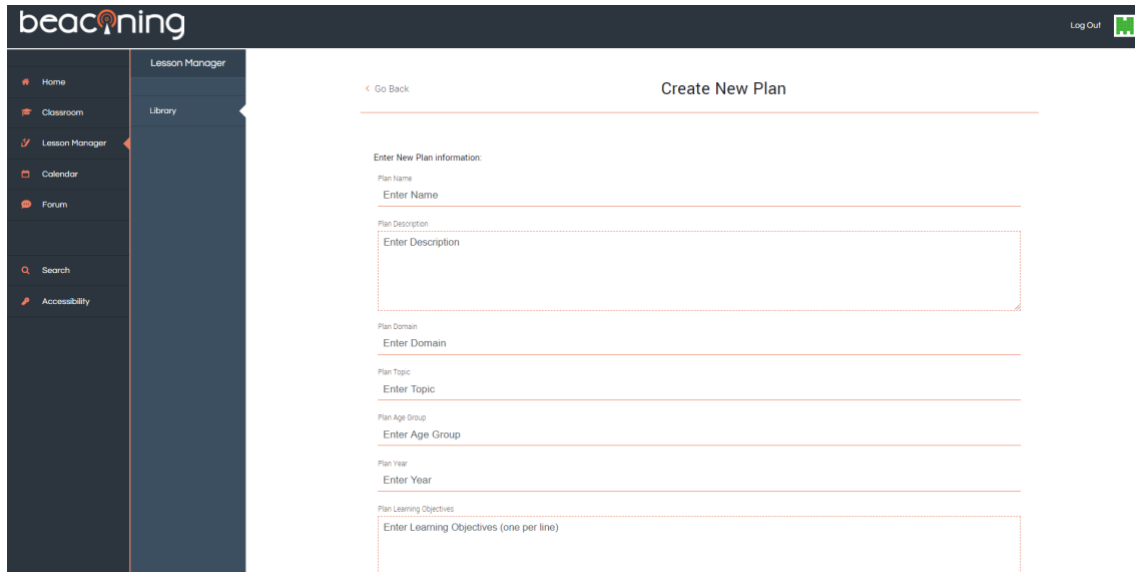


Figure 29: GLP Schedule

The user can schedule the assigning of GLPs for a specified time to fit in with learning requirements.



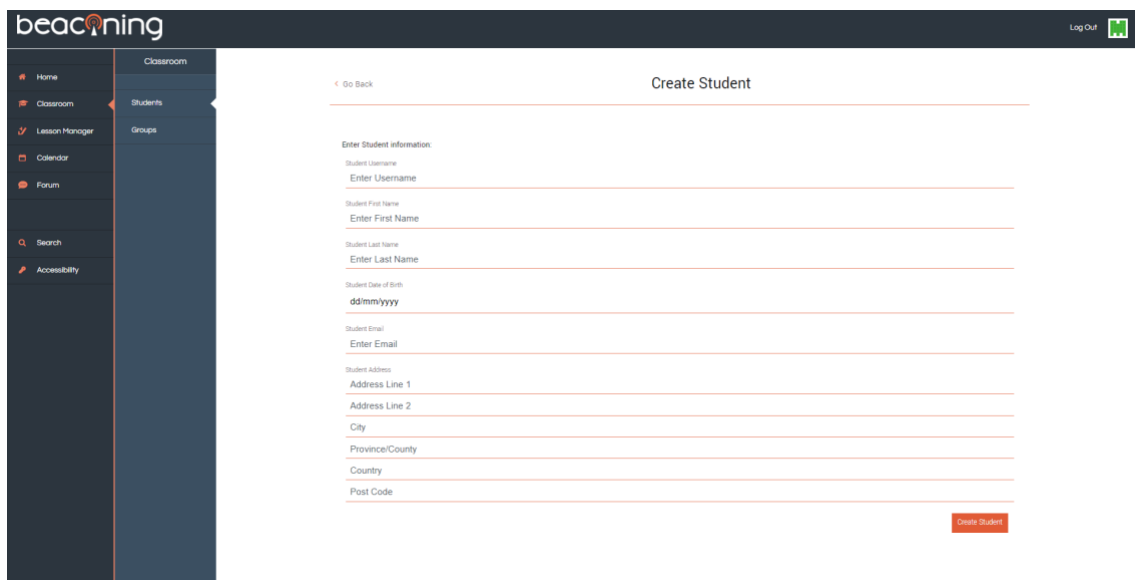
The screenshot shows the 'Create New Plan' form in the Beaconing platform. The left sidebar contains navigation links: Home, Classroom, Lesson Manager (selected), Calendar, Forum, Search, and Accessibility. The main content area has a 'Go Back' link and the title 'Create New Plan'. The form fields are as follows:

- Enter New Plan information:**
 - Plan Name:
 - Plan Description:
- Plan Domain:**
- Plan Topic:**
- Plan Age Group:**
- Plan Year:**
- Plan Learning Objectives:**

Figure 30: Create new GLP from Teacher UI

Rather than going into the Authoring Tool itself, Teachers can create a new GLP with basic information directly from the UI, streamlining the process.

Classroom



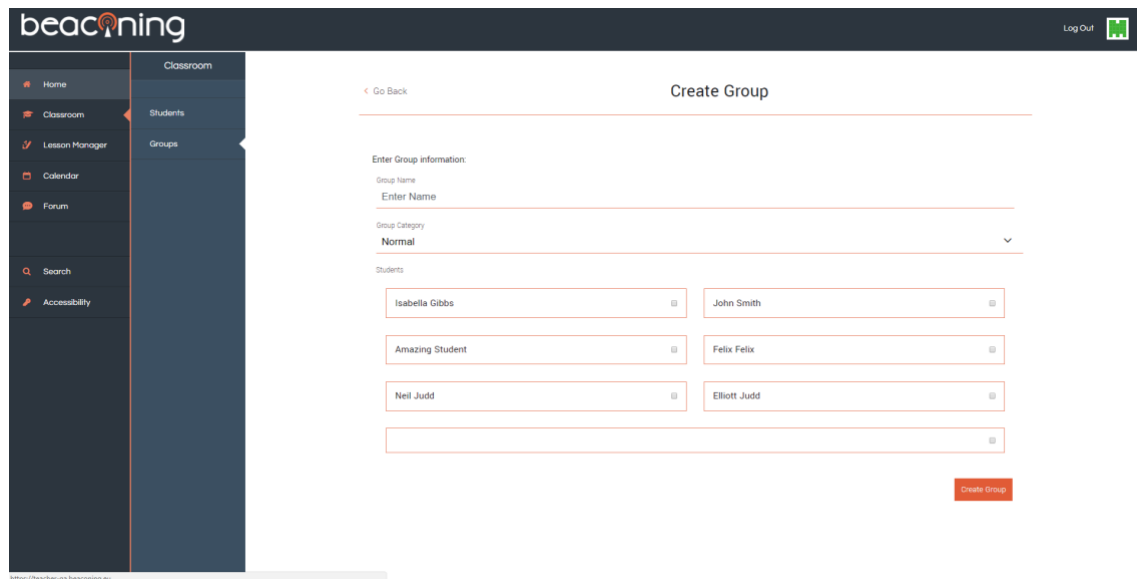
The screenshot shows the 'Create Student' form in the Beaconing platform. The left sidebar contains navigation links: Home, Classroom (selected), Lesson Manager, Calendar, Forum, Search, and Accessibility. The main content area has a 'Go Back' link and the title 'Create Student'. The form fields are as follows:

- Enter Student information:**
 - Student Username:
 - Student First Name:
 - Student Last Name:
 - Student Date of Birth:
 - Student Email:
- Student Address:**
 - Address Line 1:
 - Address Line 2:
 - City:
 - Province/County:
 - Country:
 - Post Code:

A 'Create Student' button is located at the bottom right of the form.

