

# One Digital Platform to Seek Quality Education for Everyone

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## ABSTRACT

The primary goal of this digital educational platform is to deliver high-quality educational possibilities to people looking for a degree or similar graded programs, tuition classes, and postgraduate programs provided by universities internationally and nationally. Furthermore, by advertising on our web platform, educational institutions will be able to improve the popularity of their courses and services. There will also be the opportunity to donate financial contributions to campaigns or organizations that will help persons in need of educational assistance. In addition, our development team proposed an idea about a component called volunteer support, which allows users to join up as volunteers for specific organizational initiatives that promote educational campaigns. There will also be several account types for system administrators, users searching for services, and organizations promoting educational programs and volunteer opportunities. The account's capabilities differ depending on the type of user account. The primary objectives of this thesis are to provide the concept of a system that simplifies the process of locating and advertising educational needs, opportunities, and services while providing a way to help people in need of a helping hand.

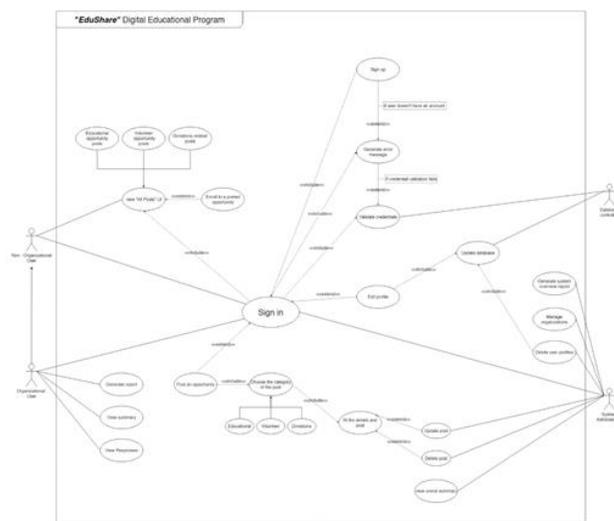
**Keywords--** Educational, Financial Contributions, Volunteers, Services, Administrators

## I. INTRODUCTION

As mentioned previously, this idea of an educational platform is to enhance Sri Lanka's literacy rate to nearly 99% and improve the educational performances of individuals by giving various sorts of educational opportunities to those who are interested in learning. This platform is intended to function as a free platform for non-organizational users in order to provide a better service. As proposed, this platform will consist of three types of accounts that will cover the *System administrator roles*, *Organizational user roles*, and *non – organizational user roles* by effectively increasing the platform's usability and reducing its complexity.

The system overview can be seen in the figure 1 graph below.

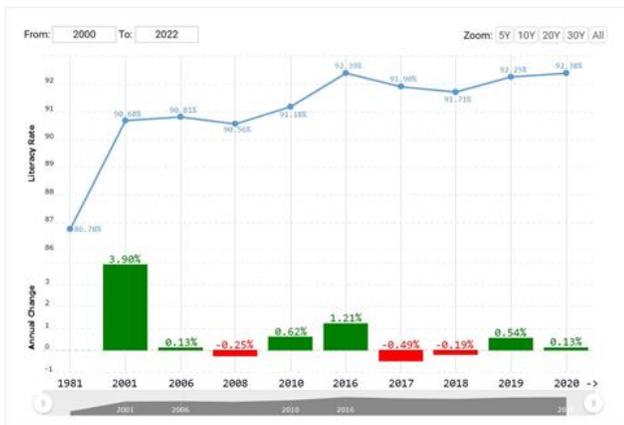
Figure 01: System Overview:



Source: (<https://www.macrotrends.net/countries/LKA/sri-lanka/literacy-rate>)

Between 2000 and 2022, there is a slight increase of literacy rate in Sri Lanka. But our goal is to acquire one of the best literacy rates in Asia. As well as there are some negative outcomes of the rates among years of 2008, 2017 and 2018. The below chart will explain the fluctuations of literacy rate in Sri Lanka between 200- to 2022. As a reference, the year of 1981 is also added in the below chart.

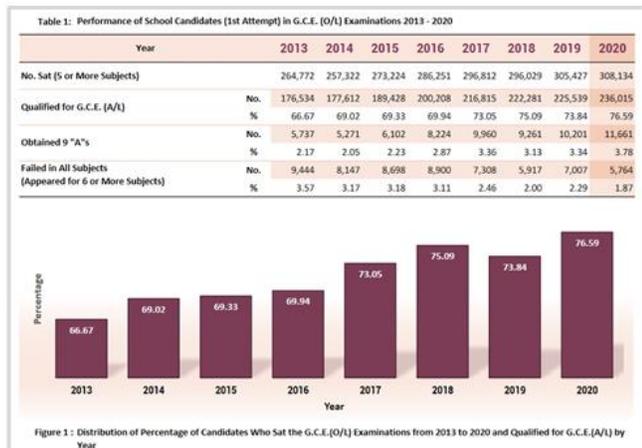
Figure 02: Literacy rate 2000 - 2022



Source: (<https://www.macrotrends.net/countries/LKA/sri-lanka/literacy-rate>)

After taking into consideration literacy rates, the performance of (O/L) applicants were gathered to compute the percentage of the pass and fail rates. And this will aid in calculating the number of people who have qualified for G.C.E A/L. The below graphs show the statistics of G.C.E O/L candidates' performance between 2013 and 2020.

