

# DESIGNING SMART LEARNING ENVIRONMENTS (DSLE-2020) SOFTWARE DESIGN REPORT



UNIVERSITY OF  
EASTERN FINLAND

## **Designing Smart Learning Environments**

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From, Team 6 – Smart Learning Environment “Quickgo”

24.02.2020

## **Abstract**

In the 21<sup>st</sup> century fast and efficient reading skills are playing significant roles in several official exams like TOEFL, IELTS, diverse university entrance exams, and etc. We designed Quickgo to help enthusiastic readers in a small learning environment surrounded with the current technology hits. In this report, first, we will give you background information in the introduction part, and then we will share the prototype with you. Prototype will be offering you both screenshots from the application and explanation with it. After that, one by one we will be explaining the smart features that any smart learning environment should have concerning the functionalities of the Quickgo in detail in the smart features part. We also provided the tools and sources we have used to create prototype and our inspiration sources with their referenced links.

## **1.Introduction**

Smart Learning Environments (SLEs) are physical environments that are improved to promote better and faster learning by enriching the environment with context-aware and adaptive digital devices that, together with the existing constituents of the physical environment, provide the situations, events, interventions and observations needed to stimulate a person to learn to know and deal with situations (identification), to socialize with the group, to create artifacts, and to practice and reflect. Also, it focuses on self-learning, self-motivation, personalized learning, efficient and effective learning. Every step forward from existing learning environments towards these smarter learning environments is an improvement that is essential for further human, economic and cultural development.

Here, we explain briefly with visualizations about one such smart learning environment called “Quickgo”. To start with, we will see what Quickgo is and why Quickgo is a smart learning environment.

Quickgo is the online "Speed Reading Platform" that allows you to double the reading speed without losing meaning. It improves the reading speed with scientific methods and allows you to understand and read many more texts/documents/books in a shorter period of time. Quickgo is for anyone, starting from the 5th grade, including students, academicians, professionals and general readers at all levels of education. Quickgo also has the following functionalities.

- It helps to increase the speed of reading and understanding while studying, preparing for the exam and solving questions during the exam.
- It allows the eye to learn how to look, slide and read on the line; it gives you a rhythm of reading; increases attention and concentration.
- Evaluates reading speed and comprehension level and enables you to notice the development in reading speed.
- With its tablet compatible feature, it allows you to work independently in time and place.

Quickgo, as a smart learning environment has a context-sensitivity that can help improve the learner's learning efficiency. Quickgo creates a special training plan for the learners and determines the text based on the information (age and grade level) provided by the learners during registration. It has an Intelligent content recommender system that constantly monitors the reading speed since its first entry into the system and plans its training according to its performance. Quickgo also provides a ubiquitous learning environment with its visual and transparent way to access learning resources and services to the learner. It also has a good reflection and feedback system, which constantly evaluates reading speed and level of comprehension with exercises and exams, follows the learners' development uninterruptedly, and shows the development of reading speed with simple graphics. Also, it provides a seamless connection and interoperability function. Learners can track their performance by connecting to the system with computers, tablets from anywhere.

Quickgo uses eye-tracking technology to catch readers' eye path to evaluate elasticity of the eye muscles and active visual field area.

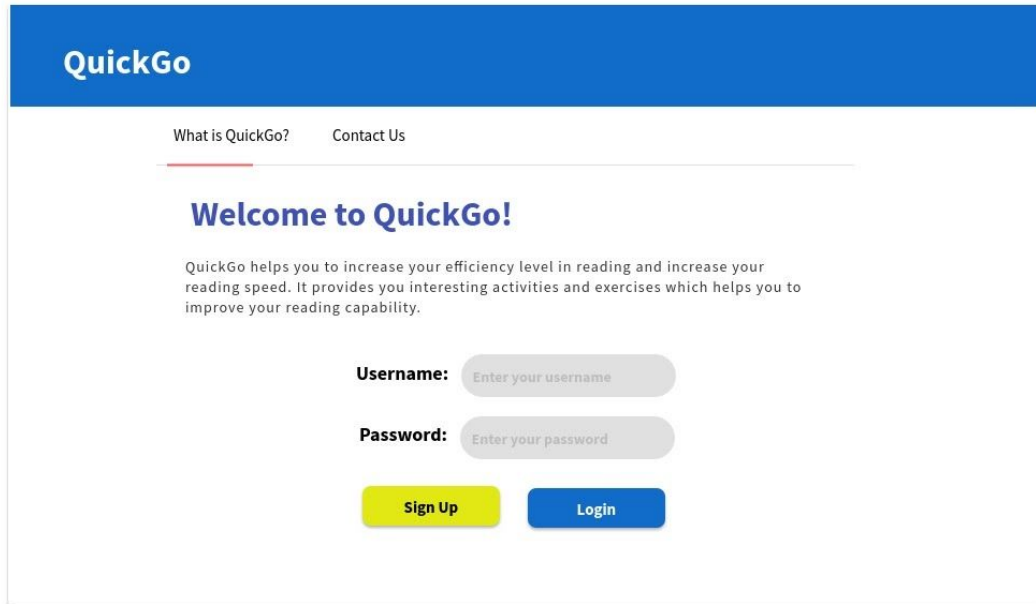
## 1.2. Team Information

Name and Surname	Student ID	Role
Qamar Uddin	308866	Use Case Diagram Creator & Explanation
Sunil Khan Bhadur	308884	Class Diagram Creator & Explanation
Fatima Rabia Yapicioglu	306627	Prototype Creation & Report Editing
Mohammed Ansari	308842	Prototype Creation
Hemapriya Chidambaram	285548	Report Creator & Introductions and Smart Features extractions

## 2.0. Prototype Simulation

In this section, we will offer you screenshots from the application Quickgo in a hierarchical manner with the explanations of the smart features that we used in this system. Finally, there will be a video advertisement that shows how we can use this system over the simulation that we created.

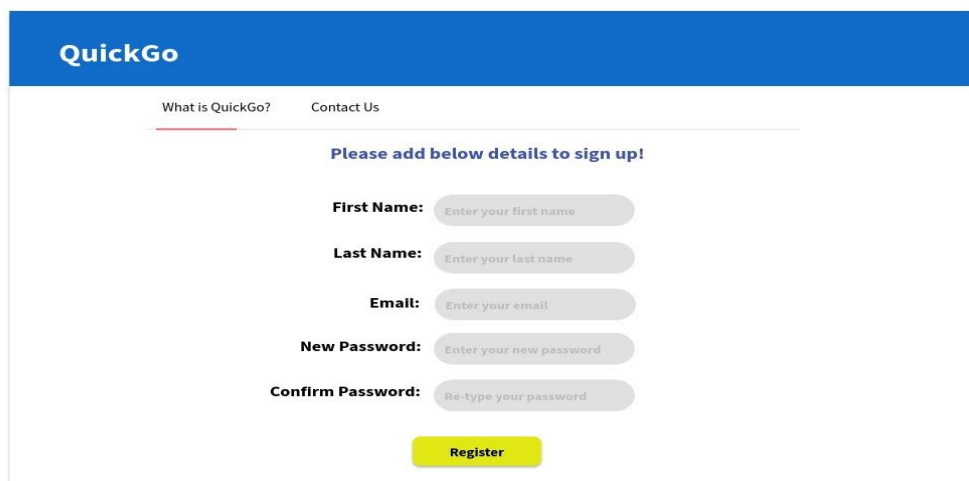
## 2.1. Quickgo Login Page



The login page features a blue header with the 'QuickGo' logo. Below the header, there are two links: 'What is QuickGo?' and 'Contact Us'. The main heading is 'Welcome to QuickGo!'. A descriptive paragraph states: 'QuickGo helps you to increase your efficiency level in reading and increase your reading speed. It provides you interesting activities and exercises which helps you to improve your reading capability.' The login form includes a 'Username:' label with a text input field containing the placeholder 'Enter your username', a 'Password:' label with a text input field containing the placeholder 'Enter your password', and two buttons: a yellow 'Sign Up' button and a blue 'Login' button.

When the users come to the login page they can log in to the system by writing their username and password if they have an account, if they don't have an account then they can go on with the sign-up page, by clicking on the sign-up button.