Figure 31: Create Student

From within the classroom section, users can easily add students to their account. Once added, students can be added to groups that have been created.



beaconing Log Out

Classroom

Home Classroom Lesson Manager Calendar Forum Search Accessibility

Students Groups

< Go Back Create Group

Enter Group information:

Group Name

Enter Name

Group Category

Normal

Students

Isabella Gibbs John Smith

Amazing Student Felix Felix

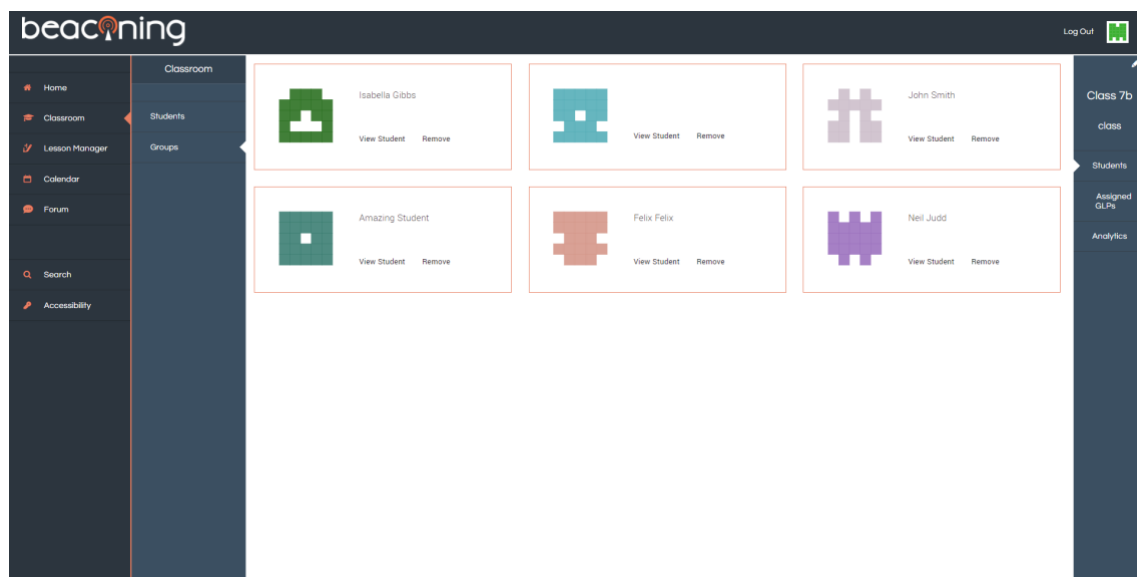
Neil Judd Elliott Judd

Create Group

https://teacher.qa.beaconing.eu

Figure 32: Create Group

Groups can be categorised as classes, courses or any other specific group you need such as special needs.



beaconing Log Out

Classroom

Home Classroom Lesson Manager Calendar Forum Search Accessibility

Students Groups

Class 7b

class

Students

Assigned GLPs

Analytics

Isabella Gibbs View Student Remove

John Smith View Student Remove

Amazing Student View Student Remove

Felix Felix View Student Remove

Neil Judd View Student Remove

Figure 33: View Group

Students within a group can be viewed, as well as assigned GLPs and Analytics associated with these assigned GLPs.

The screenshot shows the 'Edit Group' interface in the Beaconing platform. The left sidebar contains navigation links: Home, Classroom, Lesson Manager, Calendar, Forum, Search, and Accessibility. The 'Classroom' section is expanded, showing 'Students' and 'Groups'. The main content area is titled 'Edit Group information:' and contains the following fields:

- Group Name: **Class 7b**
- Group Category: **Class** (with a dropdown arrow)
- Students: A list of students with checkboxes for selection. The list includes:
 - Isabella Gibbs (checked)
 - John Smith (checked)
 - Amazing Student (checked)
 - Felix Felix (checked)
 - Neil Judd (checked)
 - Elliott Judd (unchecked)
 - An empty input field (unchecked)

At the bottom right of the form are two buttons: 'Cancel' and 'Update Group'. The right sidebar shows a user profile for 'Class 7b' with links to 'class', 'Students', 'Assigned GLPs', and 'Analytics'.

Figure 34: Edit Group

Groups can be fully edited and customised to add and remove students and rename as required.

The screenshot shows the 'Assigned GLPs to a Group' interface in the Beaconing platform. The left sidebar is identical to Figure 34. The main content area displays a single group entry:

Group Name	View	Unassign
Hands Free Computing Beaconing Game	View	Unassign

The right sidebar shows a user profile for 'Neil's group' with links to 'normal', 'Students', 'Assigned GLPs', and 'Analytics'.

Figure 35: Assigned GLPs to a Group

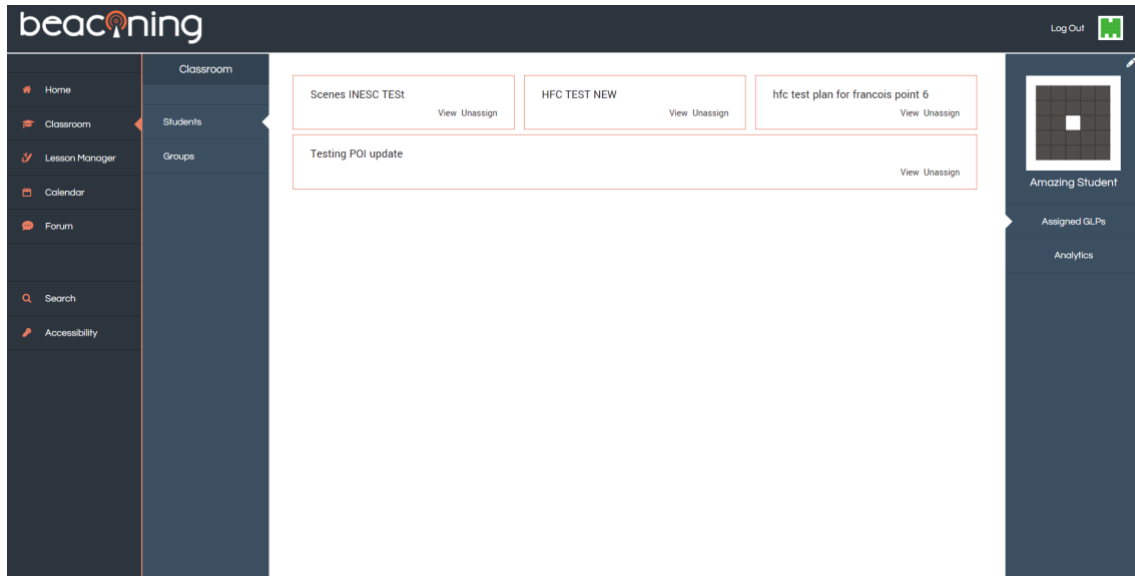


Figure 36: Assigned GLPs to a student

Assigned GLPs can be viewed for each student as well as individual analytics on their progress.

Search

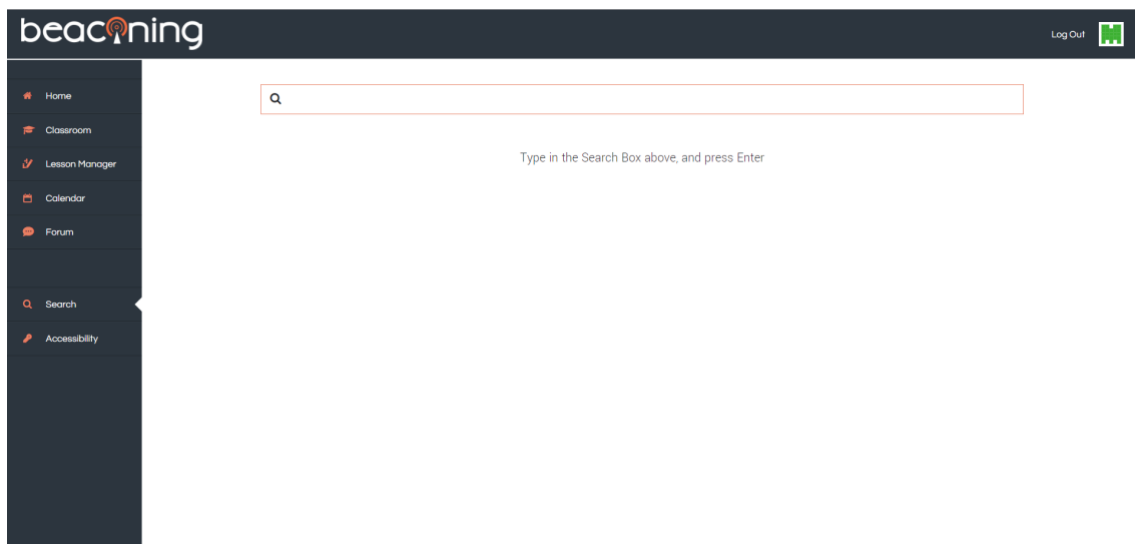


Figure 37: Search Beaconing

The Beaconing platform is fully searchable. You can search for student by name or username, GLP or search word. Results will be displayed for all differing occurrences.