Figure 03: Performance of G.C.E O/L Examinations 2013 – 2020



Source: [www.statistics.gov.lk](http://www.statistics.gov.lk)

Figure 04: Performance of Candidates by subject (2019 - 2020)

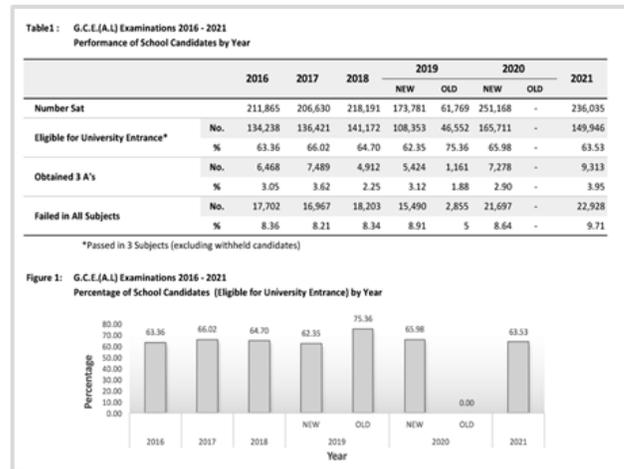
Table 11: Performance of School Candidates (1st Attempt) by Subject

Subject Number & Subject	2019		2020			
	No. Sat	Passed (A+B+C+S)	No. Sat	Passed (A+B+C+S)		
11 Buddhism	219,808	196,331	89.32	221,723	198,031	89.31
12 Jainism	36,177	29,090	80.48	34,243	29,146	85.12
14 Catholicism	19,549	18,105	92.61	19,656	18,519	94.22
15 Christianity	3,186	2,749	86.28	3,260	2,888	88.59
16 Islam	28,598	23,632	82.64	29,321	24,554	83.74
21 Sinhala Language & Literature	228,974	217,961	95.14	240,668	239,792	91.30
22 Tamil Language & Literature	66,983	58,308	87.05	67,517	60,237	89.22
31 English	305,162	190,311	62.36	307,932	202,563	65.78
32 Mathematics	304,894	216,711	71.08	307,576	216,912	70.52
33 History	305,371	255,012	83.51	308,079	259,889	84.36
34 Science	304,987	199,620	65.45	307,700	212,330	69.07
40 Music (Oriental)	41,828	38,368	91.73	34,145	33,847	99.13
41 Music (Western)	2,371	2,318	97.76	2,558	2,529	98.87
42 Music (Garnatic)	8,505	8,134	95.4	6,849	6,808	99.40
43 Art	88,372	77,493	87.69	88,868	79,234	89.16
44 Dancing (Oriental)	55,179	48,852	88.53	44,059	43,477	98.68
45 Dancing (Bharata)	2,885	2,761	95.7	2,418	2,394	99.01
46 Appreciation of English Literary Texts	8,791	8,310	94.53	8,698	8,208	94.37
47 Appreciation of Sinhala Literary Texts	24,258	22,876	94.3	25,152	27,981	95.58
48 Appreciation of Tamil Literary Texts	26,894	23,224	86.35	28,068	23,837	84.93
49 Appreciation of Arabic Literary Texts	2,228	1,961	88.02	2,595	2,170	83.62
50 Drama & Theatre (Sinhala)	32,555	31,371	96.36	23,546	23,467	99.66
51 Drama & Theatre (Tamil)	7,470	7,282	97.48	4,855	4,842	99.73
52 Drama & Theatre (English)	13	13	100	10	10	100.00
60 Business and Accounting Studies	88,365	81,302	92.01	79,492	72,788	91.57
61 Geography	78,888	70,625	89.53	78,539	71,943	91.60
62 Citizenship Education & Governance/Civic Education	104,528	83,512	79.89	107,475	88,122	82.05
63 Entrepreneurship Education	6,885	5,764	83.58	6,284	5,419	86.50
64 Second Language (Sinhala)	11,382	10,993	96.58	13,970	13,423	96.08
65 Second Language (Tamil)	12,701	12,600	99.2	19,436	19,186	98.71
66 Pali	23	20	86.96	27	21	77.78
67 Sanskrit	6	2	33.33	6	4	66.67
68 French	360	251	69.72	397	314	79.09
69 German	206	181	87.86	213	186	87.32
70 Hindi	112	94	83.93	100	87	87.00
71 Japanese	719	630	87.62	1,024	939	91.70
72 Arabic	609	578	94.91	514	464	90.27
73 Korean	222	139	62.61	248	139	56.05
74 Chinese	55	43	78.18	72	49	68.06
75 Russian	5	5	100	11	8	72.73
80 Information & Communication Technology	60,176	57,645	95.79	64,059	58,612	91.50
81 Agriculture & Food Technology	50,741	41,722	82.32	45,929	38,510	83.85
82 Aquatic Bio. Technology	671	586	87.33	685	596	87.01
84 Arts & Crafts	3,053	2,862	93.74	2,797	2,537	92.02
85 Home Economics	34,262	28,323	82.67	31,668	29,162	92.26
86 Health & Physical Education	141,833	131,722	92.87	150,249	144,306	96.04
87 Communication & Media Studies	6,115	5,108	83.53	5,088	4,158	81.72
88 Design & Con Technology	3,874	3,456	89.21	3,681	3,159	85.82
89 Design & Mec Technology	3,374	2,958	87.67	2,869	2,472	86.16
90 Design & Elec & Elec Technology	1,230	871	70.81	1,098	869	78.34
92 Electronic Writing & Shorthand (Sinhala)	13	12	92.31	4	4	100.00
93 Electronic Writing & Shorthand (Tamil)	2	2	100	19	14	73.68
94 Electronic Writing & Shorthand (English)	-	-	-	-	-	-

While researching the G.C.E O/L pass and fail statistics, we noticed that the pass rate increased significantly between 2017 and 2020.