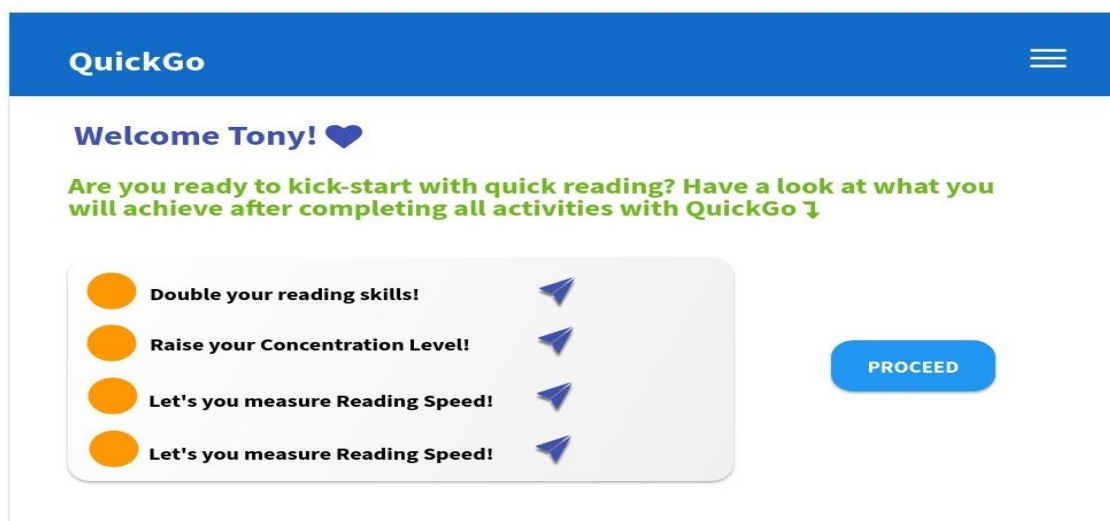
## 2.2. Sign-up page



The sign-up page features a blue header with the 'QuickGo' logo. Below the header, there are two links: 'What is QuickGo?' and 'Contact Us'. The main heading is 'Please add below details to sign up!'. The sign-up form includes five labels with corresponding text input fields: 'First Name:' (placeholder: 'Enter your first name'), 'Last Name:' (placeholder: 'Enter your last name'), 'Email:' (placeholder: 'Enter your email'), 'New Password:' (placeholder: 'Enter your new password'), and 'Confirm Password:' (placeholder: 'Re-type your password'). A yellow 'Register' button is located at the bottom of the form.

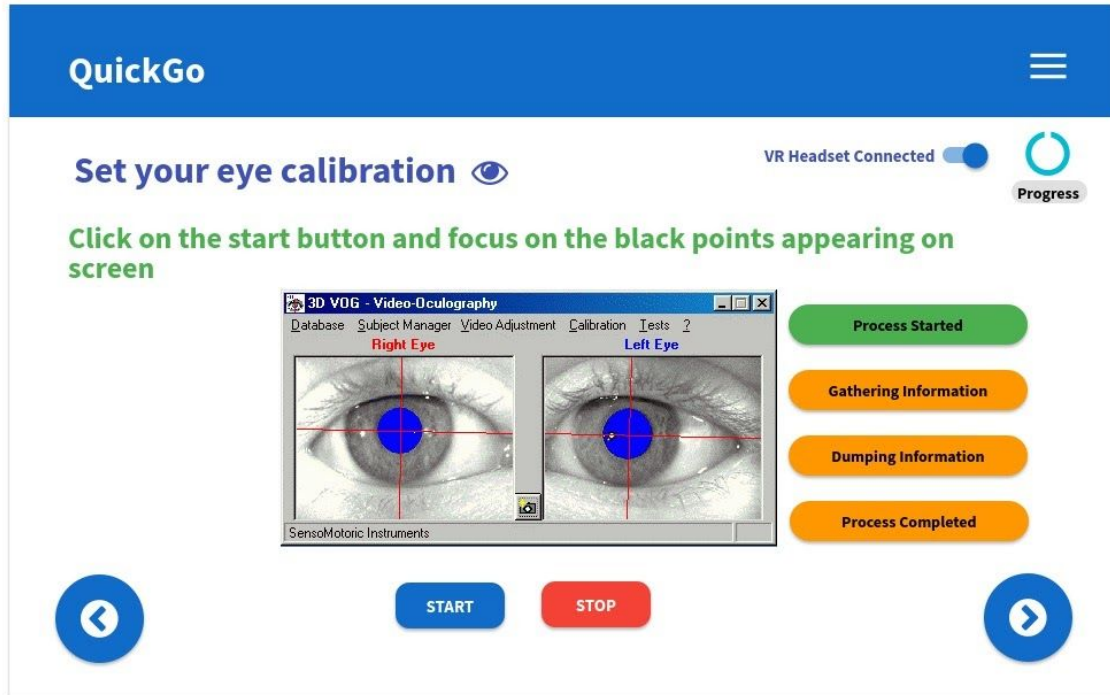
We also prepared a sign-up page for those who did not have an account to create a real-application atmosphere here. Users can enroll in the system by using any device. There are two types of user in the system: one is user as a reader and the other one is coach. The system provides a coach to each user according to his/her interests and reading speed level. Each user can contact his/her coach via the chat box on their profile page. Also the coach user can prepare new types of reading activities and suggest to the readers. The system can prompt the readers' weak points or skills to the coach so that they can directly pinpoint the weak areas and prepare activities with these contexts.

### 2.3. Set Eye-Calibration and Initial Speed Setting Page for All Users



Above is the welcome page of the Quickgo, after the user enrolled in the system he/she will face this page. Here, first, Quickgo provides smart features to the user and invites the user to start learning. We will provide another section in this report to explain smart features concerning each functionality of the Quickgo. In this page, the user can set the AR/VR configuration of the smart learning environment and set his/her initial speed of reading so that the system provides a specialized adaptive content to the user.

## 2.4. Eye-calibration page for the record eye-activity



When the user desires to use the AR/VR property of the smart learning environment on the eye-calibration page. AR/VR property will provide an opportunity for users to read texts and do exercises via specialized glasses. And, this property is important to use because the system is getting benefit from the eye-tracking technology for recording eye-elasticity, active visual widening, creating an elastic visual field, and etc. After the calibration the user can start his/her learning journey by setting his/her initial reading speed.

## 2.5. Setting initial Reading Speed Page

QuickGo

Set your Default Reading Speed

Time: 00:02:31

Progress

The Northern Lights are actually the result of collisions between gaseous particles in the Earth's atmosphere with charged particles released from the sun's atmosphere. Variations in color are due to the type of gas particles that are colliding. The most common aurora color, a pale yellowish-green, is produced by oxygen molecules located about 60 miles above the earth. Rare, all-red auroras are produced by high-altitude oxygen, at heights of up to 200 miles. Nitrogen produces blue or purplish-red aurora.

The connection between the Northern Lights and sunspot activity has been suspected since about 1880. Thanks to research conducted since the 1950's, we now know that electrons and protons from the sun are blown towards the earth on the 'solar wind'. (Note: 1957-58 was International Geophysical Year and the atmosphere was studied extensively with balloons, radar, rockets and satellites. The temperature above the surface of the sun is millions of degrees Celsius. At this temperature, collisions between gas molecules are frequent and explosive. Free electrons and protons are thrown from the sun's atmosphere by the rotation of the sun and escape through holes in the magnetic field. Blown towards the earth by the solar wind, the charged particles are largely deflected by the earth's magnetic field. However, the earth's magnetic field is weaker at either pole and therefore some particles enter the earth's atmosphere and collide with gas particles. These collisions emit light that we perceive as the dancing lights of the north (and the south).

The lights of the Aurora generally extend from 80 kilometers (50 miles) to as high as 640 kilometers (400 miles) above the earth's surface. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Nunc maximus, nulla ut commodo sagittis, sapien dui mattis dui, non pulvinar lorem felis nec erat. Aliquam egestas, velit at condimentum placerat, sem sapien laoreet mauris, dictum porttitor lacus est nec enim. Vivamus feugiat elit lorem, eu porttitor ante ultrices id. Phasellus suscipit tellus ante, nec dignissim elit imperdiet nec.

The temperature above the surface of the sun is measured in?