APPENDIX C: ACCESSABAR FUNCTIONALITY SCREENSHOTS

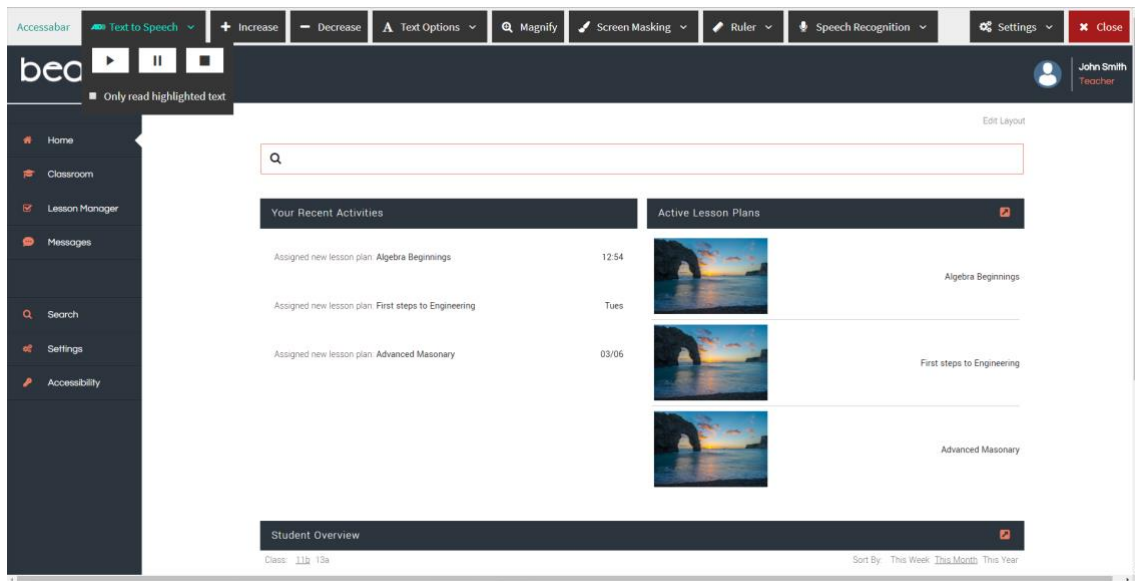


Figure 38: Accessabar Text to Speech

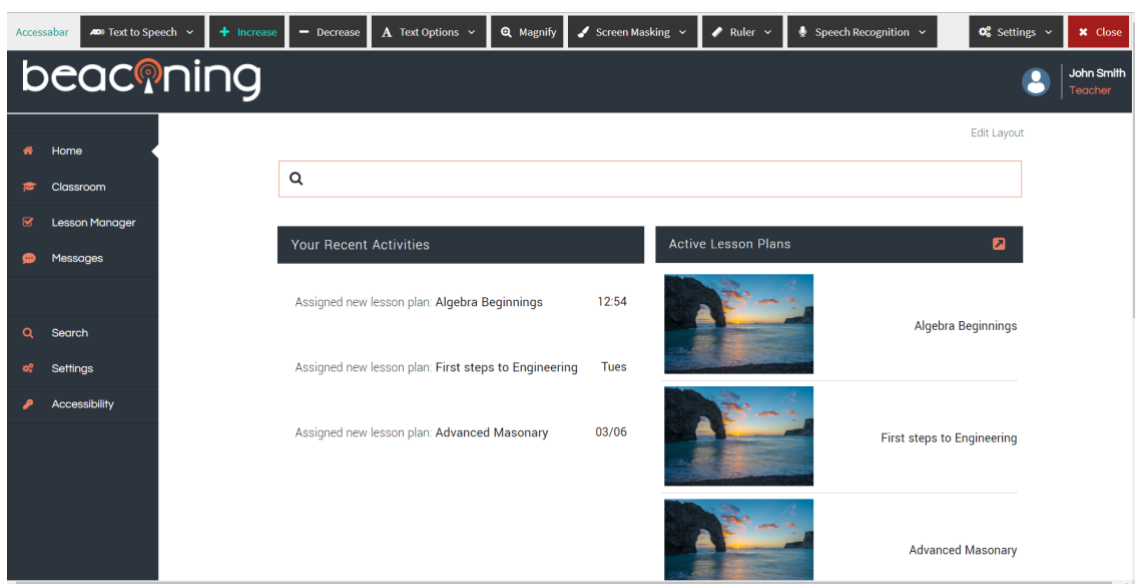


Figure 39: Accessabar Increase Font Size

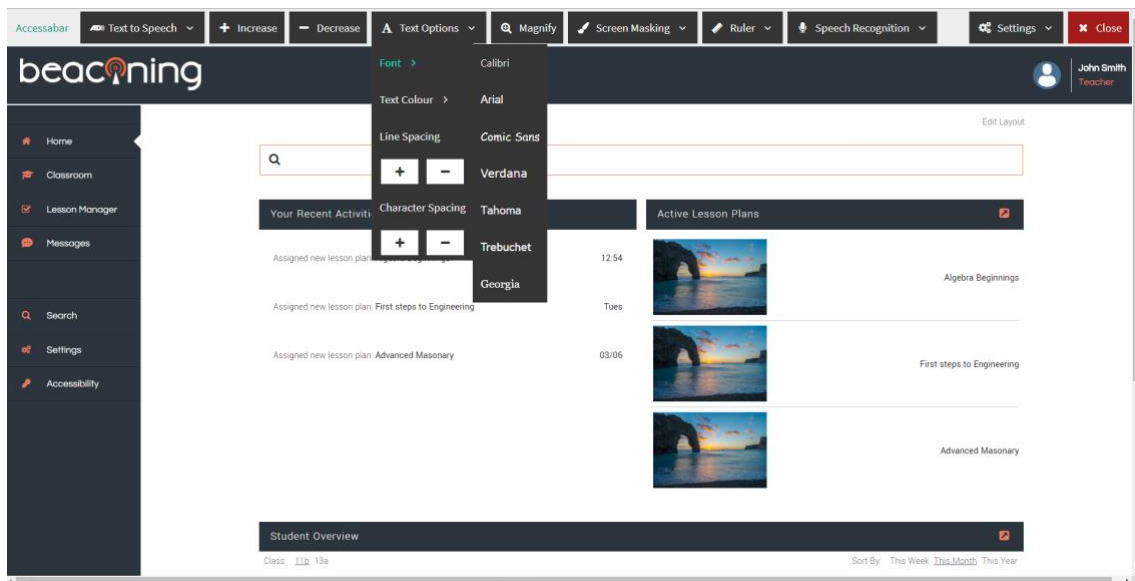