As a result, as projected, there will be more G.C.E A/L applicants from 2017 to 2020 than in previous years based on the statistics. We may conclude that more individuals are biased toward education than before.

Figure 05: G.C.E. (A/L) Examinations 2016 - 2021 Performance of School Candidates by Year and eligibility for university entrance



Source: [www.statistics.gov.lk](http://www.statistics.gov.lk)

Based on the figures and conclusions shown above, our group of members proposed this concept to effectively increase the knowledge of everyone at all levels of education. This is mostly intended for those who were unfortunate in examinations and lost their education due to poverty.

As an answer for the people who are unable to access any type of broadband service or devices such as computers and smartphones, able to get the opportunity of choosing the right path of their choice by the help of establishing small education centers around the Sri Lankan countryside.

Furthermore, this may be further extended to receive short messages (SMS) and emails based on the educational choices they selected while registering into the system with the use of an education center or a device that they own.

## II. LITERATURE REVIEW

As a strength in Sri Lankan education, the country achieved free education with the help of the free education policy in 1947[1]. Sri Lankan education is mostly driven by the government for free, for all people without measuring any class differences according to Per capita income.

Even the government universities will also provide free education.

Because of this great environment of Sri Lankan education, the country achieved the Human Development Index (HDI) score of 0.691, placing 97th out of 187 nations, owing mostly to its free education and health policies (UNICEF, 2011). Gender parity at the primary level had been attained by 2006, even in the traditionally disadvantaged tea plantation sector, with 94.4% of boys and 94.78% of girls enrolled (Dept. of Census and Statistics, 2006). In 2012, both male and female attendance in basic school was 94%, although female attendance in secondary education was higher than male (61% vs. 56%).[2]

But the main problem is there are a low number of individuals who get the opportunity to get selected to a government university. Others drop out of school in search of work or are left alone without any skills. The other part of the people will seek educational opportunities and are financially strong.

Research, done in 2007, describes the Sri Lankan education issues as this – Specifically, In Sri Lanka, students from primary to secondary schools follow a general sequence of courses aimed toward degree-level preparation. And all students completing their advanced level education, regardless of their stream or previous track, are left in a state of uncertainty if they fail to gain entry to a tertiary institution. That proves that the education system provides a little indication to the jobseeker or the employer about the types of vocationally useful skills to a young person seeking employment immediately after finishing secondary school.[3]

As stated in the above statement, our team of researchers discovered that the education path in Sri Lanka still has not changed even when the jobseekers fall into a state of uncertainty in their lives. This is the main cause why our team got motivated to develop this platform, including mobile and web-based applications.

As individuals, nearly 90% of people in the whole of Sri Lanka and the rest of people in the world tend to use mobile phones instead of computers. Because it's easy, affordable, and can be used to do various things. This citation will describe the rapid growth of mobile phone usage in Sri Lanka, done by Mr. Manoj Jinadasa, Senior Lecturer in Mass Communication, University of Kelaniya. According to his point of view and the statistics gathered, the number of mobile phones has doubled compared to 941,781 fixed-line telephones. The count of mobile phones is 18,319,447. And the no of e-mail and internet subscribers is 844,000 billion (Central Bank of Sri Lanka, 2012:08).[4]

The above statement will give an idea of the inclined usage of mobile phones and their uses such as email and internet subscriptions. According to the argument, we can conclude that a mobile solution for a digitalized system like this, can be a great approach to increasing the users count around Sri Lanka.

Providing donations will be an answer for the people who are unable to achieve educational qualifications because of poverty. Also, advertising and broadcasting non-profitable educational opportunities will be a great chance for everyone to acquire higher educational opportunities than the rest of others.

The idea of the "Help Schools Foundation " provides the financial and other needs of children through donations [5], given the primary idea of educational donation requests to be added to this proposed digitized system.

## III. METHODOLOGY

### A. The Idea

Digitalization of education changed the whole world by giving every perspective of knowledge to everyone with the help of easy access in a matter of seconds.

The purpose of this paper is to introduce a system to improve the awareness of educational opportunities and provide a way to help people in need of educational support through donations.

### B. Requirement Analysis

The main functions can be apart into 3 categories as

1. Organizational user functions
2. Non - organizational user functions
3. System Administrator functions

Those main functions will contain sub-functions as below -

- Organizational user
  - Posting donation requests, educational opportunities, and volunteer opportunities including updating and deletion.
  - Retrieving reports of post views and responses.
  - Manage user-profile
- Non-organizational user
  - Enroll in donation requests, educational opportunities, and volunteer opportunities
  - Manage user profile
  - Retrieve data on enrollments related to donations, educational, and volunteer opportunities.
- System Administrators
  - User control includes updating the details of users, removing users, and changing the user role.
  - Updating system preferences.
  - Retrieve overall analytics in the whole system.

