A Scholarship Portal for Administrators and Students of SZABIST Karachi: Digitalizing the Procedure

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***Abstract*—This paper is about the analysis of the process of scholarship grants given to students at SZABIST, Karachi. It would be identifying the weakness of the current practices that are followed by the ERFA (External Relations & Financial Assistance) department and students. The procedure of the entire scholarship process is still following the traditional file system. It involves complex and tedious tasks for both ERFA (External Relations & Financial Assistance) administrators and students. A survey consisting of the responses to the online scholarships would be discussed. This survey will establish the need for an online-based system that would be able to provide assistance to all stakeholders, which would gradually save efforts and resources consumed during the announcements, scholarship application process, interview, and grant allotment. For the development of this application, it would be necessary to review studies involving scholarship systems that are used by other educational institutions. These studies consist of the strengths and weaknesses of the respective scholarship systems within another university, which will provide solicitation as to why automated systems are necessary for an efficient SZABIST Online Scholarship Portal.**

***Keywords*—scholarship, grants, student, portal, SZABIST, ERFA, SDG-13, SDG-15**

1. Introduction

A scholarship is a financial grant provided to deserving or underprivileged students of a university in order for them to continue their education without any monetary pressure. SZABIST Karachi offers scholarships from internal and external donors. The approach followed by SZABIST's ERFA (External Relations & Financial Assistance) is conventional. Students are generally not aware of the scholarship for which they are eligible to apply and also there is no proper channel of communication between the students and the ERFA (External Relations & Financial Assistance) department. While applying to the scholarships the students need to print the entire form and then they need to fill it out manually, and if any mistake occurs then they need to reprint the form again. Due to this, there will be a wastage of papers and an increase in printing costs.

After the submission of the application form, the ERFA (External Relations & Financial Assistance) officers have to manually review each student's application and check whether the student has attached all the required documents or not. If the documents are not attached, then students are notified to submit the missing files. The status of each student's application is shared on an online social media platform. Subsequently, selected candidates are called for an interview. The candidates have to wait in long queues and the venue gets overcrowded. The interview panellist finds it difficult to manage the documents of the students as there is a bulk of files that they have to review and provide comments on their assessment of the pupil.

2. Scope

There is a need for an online portal that would be adequate for the requirements of ERFA (External Relations & Financial Assistance) administrators and students. Students would be able to apply, fill out the form and upload the relevant documents online. These documents could be verified by the ERFA Department. The shortlisted students would be selected by the ERFA Department. These applicants will be allotted an interview slot. This is necessary, in order to avoid large queues and extra waiting time for students. Interview panel members will be able to post their remarks about the candidate on the panellist portal. The status of each stage will be notified to every applicant through their personal dashboard.

By the usage of such an online platform, the cost and usage of paper would be minimized. This would adhere to the goals of the United Nations Sustainable Development Goals (SDG) like Climate Action (SDG-13) and Life on Land. At the same time, by using the interview token

mechanism crowd control is enforced. As the COVID-19 pandemic is not over, by having such flexibility it would be easier for the ERFA (External Relations & Financial Assistance) department to function based on the guidelines of health and government officials.

3. Methodology

A survey would be conducted within the SZABIST to check the problems faced by the students when they are proceeding with the scholarship application. Similarly, previous research for similar applications would be done to find their failures and success areas. Consequently, an application would be developed with respect to the findings. So, a portal where everything is automated and students can easily avail themselves of the chances for scholarships. They can check the status of their scholarship applications at any stage. An ERFA (External Relations & Financial Assistance) administrator would post the latest scholarships, select students for interviews and evaluate the profile with respect to their scholarship application as shown in figure 1.