Figure 40: Accessabar Font Style

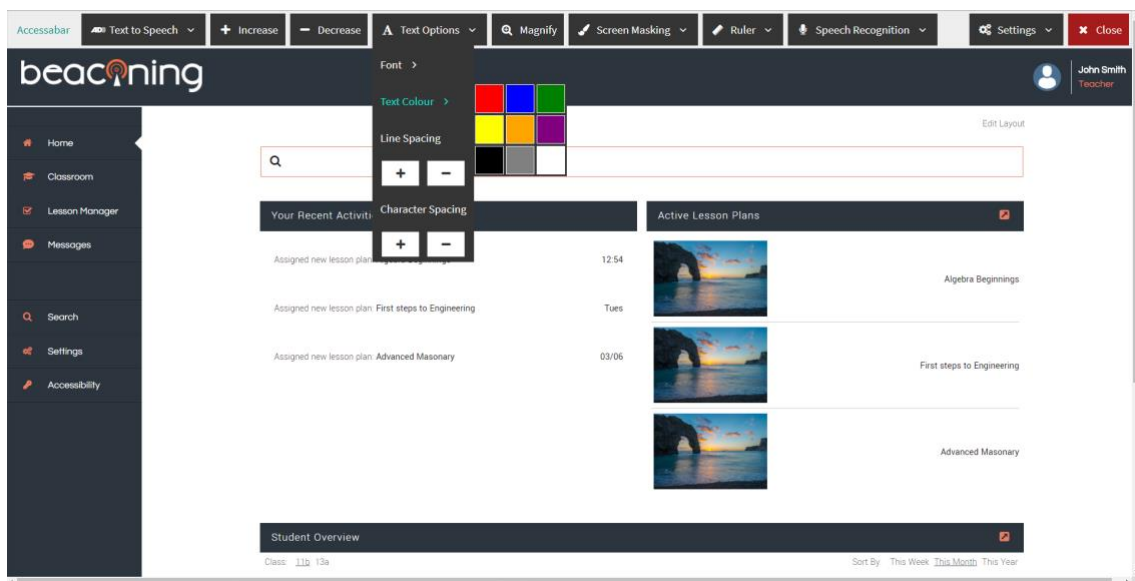
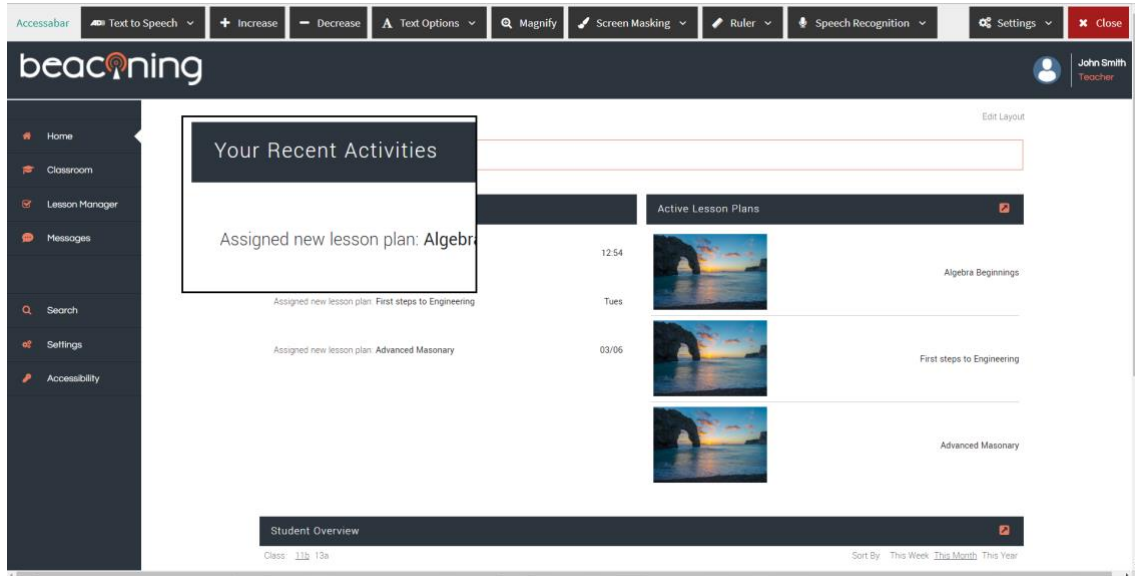
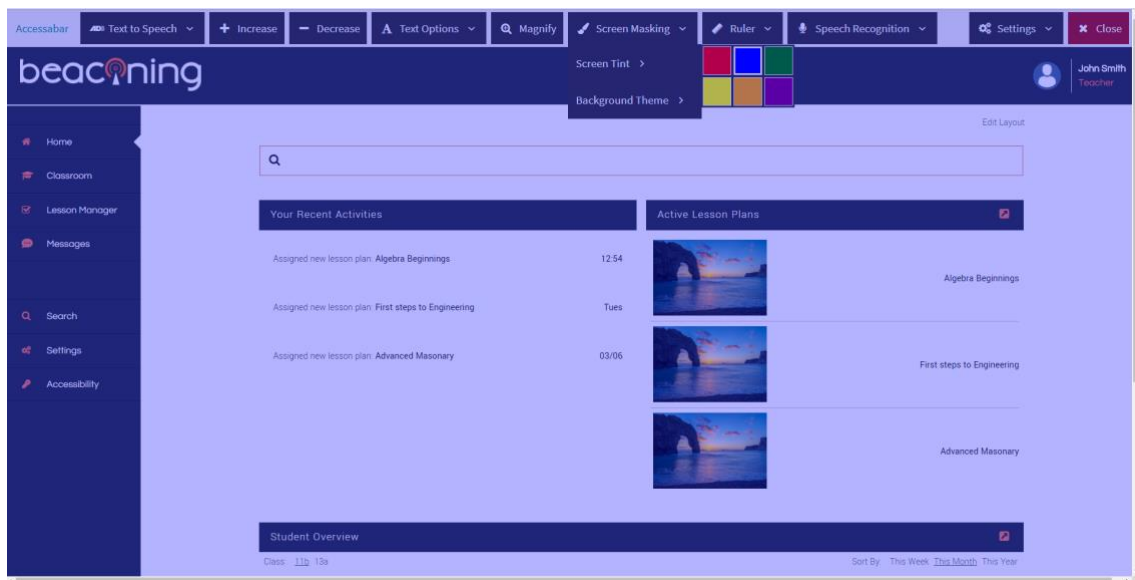
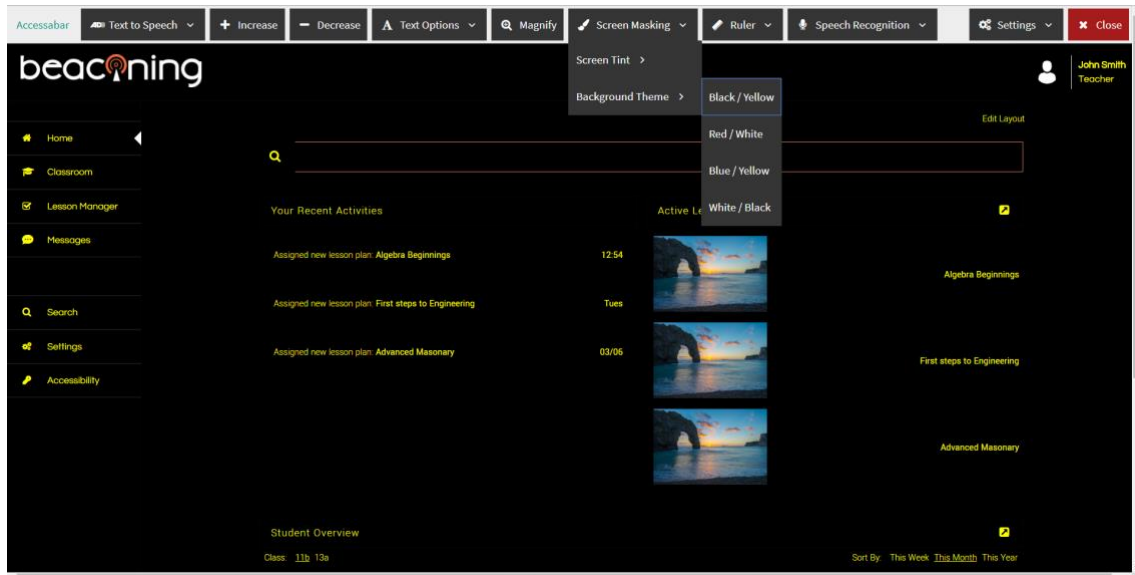
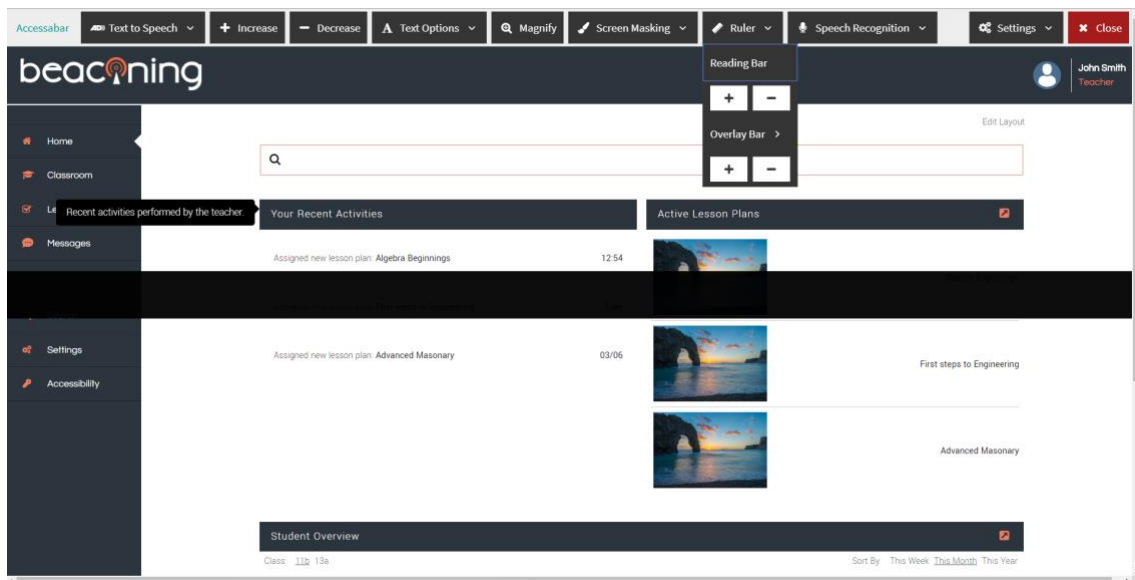