☒ millions of degree Celsius

☐ billions of degree Celsius

☐ hundreds of degree Celsius

Which particles are thrown from the sun's atmosphere?

☒ Free electrons and neutrons

☐ Encapsulated carbon and oxygen

☐ Free electrons and protons

What is true about the earth's magnetic field?

☒ Weaker at the Equator

☐ Weaker at the north pole

☐ Weaker at the south pole

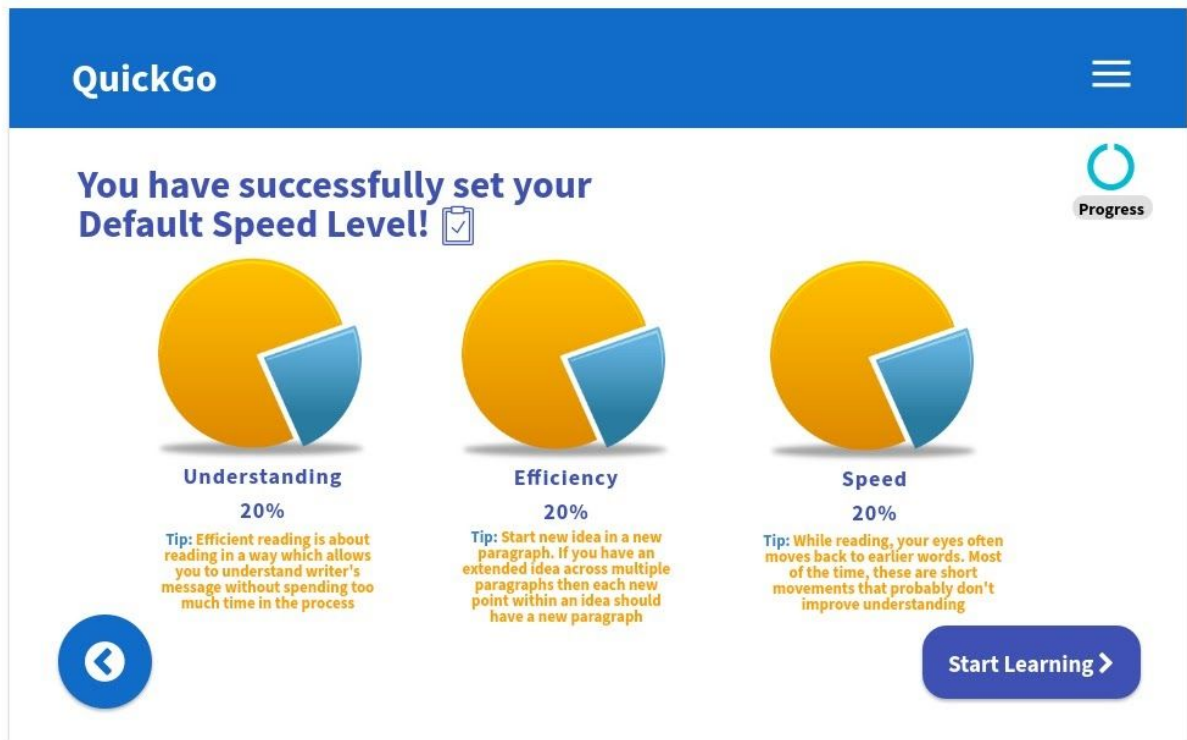
Submit

When the user clicks on the set my speed button on the previous page, they will be provided with this page. This is a basic text with some questions next to it. While the user is reading the text his/her eye movements will be evaluated to analyze the size of the visual field, and how flexible the eyes are. It also records the time taken and constitutes the



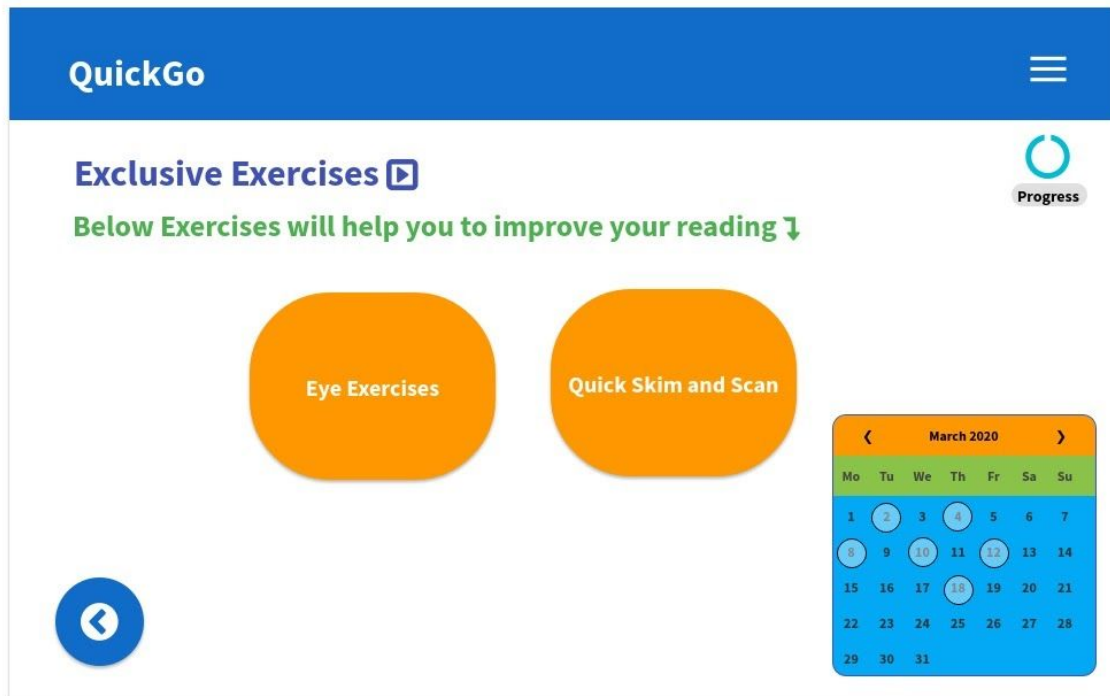
perfect path for the user who wants to improve his/her reading. There is an interactive plot on the top side of the page that shows an eye-activity being recorded and analyzed also.

## 2.6. Getting the initial results to report and specialized tips for the student



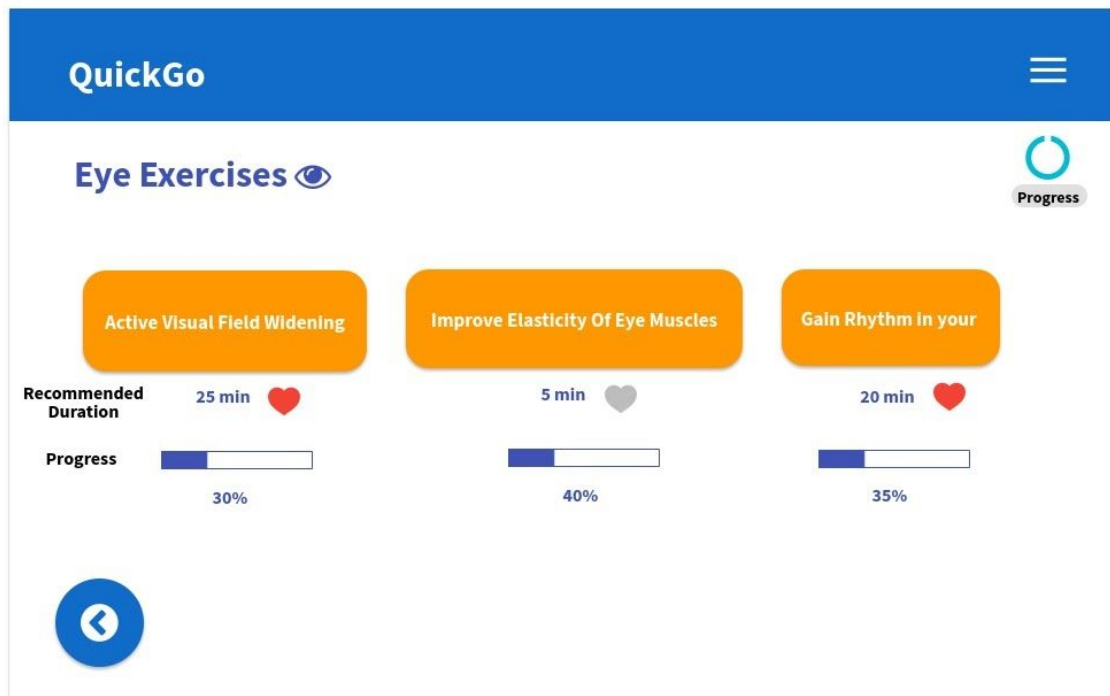
After the user submitted the first setting initial speed test, there will be an analysis of the user activity with some visualizations showing the efficiency, understanding level and speed of reading with some tips below. Then, the user can start learning by clicking on the start button. Since the system detected the most important typical properties specific to the user, the system assigns a coach to each user as an activity assistant. The responsibilities or options for the coaches in the system will be shared in the user as a coach section on the coach profile page.