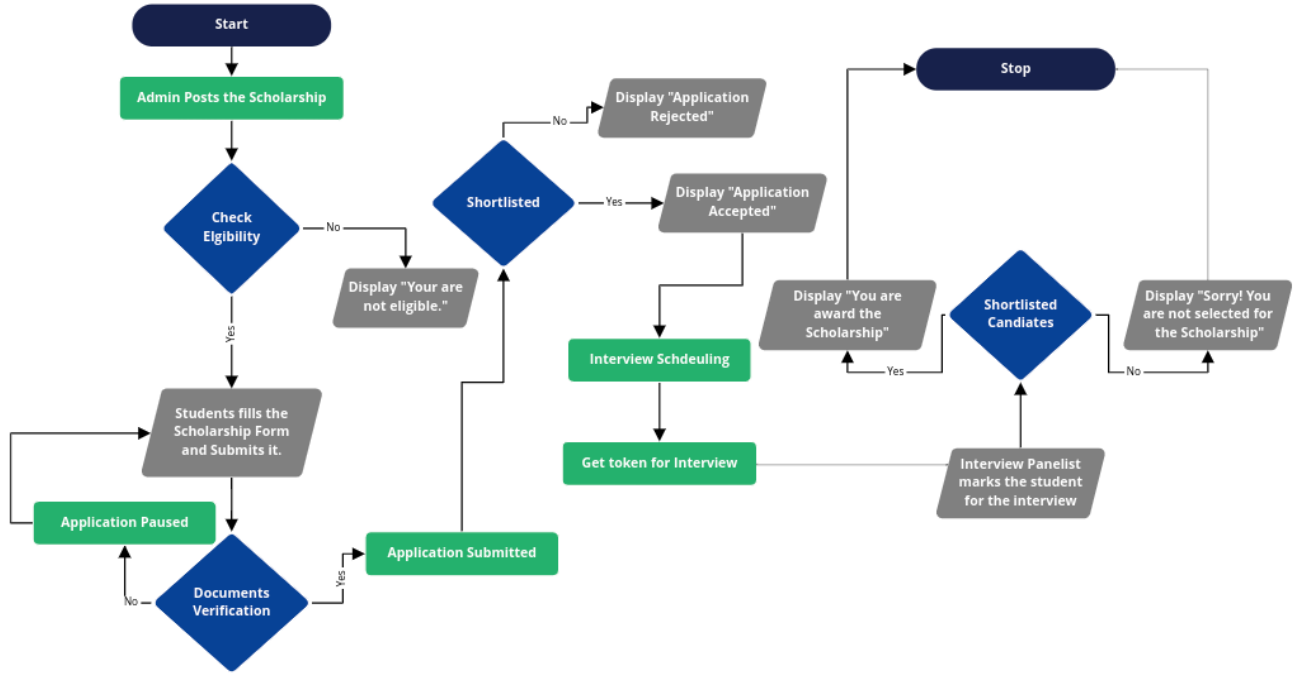

Fig. 1. Process flow diagram of the scholarship department.

The approach that this paper will be following is that the work is divided into four phases as shown in figure 2. In the first phase of the application, the existing manual procedures of SZABIST will be learned more closely in order to have a solid problem statement. In phase two, the survey is conducted by using a questionnaire having closed-ended questions. Once the data is collected then the data cleaning and visualization have to be done. After cleaning the data then the scope has to be reviewed, in which all the problems need to be stated. In phase three, the design and development of the application would be done along with the testing. Whereas, in phase four, the validation of the research will be done along with the application deployment.

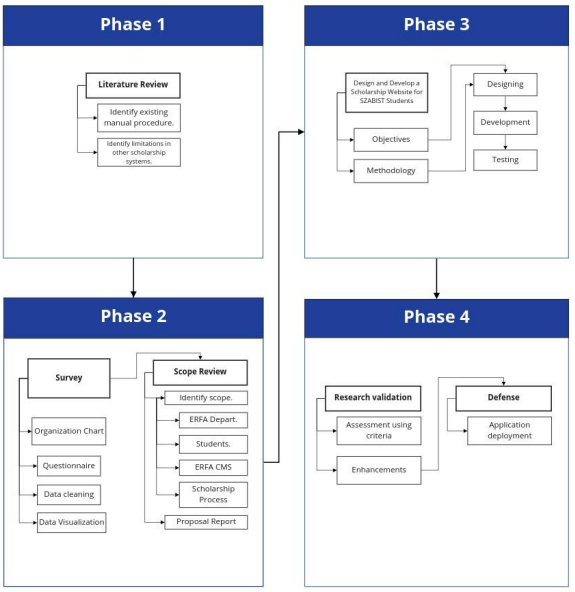

Fig. 2. Methodology breakdown.

4. Literature Review

A scholarship management system was specifically built for the University of Trás-os-Montes e Alto Douro's research projects. This was necessary for the university, as their campuses are physically very far from each other, and they required a large amount of workforce to transfer application documents. So, John Bogus and his fellow team made the system by using the .NET framework. It was a successful implementation as the whole process got smoother and easier to monitor each step of the procedure. The only issue with this system was that it only catered towards fellowship grants to students, who were not having financial issues in their life [1].

MyGJU was a combination of LMS (Learning Managing System), SIS (Student Information System), FIS (Financial Information System), and AIS (Accountant Information System) for the administrator and students of German Jordanian University. This application was developed in JAVA, it was designed to be in one application that covers the entire university affairs, but the application had no separate scholarship module for the scholarship related events. This application would only cover the funds provided by the external scholarships in the student financial account [2].