Figure 41: Accessabar Text Colour

*Figure 42: Accessibar Magnification**Figure 43: Accessibar Screen Tinting*

*Figure 44: Accessabar Background Themes**Figure 45: Accessabar Reading Bar*

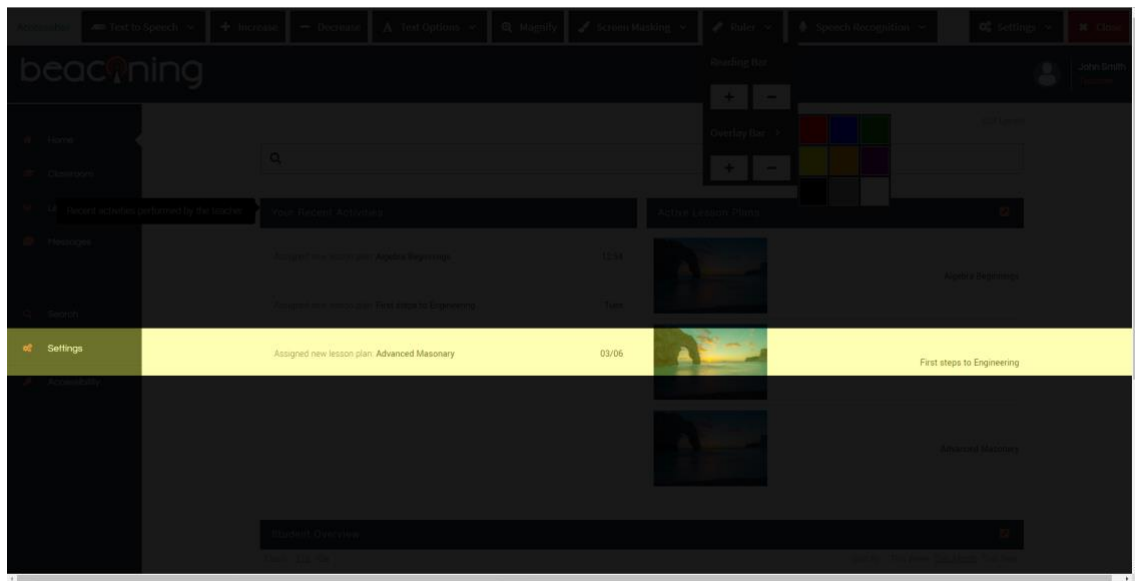


Figure 46: Accessabar Overlay Bar

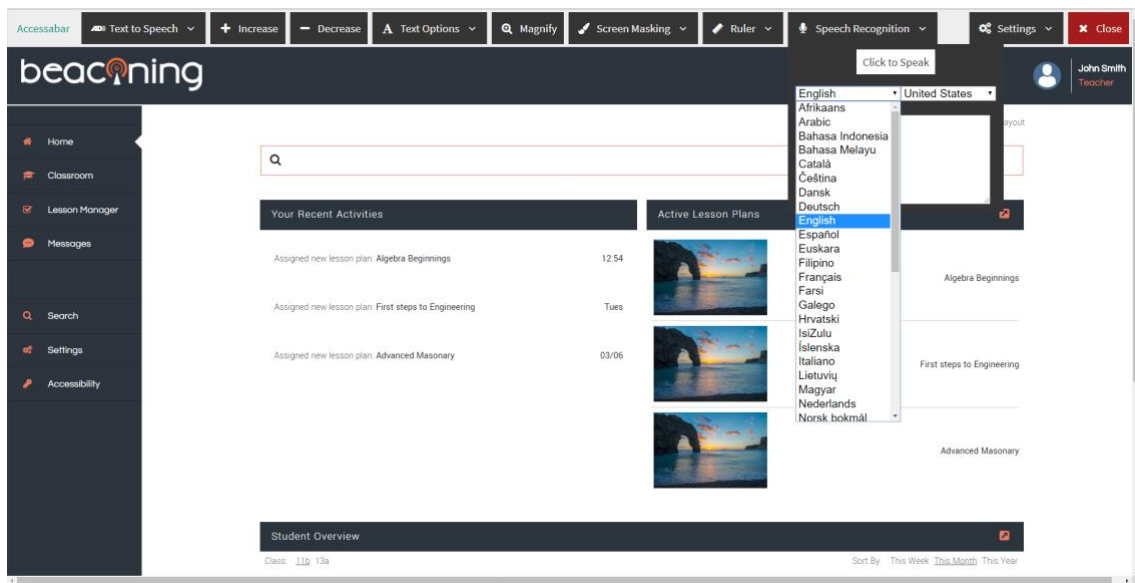


Figure 47: Accessabar Speech Recognition

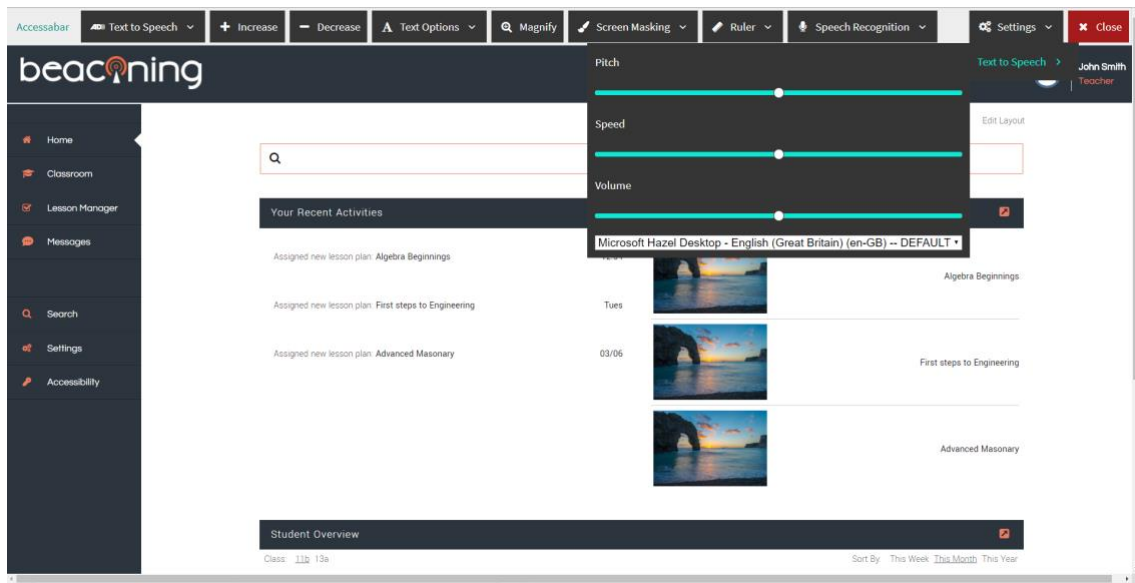


Figure 48: Accessabar Settings

APPENDIX D: ACCESSIBILITY PROFILE WIZARD

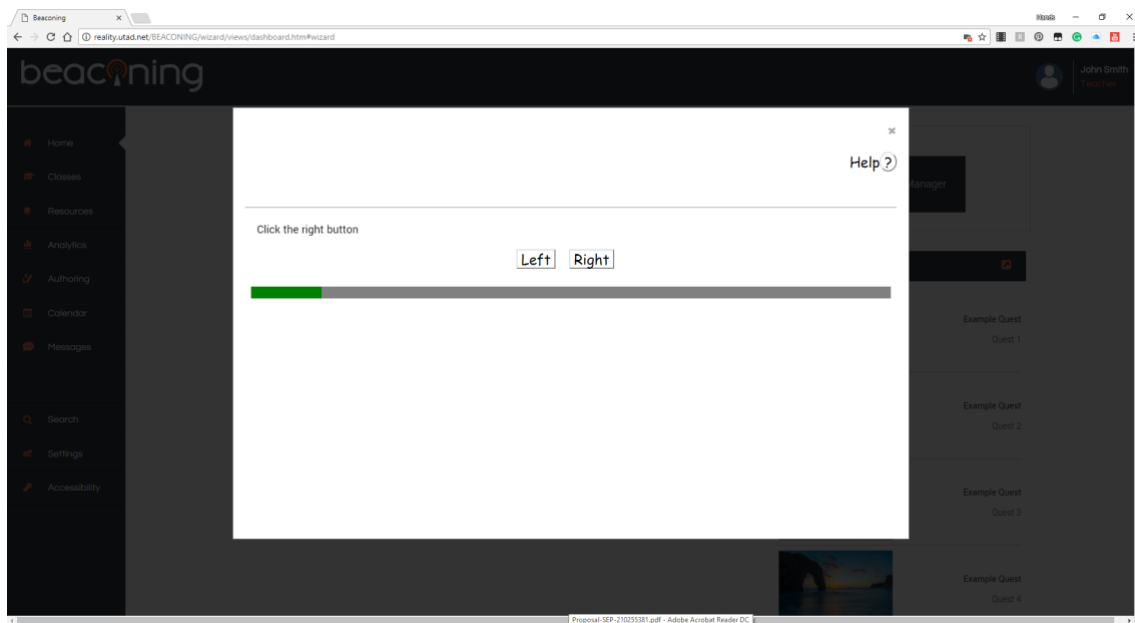


Figure 49: Accessibility Profile Wizard Start