For easy understanding of the system, below graphs will describe some of the important user interactions with the system.

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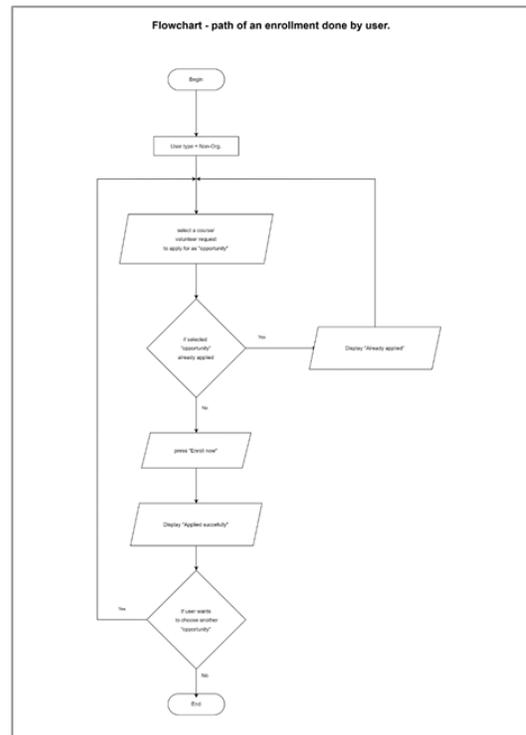


Figure 07: Flowchart - path of an enrollment done by the user

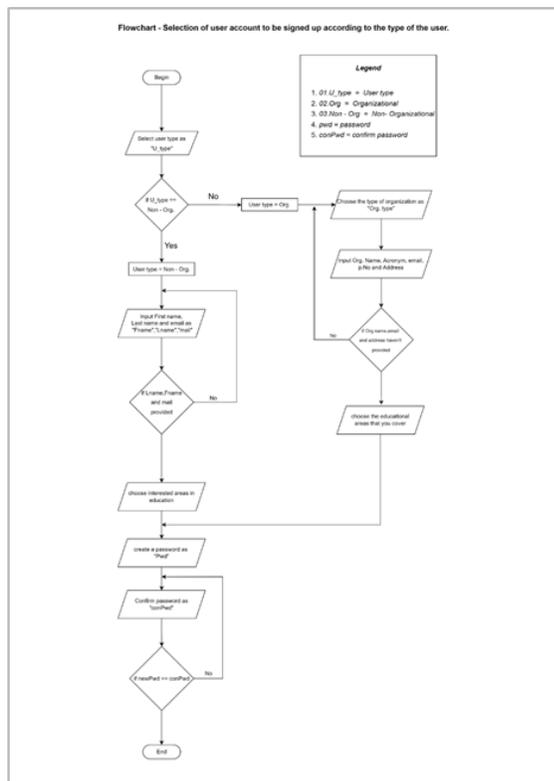


Figure 06: Flowchart - Selection of user account to be signed up according to the type of the user

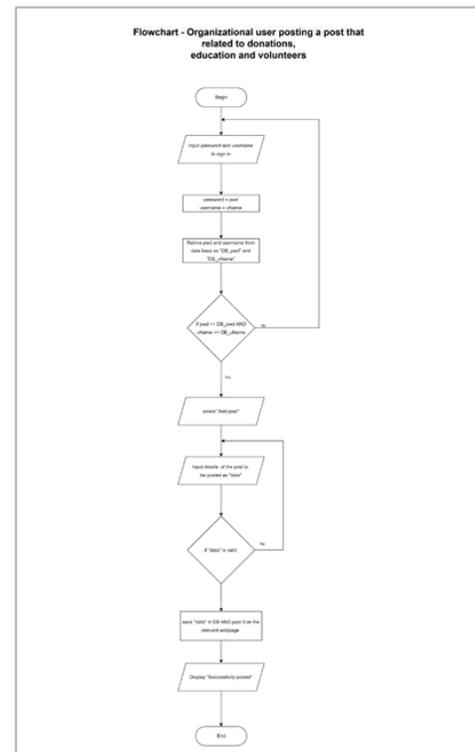


Figure 08: Flowchart - Organizational user posting a post that related to donations, education and volunteers

**C. Environment Development**

This section will explain how this system is going to be developed and what technologies have been used to utilize the reliability and satisfaction of the users.

For the development of this whole project, “FERN Stack” has been used with additional react libraries such as “Material UI”.

The main parts of the MERN can be described as below:

F - Firebase - database

E - Express - Backend web application framework

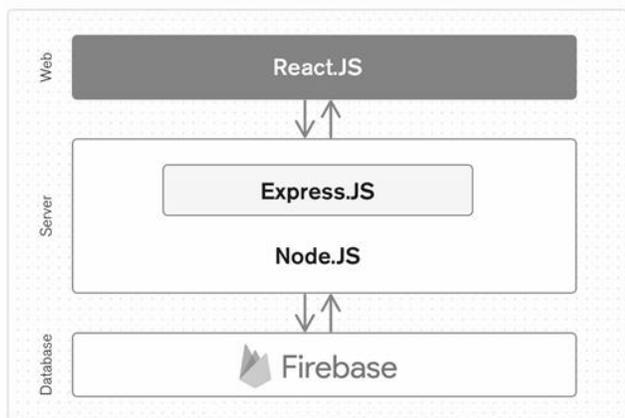
R - React - frontend JavaScript framework

N - Node - Cross-platform backend runtime environment

This stack of technologies makes it possible to construct a web - based application or a website more quickly. The most popular stack of technologies are basically MERN stack and MEAN stack but “Firebase” has been used as the database instead of MongoDB for easy deployment. Therefore, this stack can be called as FERN stack.