## 2.7. Specialized exercise path for each user page



When the user decides to go on with the recommended exercise path and click on the start button he/she will also get a calendar with the recommended dates for each exercise. Exercise types and order of the hierarchy are recommended to each user. There are two types of exercises called eye-exercises and quick skim and scan each of which has their own sub-activities. Here, the calendar shows the recommended days for the user, recommended days are decided according to not make readers' eyes too exhausted. Gaps between the exercise days are being decided by the users initial performance and public health sources.


## 2.8. Exercises have their sub-exercises which are also specialized in users.



Each exercise type has its own activities with their own recommended durations to the user. The durations will be regularly updated according to the performance of the user. Users can track his/her own activity on the below charts, and give feedback to the coaches who prepared the activities. The system also offers progress bars users to make them be able to track their progress. User can also give feedback to each activity in this page. Reader coaches have the ability to create new activities and suggest to each user in their recommended paths. Regularly, the durations of the activities are being updated by the performance of the user, and can be followed by the readers on that screen.

## 2.9. Active Visual Field Widening Activity

Quickgo-Active Visual Field Widening Activity



[Main Page](#)[Exercises](#)[Reports](#)[Profile](#)

Welcome to visual field widening activity, please read the instructions carefully and click on the start button.

You will see a page divided into the two parts.

On the left hand side you'll see the point the you should focus on.

On the right hand side you'll see some words at the random places on the screen.

At the bottom there will be a box, please type there what you've seen, and click on submit.


It will continue in this manner, until you get done with the recommended duration.

Start

The Quickgo has two main exercise types and each of them has their own activities with their recommended durations to the user. And this page belongs to one of the activities under the eye-stretching exercise. Required information for the activity is provided on this page to the user. Then users can click on start and start practice for this activity.

The following figure shows the context of the activity in the next page after clicking the start.

Quickgo-Active Visual Field Widening Activity



Main Page


Exercise

Reports

Profile

Please focus on the blue point below and try to read the word on the right hand-side. Type the word into the box and click on the continue button.

1



fleur-de-lis

Continue

1

2


3

4

5

The Quickgo offers different activities to the user and tries to detect learning style and the activity types most suitable to the user. Also, the Quickgo detects the weaknesses of the user and creates analysis charts on the coach page to direct them to create activities with related contents. In this activity after the user enters the first word and click on the enter button, Quickgo directs user to the next following page with the new word which takes place at the random area of the right hand side.

Quickgo-Active Visual Field Widening Activity



Main Page


Exercise

Reports

Profile

Please focus on the blue point below and try to read the word on the right hand-side. Type the word into the box and click on the continue button.