This test can determine whether the user has difficulty in following instructions and may have Dyslexia. Resulting actions may be to recommend the use of other functions on Accessabar.

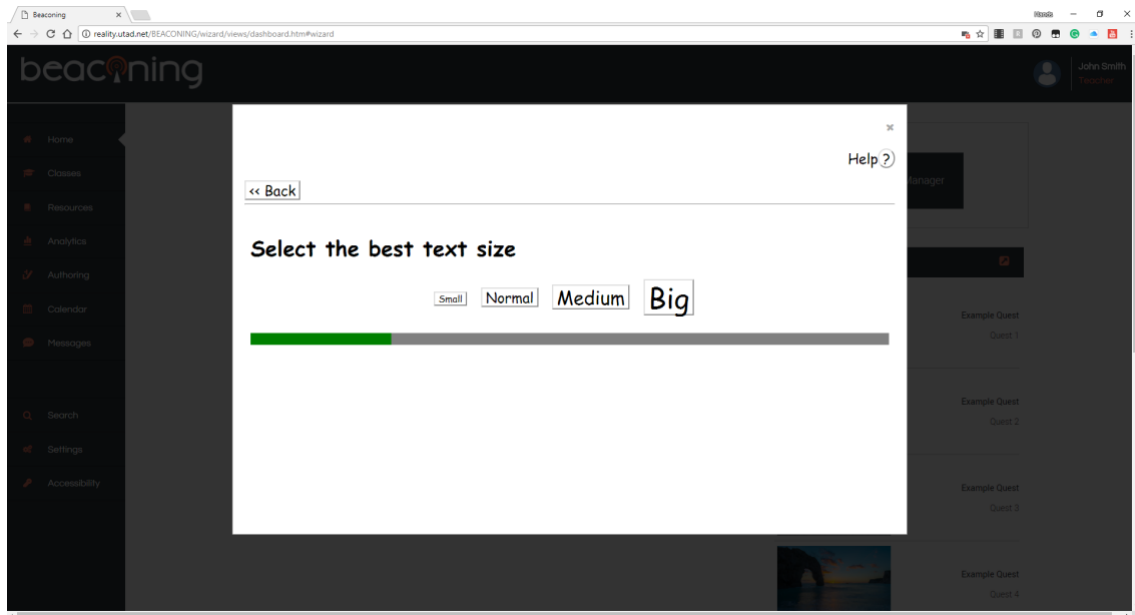


Figure 50: Accessibility Profile Wizard Text Size

This window sets the text size of the interface and configures Accessabar accordingly. Very good for Dyslexia and Visual Impairments.

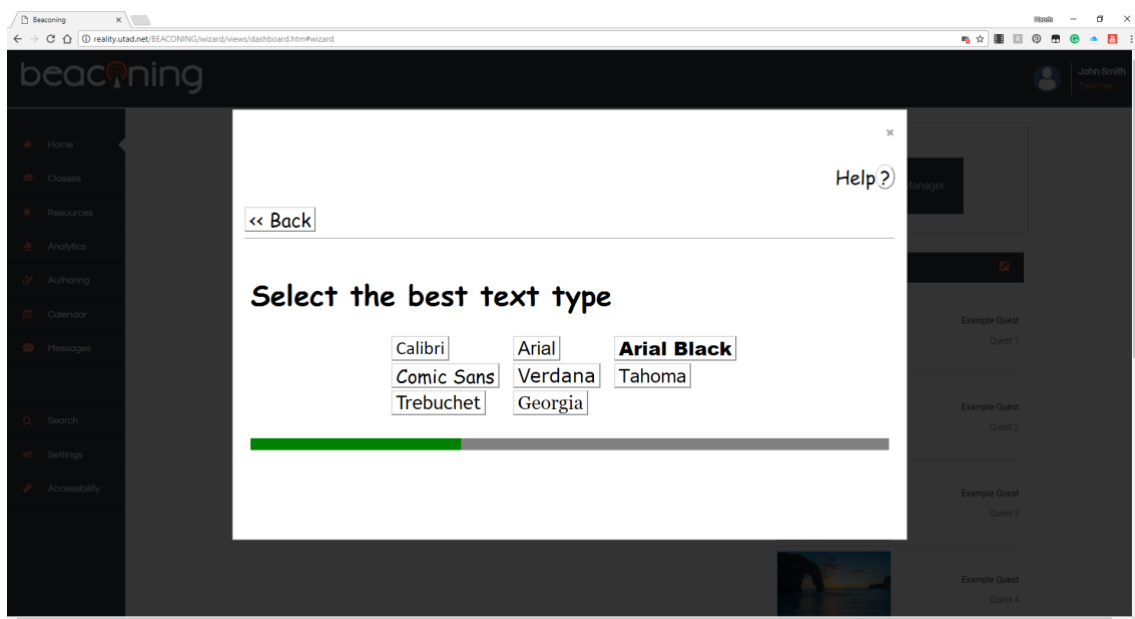


Figure 51: Accessibility Profile Wizard Text Type

This window sets the preferences for font type and configures both the interface and Accessabar. Very good for both Dyslexic Fonts and Visual Impairments.