**Cont’d**

Below graph will show the high-level structure of FERN stack



**Figure 09:** High level structure of FERN stack

The front-end framework, the Resct.JS, is a free and open-source front-end JavaScript toolkit for creating user interfaces based on UI components. It is sometimes known as React.js or ReactJS. It is kept up to date by Meta (previously Facebook) and a group of independent programmers and businesses. With frameworks like Next.js, React can be the foundation for single-page, mobile, or server-rendered applications. Making React apps typically necessitates the use of extra libraries for routing and specific client-side functionality because *React* is only focused with state management and presenting that information to the DOM (Document Object Model).[6]

As the back-end web application framework, Express.js, sometimes known as Express, is a Node.js back-end web application framework that is made available as free

and open-source software under the Open-Source license. It is used to create RESTful (Representational state transfer) APIs. It is made for creating APIs and online applications.[7]

“Firebase” has been used as the database in this web application project.

Using this, developers can create iOS, Android, and Web apps using the Google-sponsored application development platform known as Firebase. Tools are available from Firebase for monitoring analytics, reporting and resolving app errors, as well as developing marketing and product experiments.

The main reason to use the Firebase as the database is because it is a Realtime database. The Firebase Realtime Database is a cloud-hosted NoSQL database that enables data to be stored and synced between users in real time. The data is synced across all clients in real time and is still available when an app goes offline.[8]

This is the last technology that consists of this stack. Node.js can be described as an open source, cross-platform runtime environment. This is used to create networking and server-side applications. Applications for Node.js may be created in JavaScript and run-on Linux, OS X, and Microsoft Windows using the Node.js runtime.

Additionally, comprehensive library of different JavaScript modules, greatly simplifying the creation of web applications utilizing Node.js.[9]

**D. Design Implementation**

Design of a system or a product, can be recognized as one of the most valuable key features. Therefore, to get the full potential out of our designs, the team has used “Figma” and” Balsamiq Mockup” for prototyping and wireframing and “Photoshop” used for designing some additional parts such as banners inside the pages.

To improve the design and the user experience of the whole system we have used some surveys including user interface designs that can be understood by anyone. Below images show how we used user interface validations as mentioned above. **(This validation survey was done for the mobile application).**

01. What do you think about **\*Onboarding Screens** of this app?

\* Onboarding screens are the first things that the users see when they launch the application for the first time.

Great!  
 Agreeable  
 Needed to be improved  
 Other: \_\_\_\_\_

Figure 10: User-interface validation question.01

Cont'd

02. What is your thought about those **account creation** UIs?

Great!  
 Agreeable.  
 Needed to be improved!  
 Other: \_\_\_\_\_

Figure 11: User-interface validation question.02

03. Are those UIs user-friendly, according to your perspective ?

Yes  
 No  
 Maybe  
 Other: \_\_\_\_\_

Figure 12: User-interface validation question.03

04. Does this user profile UI shows everything a user wants to see?

Yes  
 No  
 Maybe  
 Other: \_\_\_\_\_

Figure 13: User-interface validation question.04

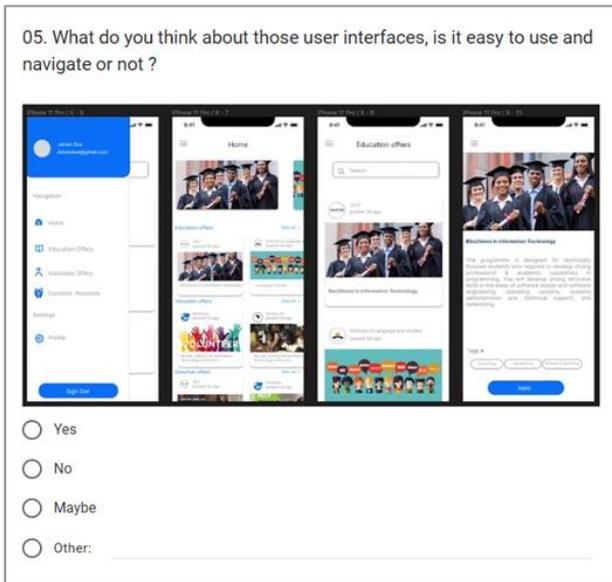


Figure 14: User-interface validation question.05

**E. Testing**

After implementation of the system, by the help of recommendations done by the users according to the user interface validation surveys, testing of the system has been done to check the system stability and security. “SonarQube” and “Selenium” have been used as testing platforms for this system.