2



Tervetuloa

Continue

1

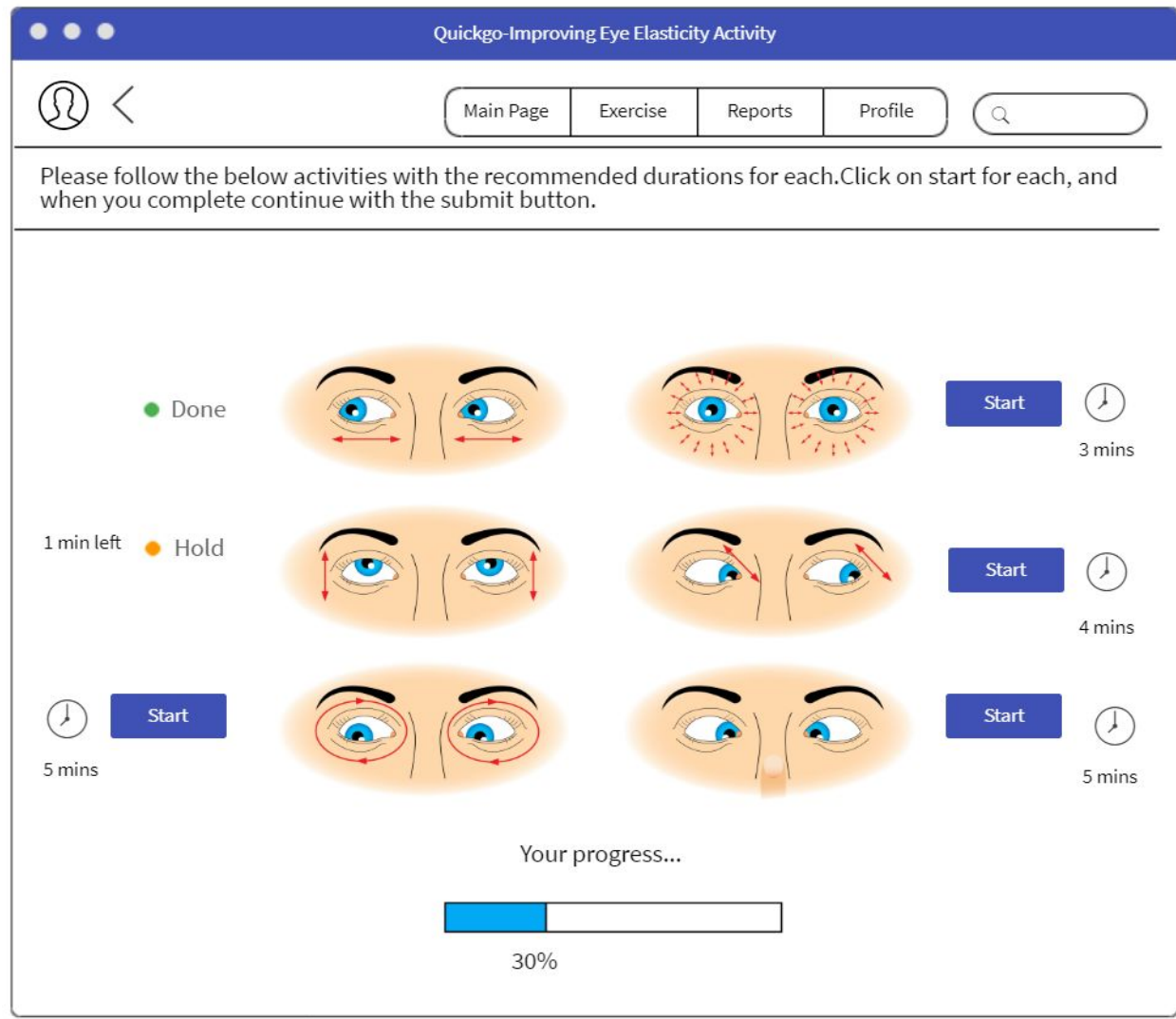
2

3

4

5

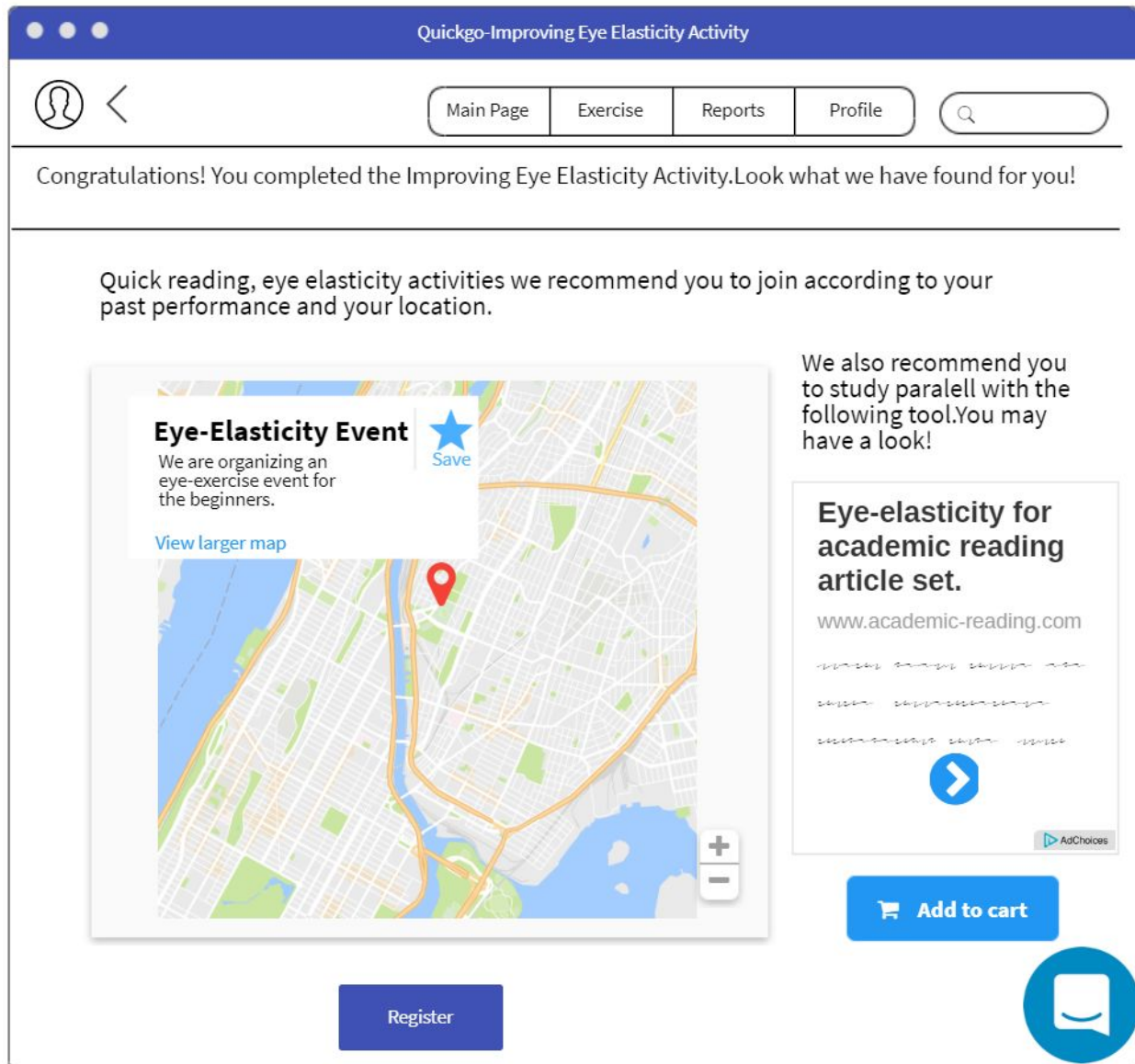
As the user continues to practise with the activities included in the exercises page, the system gets better from the perspective of adaptivity which is an unwavering component of the smart learning environments. This page is the continuation of the previous page. As the user continues to enter words to the input box, the system will show the new one and the Quickgo aims to widen the active visual reading field of the user. If we continue with the next activity we will see that there is another context adaptive content to each user.



The page is one of the activities under the eye-stretching exercise and the duration of each movement is specialized to the user. This activity aims to improve the elasticity level of the eye-muscles for better and fast reading. Those activities can be assisted by the AR/VR headset to detect the quality level of the movements that are being performed by the user.

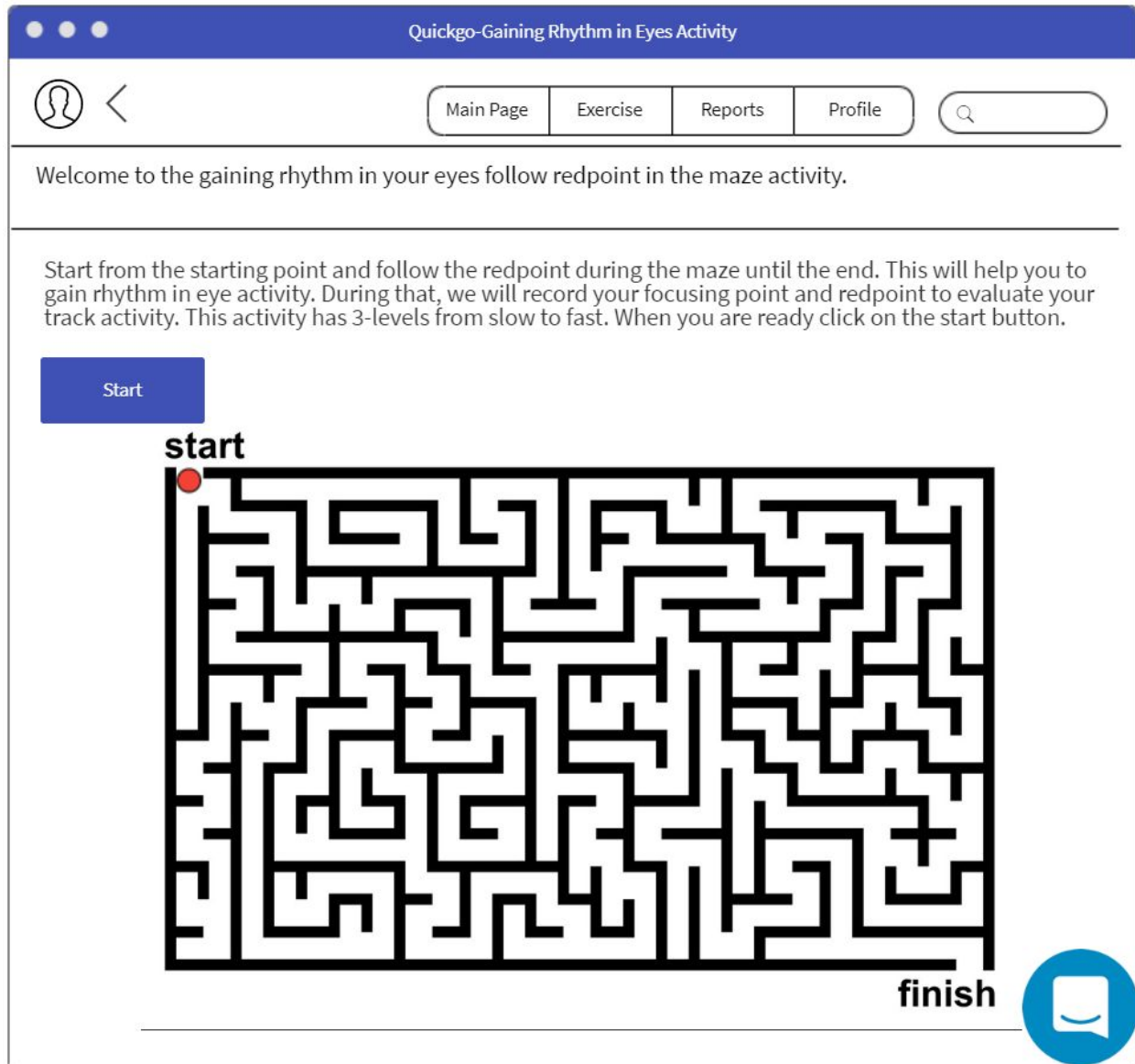
After the user completes the related activity within his/her recommended path, he/she will face this page. This page recommends the user some activities according to his/her past activity and weak points detected during the exercises. Since this property uses the location information of the user, Quickgo is a location-aware smart learning environment.





Also on this page users can find some other educational reading stuff to buy from online Quickgo store. User can study parallel by using written, video, AR/VR and live events parallel in this application, it is socially aware.