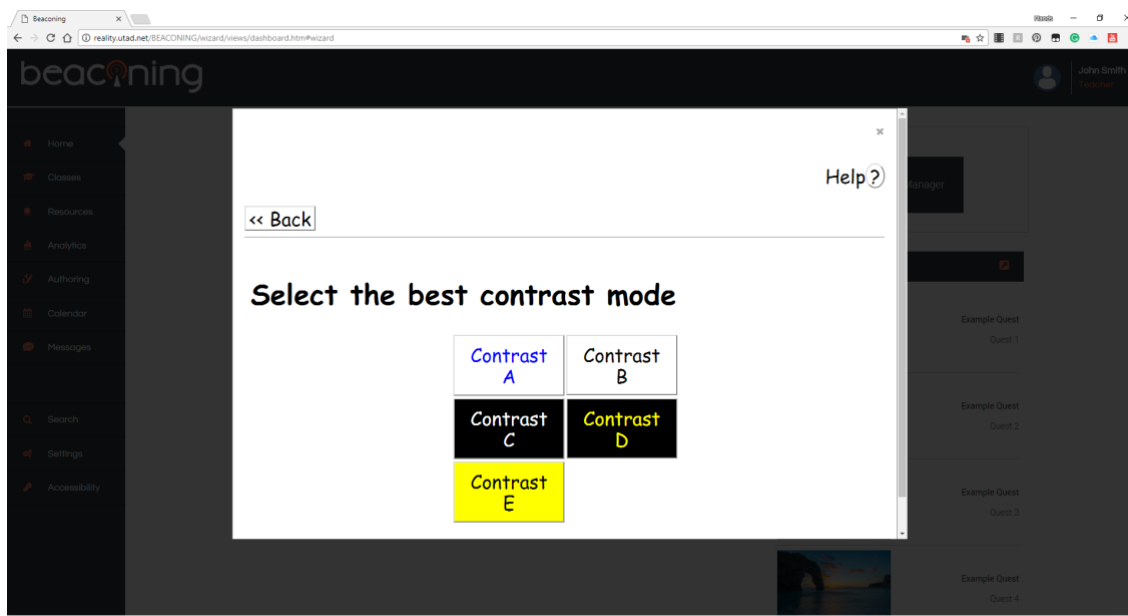


Figure 52: Accessibility Profile Wizard Contrast Mode

This window sets the preferences for contrast mode and is a way of determining visual impairment requirements. The interface and Accessabar will be configured accordingly.

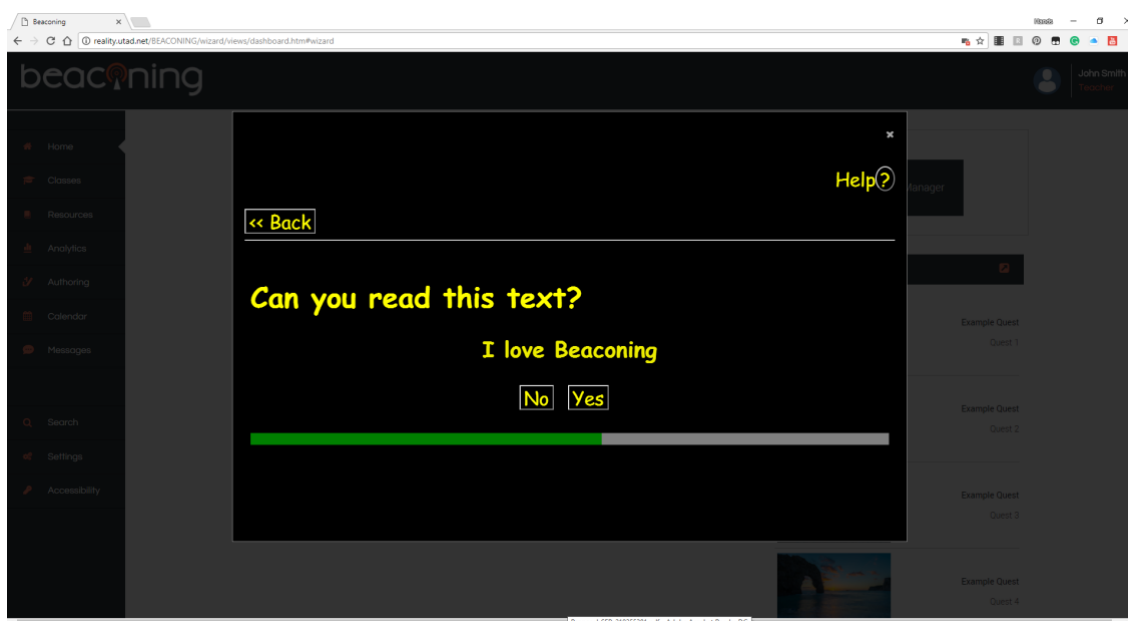


Figure 53: Accessibility Profile Wizard Flashing Text

The next window gathers information on the ability to see flashing text or objects in colour as the text in the middle of the screen is blinking. The interface and Accessabar will be configured accordingly by turning the Simplify Page option on or off.

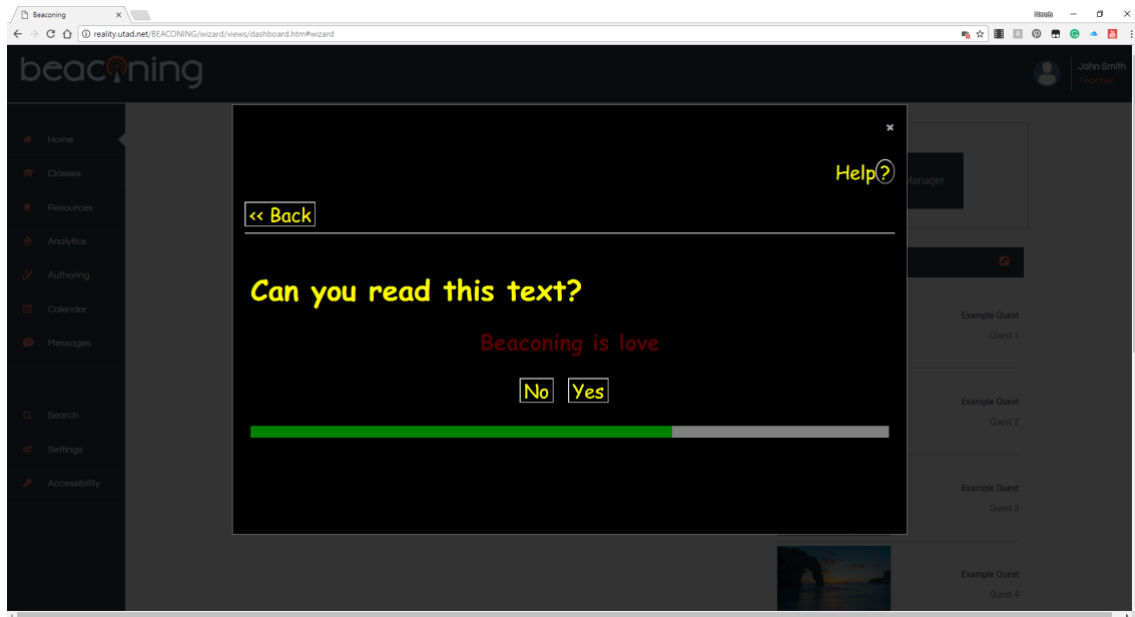


Figure 54: Accessibility Profile Wizard Flashing Coloured Text

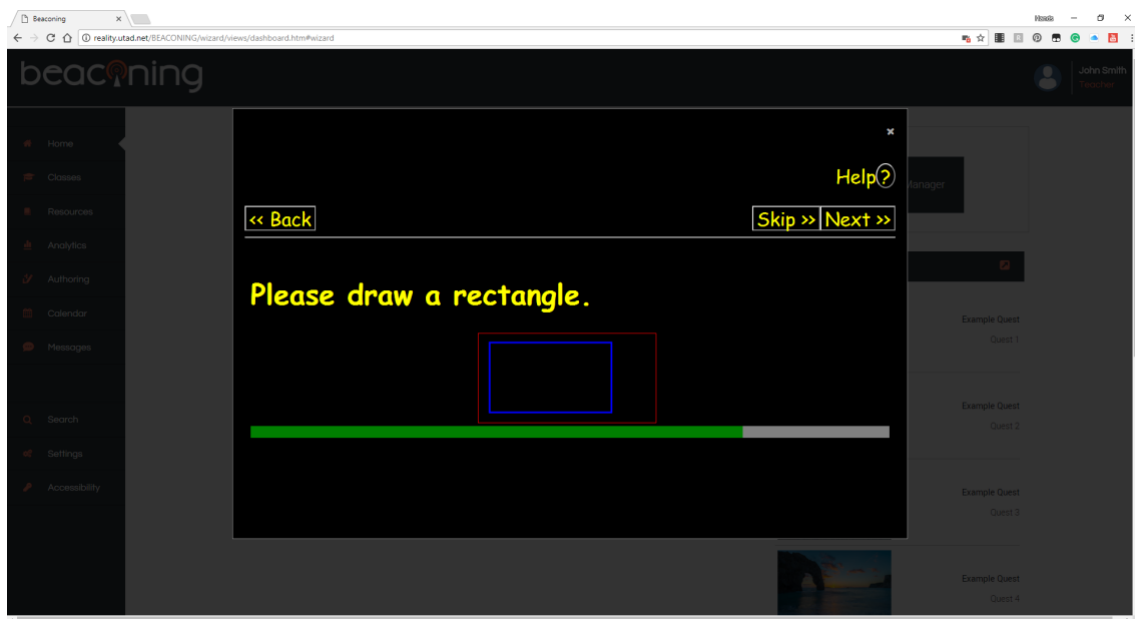


Figure 55: Accessibility Profile Wizard Draw Rectangle

This window determines the capability of users to control the mouse and detects cognitive as well as physical disability. Recommendations can be made to use keyboard shortcuts to navigate the interface, screen readers or speech recognition.