SonarQube is an open-source platform built by Sonar Source for continuous code quality inspection. It does automated inspections with static code analysis to find flaws and code smells in 29 programming languages. [10]

And Selenium has been used as the functional testing software in web browsers. Selenium is an open-source umbrella project covering a variety of browser automation tools and frameworks. It provides a recording and replaying tool for building functional tests that run in most current web browsers, eliminating the need to learn a test programming language. [11]

**IV. PROPOSED SYSTEM**

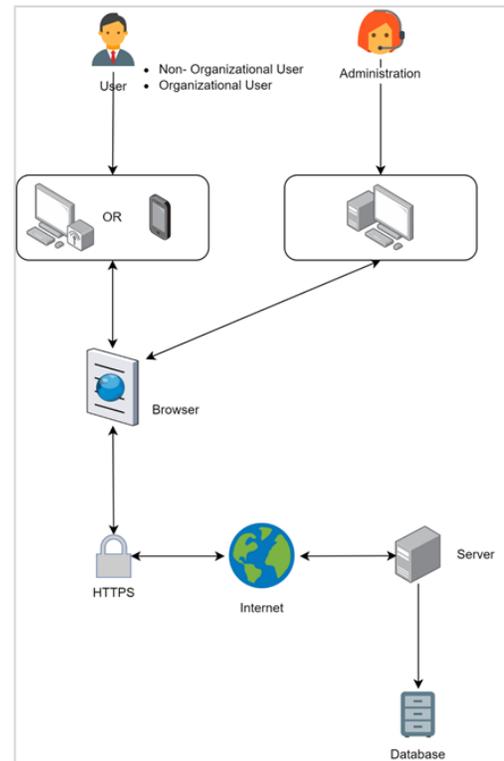


Figure 15: System Overview in high level state

This system is proposed to contribute to the education section by giving an easy approach to everyone in Sri Lanka. By implementing the most valuable areas such as identifying and warning the users about education Opportunities by their preferred areas in education, volunteer opportunities, and donation requests that have been published by recognized organizations and institutions.

Also, this will help organizations to promote and manage their free and paid offerings by advertising through this online digital platform. According to the type of organization, the payments will vary. The Non—profit organizations will get the opportunity to publish their free Offerings for free. If they are willing to post any paid courses in the system, they will be charged 0.2% as a commission for each enrolment (**the amount of commission can be changed according to the preferences.**). This constraint also applies to profitable organizations and institutions.

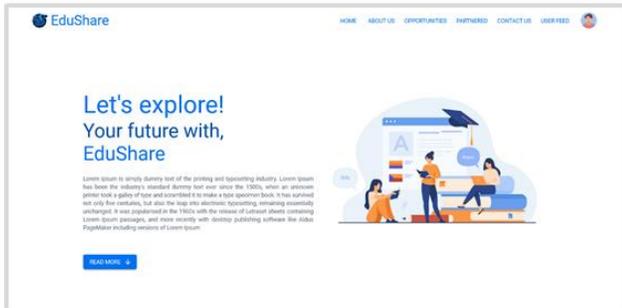
e.g.: Course fee = Rs.50000.00/-  
 Participants enrolled = 20  
 commission rate = 0.2%  
 Full commission to be charged = 100×20 =  
 Rs.2000.00/-

Furthermore, according to this proposed system, there are no additional charges for donation request

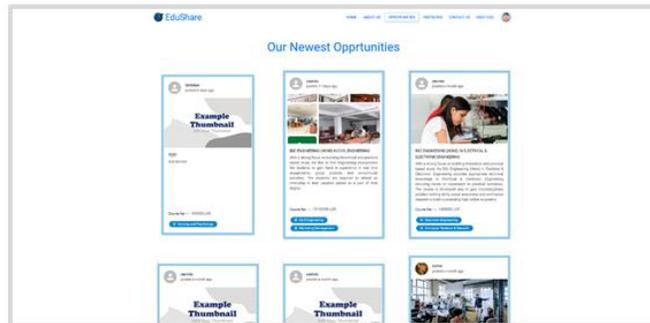
advertisements and volunteer support requests that are done by both non-profit and profitable organizations.

In the next section, some of the user interfaces can be seen that developed according to the user preferences that were collected from surveys.

**A. User Interface**



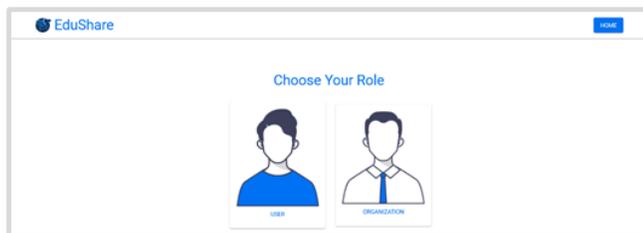
**Figure 16:** Landing page (Home page)