A website covering the latest scholarships was developed at Shaqra University. It was developed for the training of masters and PhDs of the university faculty. It automated the entire process from the commencement of the scholarship till the final stages. The weakness of the system consisted of an absent student module [3].

A scholarship application was developed in 2021. The purpose of the application was to track the student's documents. The limitation of this application could not provide online assessments and conduct interviews virtually [4].

A scholarship website was developed for the UNWAHA Students. They used PHP, JavaScript, MySQL, and Bootstrap in the development. The website had very limited features, as students would post the scholarship information they know about to the website. The only downside to this was that the interested pupils would not be able to process their application as the scholarship donors were not linked with the website [5].

In 2020 an idea was proposed through which the students' scholarship could be stored, the data was stored on the Ethereum blockchain, but the main issue in this is that the practical implementation of this idea has not yet been done up till now [6].

An application was created with lean UX which was sort of a community platform where all the news related to the university would be posted by random people, but the downside was that it was not connected with the admin or relevant departments, so it was not possible to be updated with all the news related to fundings and scholarships [7].

Automated Method Research was conducted on College Student Scholarship Evaluation. An algorithm and computer program was suggested but this did not include an application procedure or a flowchart of the entire scholarship process [8].

HTML, CSS, and SQL were used to develop the System Information System. The SIS was developed as a module compilation of applications and utilities. The application relies on the retrieval of basic student information which would be difficult to find in hardcopy records of the students. This approach allows staff members required access to the system. The limitation of the system was that the application did not have any module on scholarships for the students [9].

Table. 1. Literature Review.

#	Title	Year	Methodology	Limitation
1	Scholarship Management at the University of Trás-os-Montes and Alto Douro: An Update to the Current Ecosystem [1]	2017	They built a .NET framework application for the research fellowship.	They were mainly specific in offering fellowships.
2	The Software Engineering of a Three-Tier Web-Based Student Information System (MyGJU) [2]	2016	A Java Application was built for their entire university.	No scholarship module in this application.
3	An Automated Web-Based System for Follow up on the Scholarships of Faculty Members: A Case Study Based on Shaqra University [3]	2019	They developed a website application for the latest Bachelor, master, and training scholarships.	No students were catered to in this application.
4	QR-Code trackings and SMS notification transaction interface for scholarship management system [4]	2021	They made an application specifically tracking student's documents.	There was no scholarship assessment and interview module.

5	Website-Based Design of Scholarship Information Distribution System for UNWAHA Students [5]	2021	They made a website by PHP, JavaScript, MySQL, and Bootstrap.	It had very limited features, as students would post the scholarship information they know about to the website, but the only downside to this is that interested pupils would be able to see the information about the scholarship and not be able to process their application as the scholarship donors were not linked with the website itself.
6	ScholarChain: The Scholarship Management Platform with Blockchain and Smart Contracts Technology [6]	2020	A proposed system of scholarship using Ethereum and Oracle.	There is no practical implementation of this idea until now.
7	Designing a mobile user experience student knowledge management system using Lean UX [7]	2021	A student knowledge application sharing platform where it would have all university-related news and discussion on accommodations, club activities, events, and scholarships,	This would have not been connected with the university administrators.
8	Automated Method Research on College StudentScholarship Evaluation [8]	2019	An algorithm and computer program was suggested as the way of evaluation.	This did not include an application procedure or a flowchart of the entire scholarship process.
9	Design of a Comprehensive Student Information System (SIS) and User Interface for the Honors College at USF [9]	2010	HTML, CSS, and SQL was used to develop the System Information System. The application provides the retrieval of basic student information	This system is a student information management system. This system does not contain any module for providing scholarships for the students.

5. Results And Discussion

5A. SURVEY RESULT

This section would be explaining the approach and results of the survey.

The questionnaire was designed on the findings of the previous research and observations of the current problems. This step ensured that the questionnaire addresses issues faced by the ERFA department and students of SZABIST Karachi, as well as the common hurdles encountered by the past authors while improving the scholarship process for their respective educational institutes. So, the questionnaire was prepared using Google Forms.

The survey was conducted in one week. It was shared on various social media platforms including the students' class groups. Most of the students were requested physically to respond to the questionnaire. At the same time, students that were scholarship holders or selected for scholarship interviews were sent an email to answer the questionnaire according to their personal experiences. A similar questionnaire was prepared for ERFA administrators related to their difficulties.