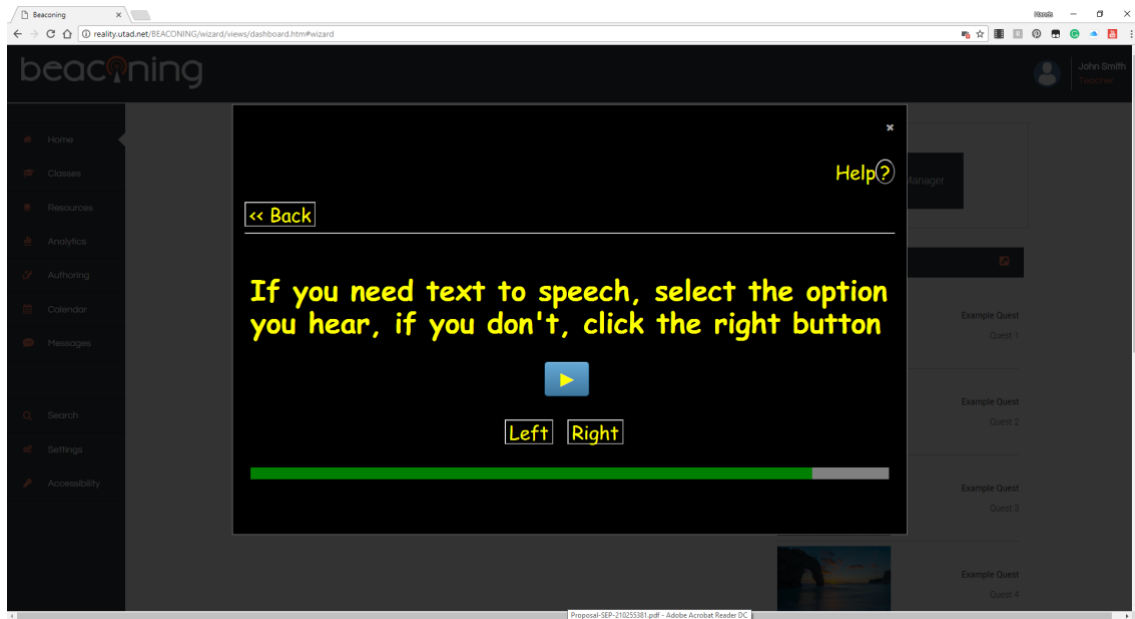


Figure 56: Accessibility Profile Wizard Text to Speech

From the results of this test Text to Speech can be configured on the Accessabar.

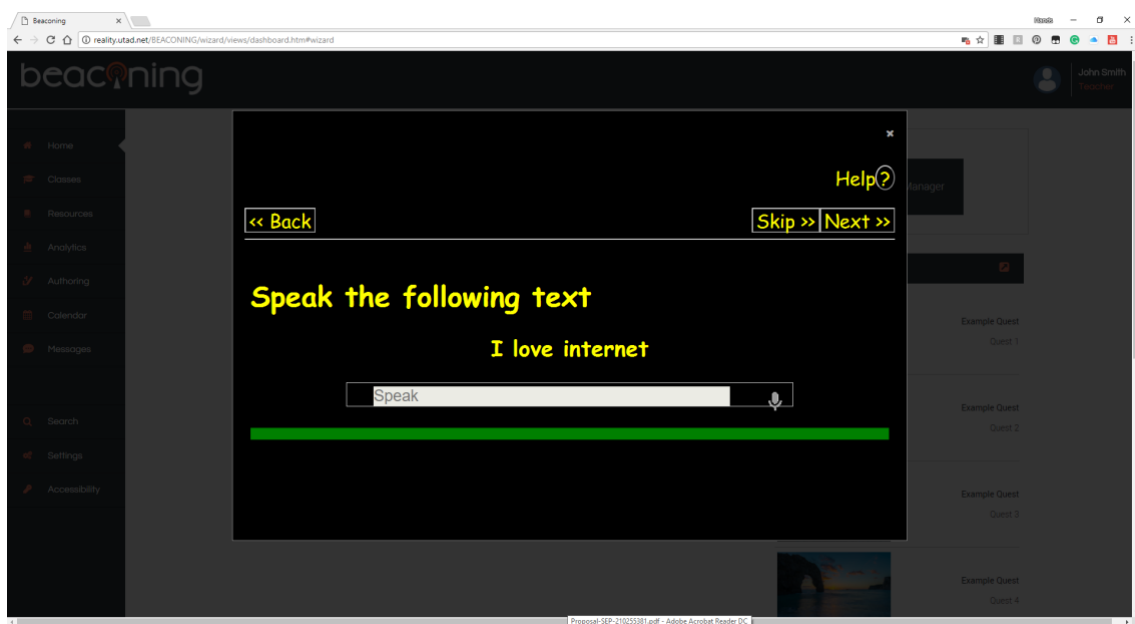


Figure 57: Accessibility Profile Wizard Speech Recognition

This exercise can configure settings for Speech Recognition on Accessabar and can help to determine whether the user benefit from the use of Speech Recognition.

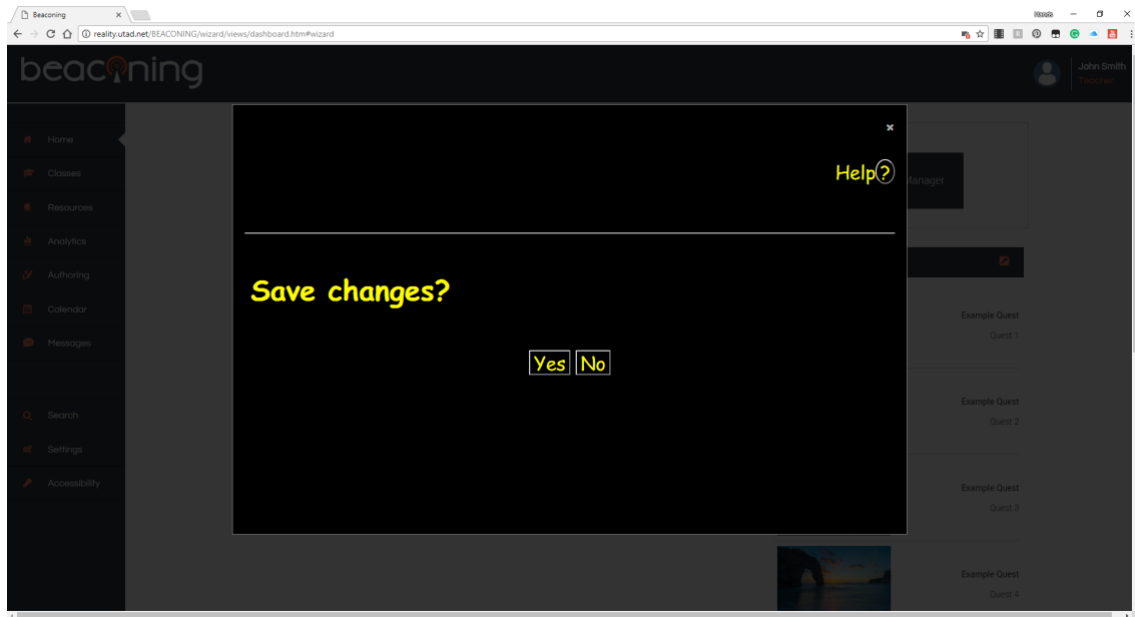


Figure 58: Accessibility Profile Wizard Save Changes

Results can then be saved to the individual's profile and sent to the Beaconing server. When the individual accesses Accessabar again the data will be pulled from their profile and specific settings will be applied to the interface.

This process is a notable example of good user experience and an adaptable interface, coupled with good interface design with the appearance and accessibility of the Beaconing dashboards and discreet Accessabar Tools.