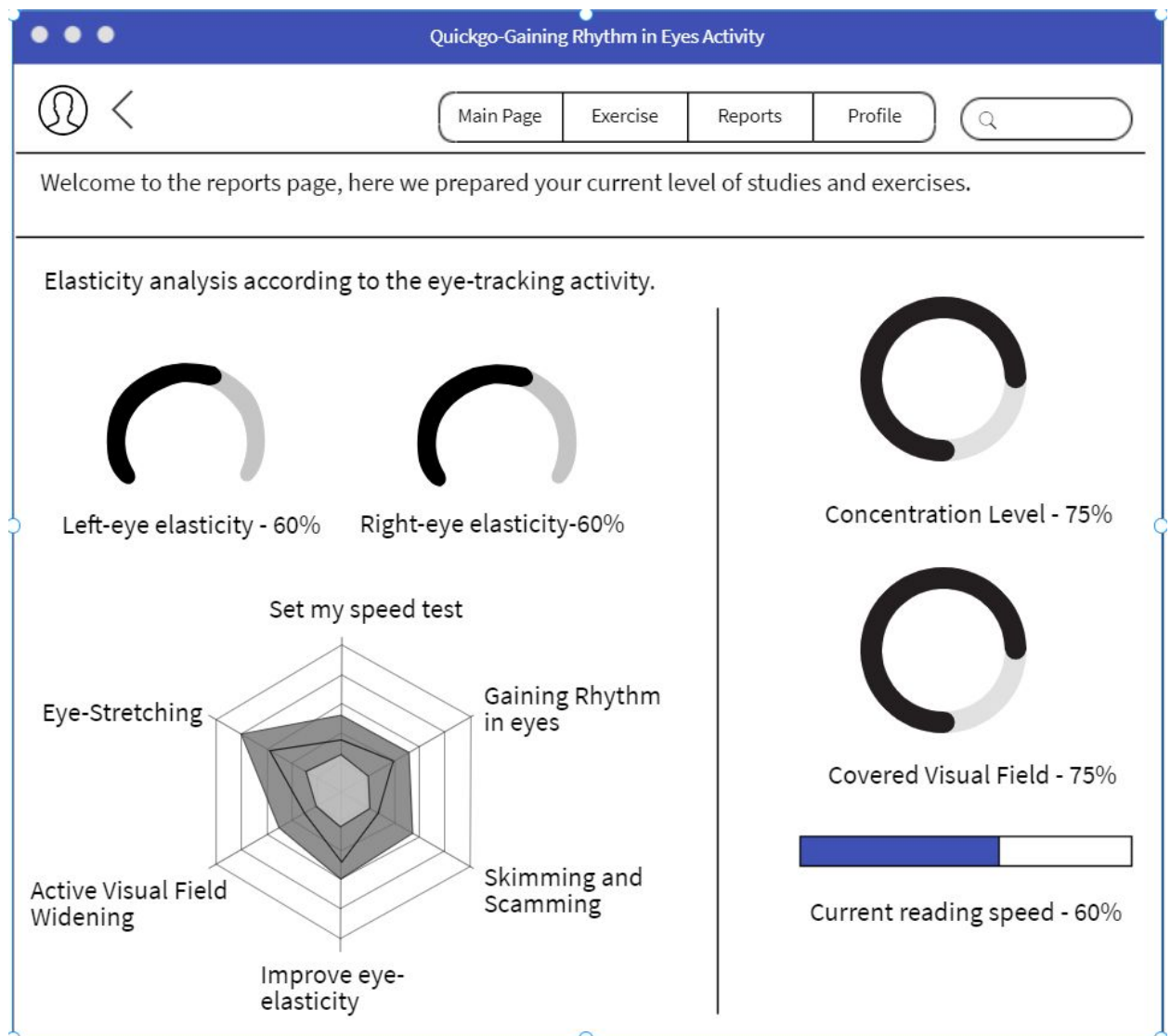
This page is again one of the activities under the eye-stretching exercise. This activity called 'Gaining Rhythm in Eyes Activity'. In this activity the user should follow the red point during the maze. This activity will be both slow and fast and this rhythm could be changed by the Quickgo time after time to increase rhythm in eyes.

## 2.10. Reader Profile Page



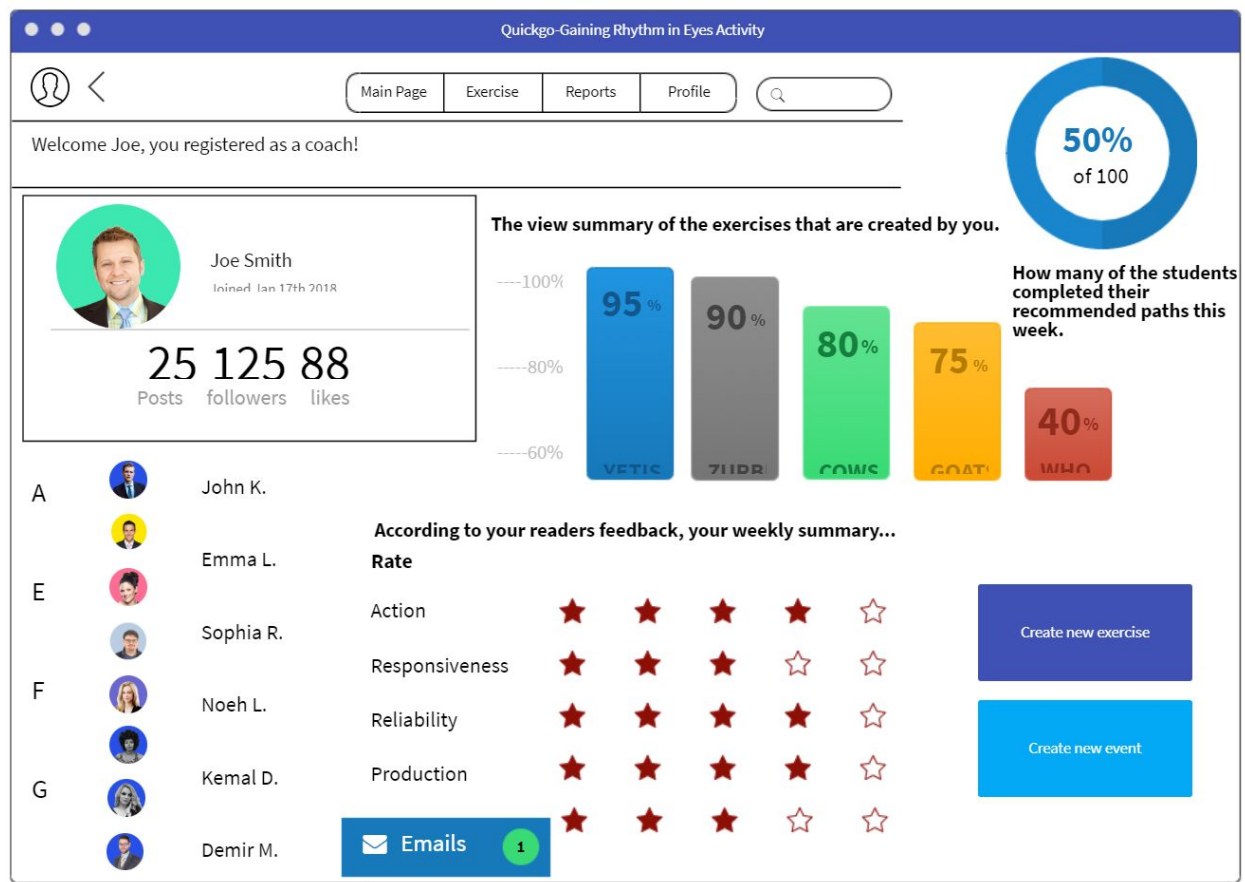
In the user profile first, we can see there are social media options. This means that all the users of the Quickgo can connect to other users via Facebook, Twitter, and Google+. The system can compare users that are at the same level and prompts users by posting automatic comparison charts, so it is a socially aware system. Also on the right-hand side users can follow the recommended activities close to this/her location, so it is location-aware. There is a mailbox on the user page that provides a chat talk with his/her coach. The profile page has a dashboard that also shows the latest three steps of the user and their progress percentages.

## 2.11. Reports Page






Reports page has all kinds of visualizations and analysis parts. On the top side, Quickgo provides elasticity analysis according to the users' eye-tracking records and on the bottom side, Quickgo provides the comparison of the number of the words that you read and your understanding level according to your answers. It can also catch your eye-track and compare with the script that you should be reading actually and compares with the answers of you. On the right side, Quickgo provides pie charts to the user.