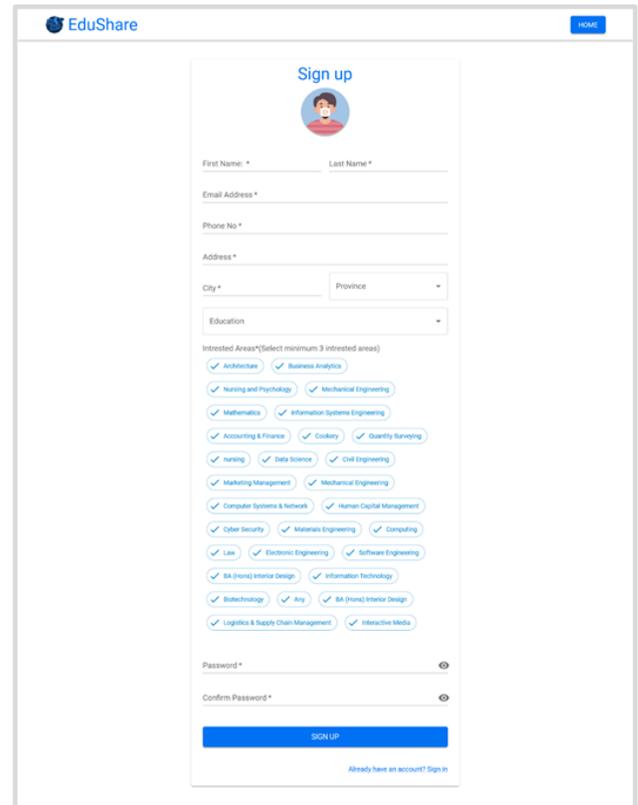
**Figure 17:** User Opportunities



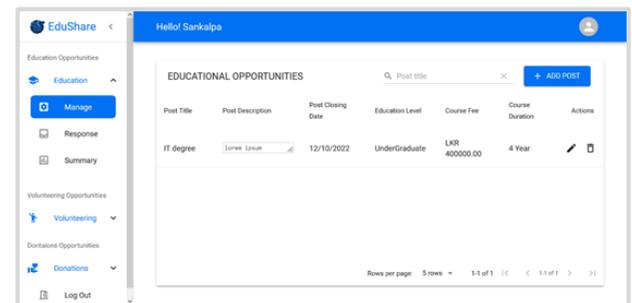
**Figure 18:** Contact us



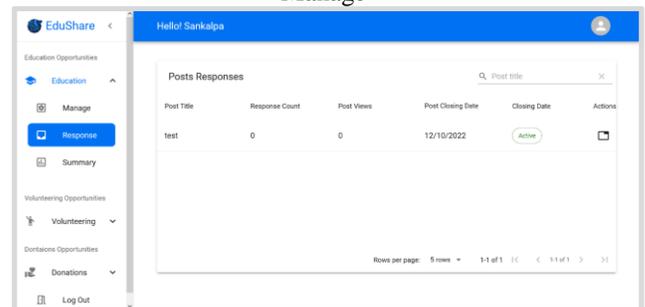
**Figure 19:** Choose Role page in the user registration



**Figure 20:** User Registration page



**Figure 21:** Organizational user control panel: Section – Manage



**Figure 22:** Organizational user control panel: Section – Summary

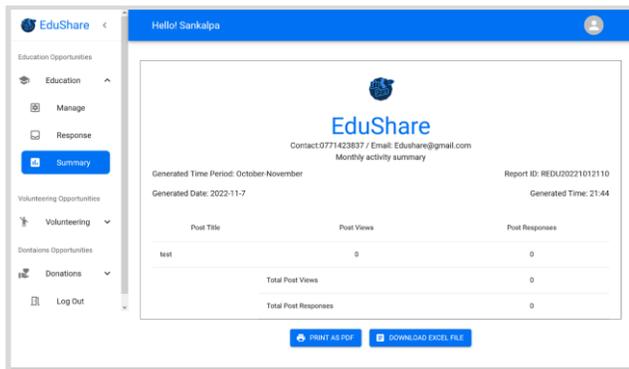


Figure 23: Organizational user control panel: Section - Report

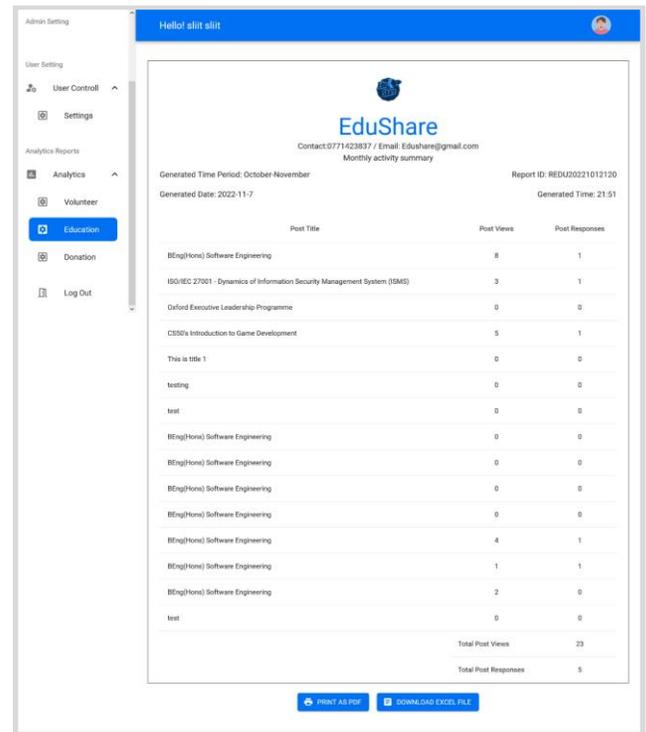


Figure 26: Admin panel: Section - Analytics

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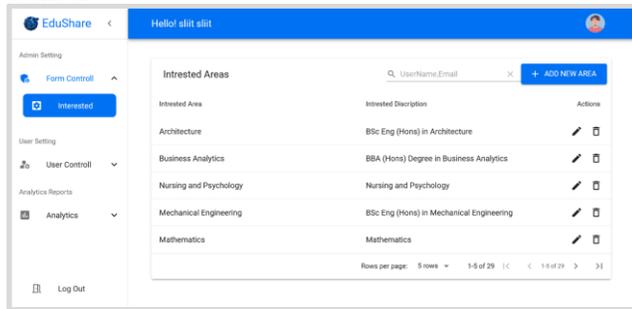