## 2.12. Coach Page



The Quickgo runs in the reader & coach relationship environment. The above page is the coach's page. The coach has a contact list of his/her students in the profile and there is a mailbox for each of them. The coach can see the graph or analysis of the activity views reasoning from the readers performance. Also, Quickgo provides the content analysis of the feedback and draws a big picture of it with the star table above. Coach can create new activities according to the feedback and suggests to users. Also Quickgo provides an opportunity to create an event if there is a common weak point. Quickgo uses location property of the application, it especially recommends for the readers who need that content and are close to this event place.

## 2.13.Sample Skimming and Scanning Practise



Quick Reading

Exercises

Reports

Information

**Practice**  
Now it's time for practice. Like on a real IELTS Reading test, you have to read the text and answer the questions below.

First of all, let's practise skimming. When reading a text for the first time, you should skim over it to grasp the main idea. In this example, read the highlighted text and quickly look over the rest of the text (you have about 1-2 minutes):

**Are electric cars really eco-friendly?**

Electric-car drivers are saving the planet, right? Their vehicles produce none of the pollutants that dinosaur-burning, fossil-fuel-powered machines do. That is the standard view, and governments around the world provide incentives to encourage the uptake of this new technology.

That is why a Tesla owner got a rude shock when he went to import his vehicle into Singapore - the first person to do so. The Tesla Model S is a 100% electric vehicle. It does not have an exhaust to emit from. So what happened?

Instead of an expected rebate of around S\$15,000 (US\$10,800) he received a fine of the same amount for being a gross polluter. The company commented the incident, "The Model S that our customer imported into Singapore left our factory only two years ago with energy consumption rated at 181 Wh/km. This qualifies as the cleanest possible category of car in Singapore and entitles the owner to an incentive rather than a fine."

The Singapore authorities calculated the 'carbon cost' of generating the electricity that will be used to charge the car. This is the elephant in the trunk of electric vehicles. Where and how the power is produced is not often considered, but perhaps it should be. Let's move the elephant up to the passenger seat and address it directly.

The authorities in Singapore apparently found the Tesla in question consumes 444 watt-hours of electricity per km (Wh/km) in tests. Without wanting to get too maths-heavy, the number of 444Wh/km does seem high. And as we still need power stations to produce such amount electric energy, the environmental impact is not so small as it seemed to be.




But what about the bigger picture - should we be factoring in the emissions of power stations when working out how green an electric car is? The logical answer is yes. Emissions shifted elsewhere are still emissions, and CO2 impacts the global atmosphere wherever it is released.

After you've skimmed the text, you should get the general idea, please write down your answer below.

Text Area

Submit and start test questions

Skimming and Scanning activities includes wide range of text samples.It can be a menu of a restaurant, it can be a published post in social media, recipe, or etc.Quickgo aims to improve users perception or increases the speed of information flow to the user at the first sight.It suggests different texts with certain durations and try to test users remembrance and understanding capability.



Quick Reading

Exercises

Reports

Information

**1. What is the aim of this text?**

☐ To discourage people from visiting Singapore

☐ To prove that electric cars are less eco-friendly than fossil-fuel-powered machines

☐ To show that we need to count the emissions of power stations to see how green an electric car is.

**2. When the owner of the electric car went to Singapore, he received?**

☐ a rebate of around US\$10,800

☐ a fine of around US\$10,800

☐ a fine of around US\$15,000

**3. To prove that electric car was a gross polluter, the authorities in Singapore calculated the ..... of generating the electricity to charge the car.**




Text Area

Submit and get  
specialized  
recommendations

The core point of fast reading is not reading all of the text fastly. The core point here is to find the most important points in the text and draw an abstract mind map on the user's mind about the content of the paragraph. These skim and scan exercises can be prepared by the coaches according to the users' weak capabilities or reading skills. After those skim and scan exercises the user can see a detailed analysis of his/her performance by using more than one source like AR/VR headset and eye-tracking activity.



## 2.14. Sample Practise Analysis





Quick ReadingExercisesReportsInformation


**Your specialized feedback and suggestions according to your answers.**



### Your results.

Eye-Elasticity according to eye tracking results



Activity	Value
Visual Field Widening	High
Skimming	Medium
Scanning	Low
Efficiency	Medium

- 

After you skimmed over the article, you should know that the Singapore authorities and charging car were mentioned somewhere in the middle of the text. Moreover, you have another clue: the answer should be after the answer to the question 3. You can find the right answer by these key words:  
-> authorities in Singapore  
-> electricity to charge the car
- 
- 

1. This question can be answered immediately after you skimmed over the text. Here, you're required to understand only the main idea of the passage.

Obviously, the correct answer is C. It's also stated in the last paragraph:

But what about the bigger picture - should we be factoring in the emissions of power stations when working out how green an electric car is? The logical answer is yes.

2. And this question, unlike the previous one, requires specific detail: amount of money. To answer it, you should scan the text for words \$10,800 and \$15,000. Don't read the text again! Just search these two key words. Once you have found the right sentence, read it attentively to get the answer. The sentence that contains these key words is in the third paragraph:

Instead of an expected rebate of around S\$15,000 (US\$10,800) he received a fine of the same amount for being a gross polluter.

Now it's clear to us that the correct answer is B.

We propose you to continue with Visual Field Widening Exercise, Click here to start eye elasticity...

## 3.0. Smart Features

### 3.1. Location-Aware

Quickgo recommends the user some activities according to his/her past activity and weak points detected during the exercises. This property recommends activities close to this/her location. Hence, Quickgo is a location-aware smart learning environment.

### **3.2. Context-Aware**

Quickgo is context-aware that can help improve the learner's learning efficiency. Quickgo creates a special training plan for the learners and determines the text based on the information (age and grade level) provided by the learners during registration.

### **3.3. Socially Aware**

All the users of Quickgo can connect to other users via Facebook, Twitter, and Google+. The system can compare users that are at the same level and prompts users by posting automatic comparison charts, so it is a socially aware system.

### **3.4. Interoperability**

Quickgo works on different platforms , which makes it interoperable.

### **3.5. Seamless Connection**

Quickgo provides seamless connection as learners can track their performance by connecting to the system with computers, tablets from anywhere.

### **3.6. Adaptability**

The user can set the AR/VR configuration of the Quickgo and set his/her initial speed of reading so that the system provides a specialized adaptive content to the user.

### **3.7. Ubiquitous**

Quickgo provides a ubiquitous learning environment with its visual and transparent way to access learning resources and services to the learner.

### **3.8. Whole Record**

It also has a good reflection and feedback system, which constantly evaluates reading speed and level of comprehension with exercises and



exams, follows the learners' development uninterruptedly, and shows the development of reading speed with simple graphics.

### **3.9. Natural Interaction**

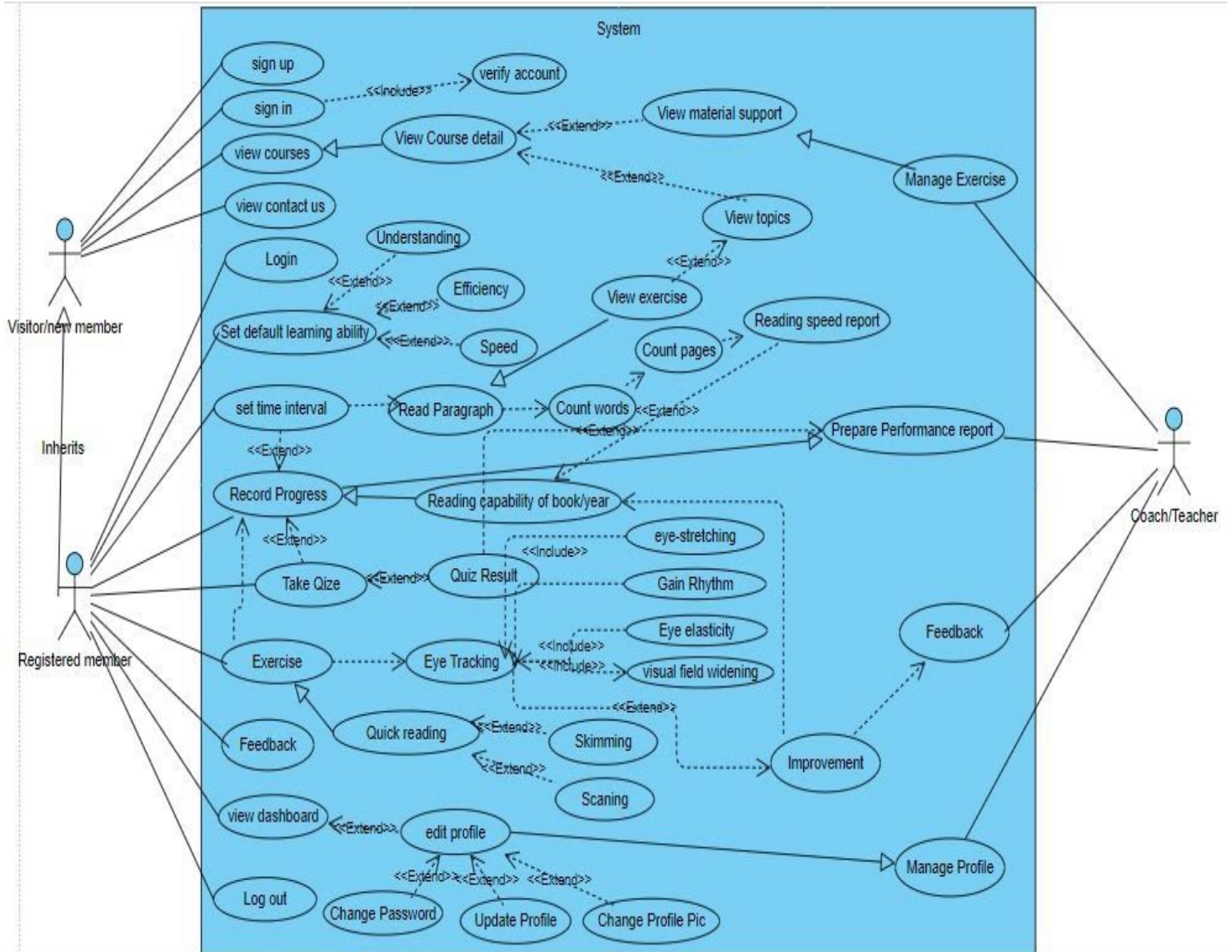
Quickgo uses AR/VR property which will provide an opportunity for users to read texts and do exercises via specialized glasses. And, this property is important to use because the system is getting benefit from the eye-tracking technology for recording eye-elasticity, active visual widening, creating an elastic visual field, and etc.

### **3.10. High Engagement**

Quickgo provides multidirectional interaction learning experience as the user can study parallelly by using written, video, AR/VR and live events parallel while doing eye-tracking activity.

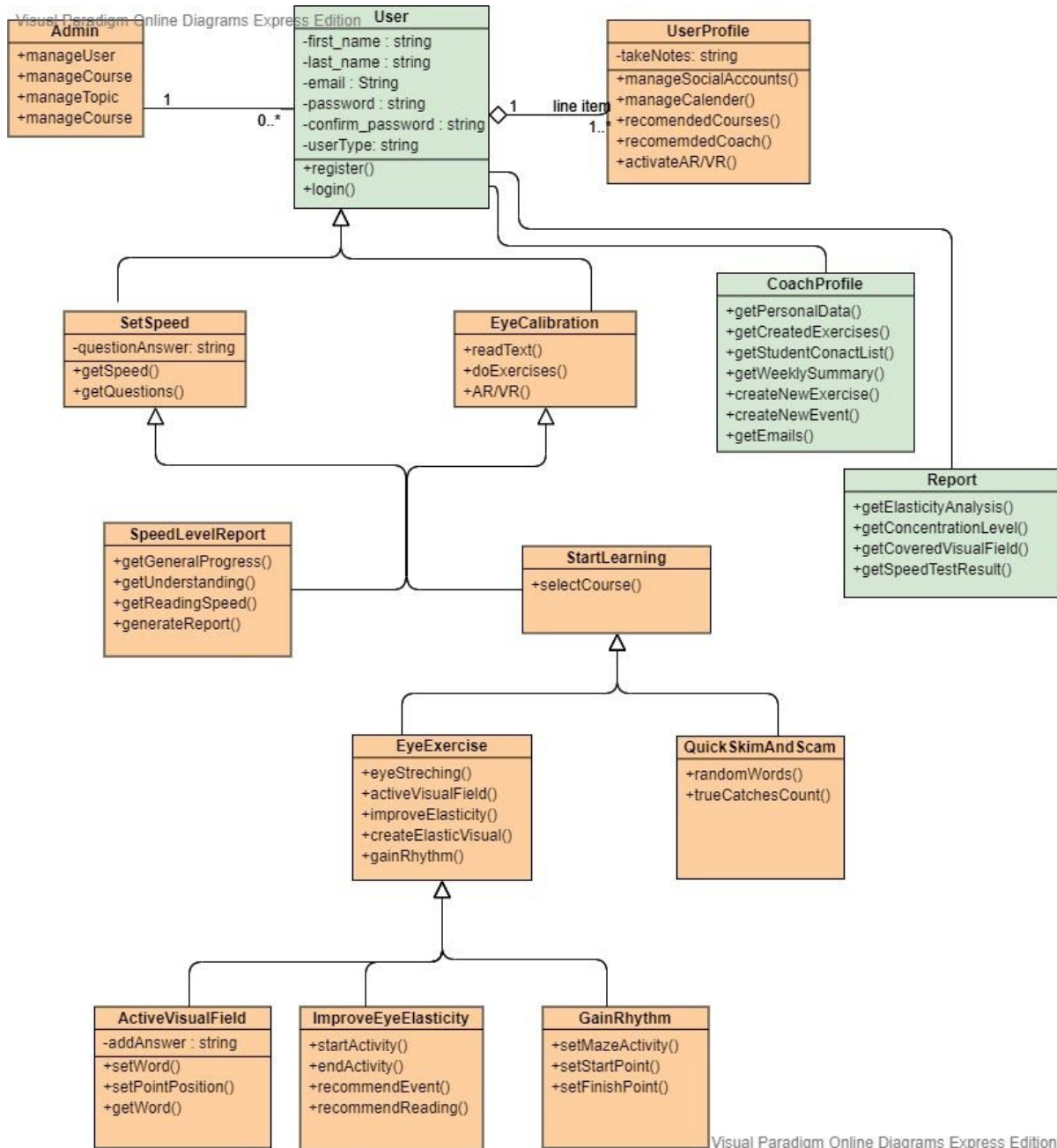
## **4.0. Use-Case Diagram**

This is the use case diagram of our DSLE system "Quick go" which describes the relationship of the student/learner and teacher/coach with the system, It shows the activities and the stakeholder that are the part of this system, object and features are visible with the help of the use case diagram. The working flow of our system looks through this diagram to show how the learner can register himself/herself to test their speed of reading and learning and then get the expected result from this system based on his/her capability.



## 5.0. Class Diagram

Here is the class diagram of Quickgo smart learning environment in which describes the structure of that learning system by showing the system's classes, attributes, methods and relationship between objects. This diagram mainly emphasizes the smart features of this learning environment like recommended exercise paths, eye-tracking property via AR/VR etc.



## 6.0. Tools

The tools that we use in this project have wide scale. We used two different prototyping tools to first design our project skeleton and then we spent much more effort on aesthetic issues. The names of the tools are as follows: Justinmind Wireframe Tool and Mockflow which is also being used

by famous companies like slack, windows, google drive, and etc. For designing class diagrams and use-case diagrams we've used Visual Paradigm Online Diagrams Express Edition, especially extracting the smart features and functionalities of the Quickgo smart learning environment. We also search the public health sources and professional reading skills sources to prepare exercises and activities which are specialized to user from the context adaptability. And our inspiration in the practical manner is an application from HIZLIGO.com. This is an application which aims to improve fast reading skills for university entrance exam in Turkey, but since it doesn't have some properties that any smart learning environment should has we cannot show it as an example of smart learning environment. We add parameters and features to convert it into smart learning environment and created a brand new prototype for the graphical user interface. The facilitator of this underlying applications Sebit AŞ is producing smart contents both in Europe and US. They also produced the leading dynamic maths and science application which are being used by more than 500 US preliminary schools called adaptive curriculum today. For more information visit company website in references part.

## 7.0. References

1. <https://www.mockflow.com/>
2. <https://www.justinmind.com/>
3. <https://online.visual-paradigm.com/>
4. <https://www.sebit.com.tr/index-en.html>
5. <https://www.hizligo.com/>