Figure 24: Admin panel: Section - Form control

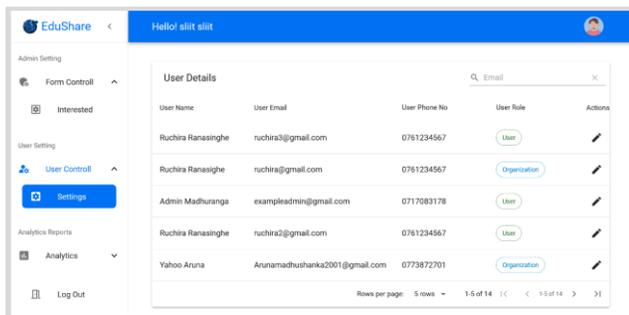


Figure 25: Admin panel: Section - User control

## V. DISCUSSION

This educational support system developed to reduce the waste of time that people are facing while finding educational opportunities and to provide a system to access most of the educational opportunities posted by Sri Lankan organizations/institutions and international institutions.

The main goal is to provide sustainable education to everyone, and the second goal is strengthening educational support by providing donations and the third goal is to provide a way for volunteers to support ongoing educational campaigns.

In the previous sectors, poverty, difficulty of finding the right educational path to choose and difficulty of finding resources to learn has been identified as the main problems.

As solutions, easy enrollments for educational opportunities, Volunteer support campaigns and donation requests have been introduced in a manner of posts that can be seen on social media platforms. Such as "Facebook, Instagram and Twitter"

For the Non-Organizational users, all the enrollments can be done with a click of a button without any hard steps. financial support (Donations) can be done in a secure way with the OTP verifications.

Now Organizational users can post, update, delete and retrieve reports in one place with the benefit of collecting user data\* This will help organizations to manage their opportunities without wasting time on separate platforms.

**\*(Data that is only given by the user to the system while doing an enrollment will be collected. All other data is confidential.)**

FERN stack has been used as our development framework with additional libraries consisting of React components named as *Material UI*.

Prototyping of the UIs has been done to give the best experience to the users who are using our digital platform. Mainly *Figma, Balsamiq Mockup and photoshop* has been used for the prototyping and wireframing.

## VI. CONCLUSION

Sri Lanka is one of the countries that has a good literacy rate according to the statistics gathered from the organizations such as UNICEF. This is mainly based on the free education system of Sri Lanka according to the 1947 free education policy, but the problem is, there are some downfalls in the education system. This led people to be left alone without employment. This affected mostly the people who are under poverty.

The lack of practical knowledge that is given by the school system isn't enough for someone who left school after G.C.E O/L. and the other problem is those people haven't achieved any recognized qualifications under education to enter the path of employment.

By the help of this system, the users can discover their preferred educational path with easy access and without any subscriptions. Simple user interface also provided according to the user preferences. Therefore, this system is easy to use and free of charge. Also, this will help the organizations to advertise their educational opportunities and other campaigns that are related to donations and volunteering.

## REFERENCES

- [1] I. M. Kamala Liyanage. (2014). Sri Lanka's economy after the civil war. *Research report, Institute of Developing Economies, Chapter 7*, pp. 118-121.
- [2] I. M. Kamala Liyanage. (2014). Sri Lanka's economy after the civil war. *Research report. Institute of Developing Economies, Chapter 7*, pp. 116.
- [3] Nithiyaluxmy Tharmaseelan. (2007). Tertiary education in Sri Lanka: Issues and challenges. *Journal of Science and Education Policy (BJSEP)*, 1(1), 174-176.
- [4] Manoj Jinadasa. (2016). Representation of youth generation in the mobile phone and internet media in Sri Lanka. *Psychology Research*, 6(5), 311-317. DOI: 10.17265/2159-5542/.
- [5] 'Help Schools Foundation', *Help Schools Foundation*. Retrieved: from: <http://helpschools.lk/upcoming-campaigns.php>.
- [6] 'React (JavaScript library)', *Wikipedia*, [https://en.wikipedia.org/wiki/React\\_\(JavaScript\\_library\)](https://en.wikipedia.org/wiki/React_(JavaScript_library)). Retrieved November 2, 2022.
- [7] 'Express.js', *Wikipedia*, Available at: <https://en.wikipedia.org/wiki/Express.js>. Retrieved November 2, 2022.
- [8] Linda Rosen, 'What is Google Firebase? - Definition from WhatIs.com', *TechTarget*, <https://www.techtarget.com/searchmobilecomputing/definition/Google-Firebase>. Retrieved: November 2, 2022.
- [9] Node.js - Introduction', *Tutorialspoint*. Available at: <https://www.tutorialspoint.com/nodejs/index.htm>. Retrieved: November 2, 2022.
- [10] 'SonarQube', *Wikipedia*. Available at: [https://en.wikipedia.org/wiki/SonarQube\\_](https://en.wikipedia.org/wiki/SonarQube_). Retrieved November 2, 2022.
- [11] "Selenium (software)." *Wikipedia*, [https://en.wikipedia.org/wiki/Selenium\\_\(software\)](https://en.wikipedia.org/wiki/Selenium_(software)). Retrieved 2 November 2022.