The following questions were asked in the student questionnaire:

RQ-1. I am regularly updated about the new scholarship programs offered within the university.

RQ-2. The scholarship application form is complex and difficult to fill.

RQ-3. I do not make any mistakes while filling out the scholarship application form.

RQ-4. The scholarship application file submission process is easy.

RQ-5. I get easily notified about the status of my scholarship application at each stage.

RQ-6. The waiting for a scholarship interview is long.

RQ-7. I am satisfied with the current scholarship process.

RQ-8. It would be helpful, the entire procedure was done on a website.

The total response from the student questionnaire was 398. A cluster sampling approach was used to filter the responses, and students from programs which accounted for less than 10% were removed from the questionnaire results. This approach is illustrated in Table 2.

Table. 2. Cluster Sampling of the Student Questionnaire.

Program	Count	Total	Percentage
BSCS	156	398	39.2%
BBA	46	398	11.6%
BSSS	52	398	13.1%
BSAF	44	398	11.1%
Overall	298	398	75.0%

In Table 2, the majority of students that dominated the questionnaire belong to BSCS with 39%. The respondents from BSSS accounted for 13%, while BBA students were about 12% and BSAF pupils were 11%. 75% of the responses would be considered for further discussion, which accounted for 298 students.

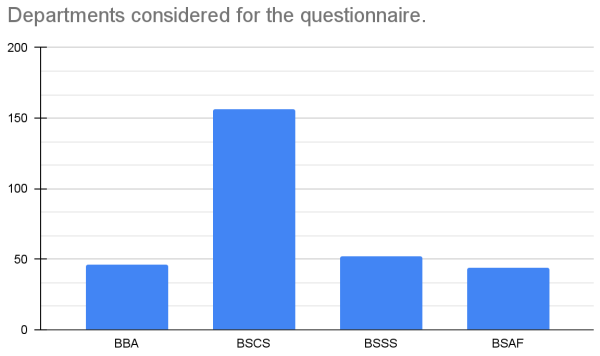

Fig. 3. Departments were considered for the questionnaire.

Figure 3, is the representation of the departments after applying the Cluster Sampling technique to the student questionnaire. BSCS students were with the majority of 156 students. BSSS pupils are represented by 52 students, while BBA and BSAF students are more than 40 students in the filtered sample.

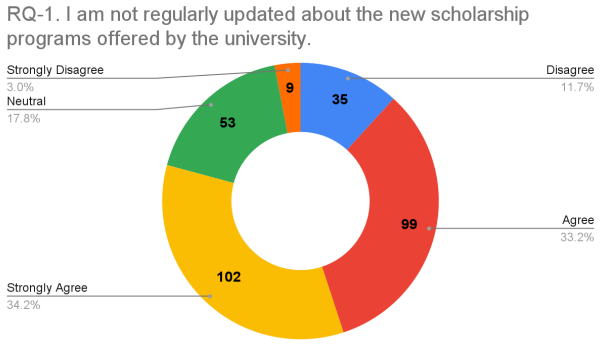

Fig. 4. Student Questionnaire question 1.

In figure 4, 34.2% of students strongly agree that they are not regularly updated about the new scholarship

programs, while 33.2% agree. 17.8% of the students are neutral about their response to being updated about the scholarship program and 11.7% of students strongly disagree, with the percentage of the student who disagrees with this being 11.7%. So, we conclude that most of the students are not aware of the news scholarship opportunities offered by the SZABIST Karachi.

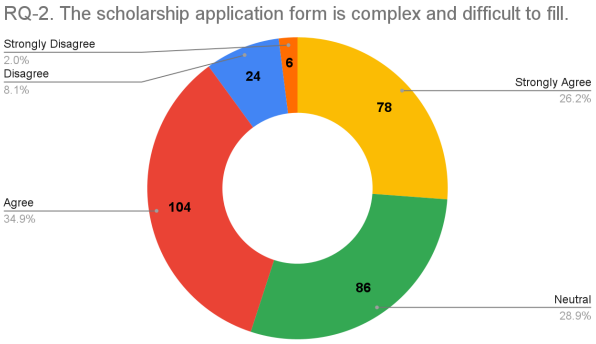

Fig. 5. Student Questionnaire question 2.

From Figure 5, 2% of students strongly disagree with the fact that it is complex and difficult for them to fill out the scholarship form, while 34.9% agree with the idea. 28.9% of the students are neutral about their response and 26.2% of students strongly agree with this question, the percentage of the student who disagrees with this is 8.1%. Taking into account that the number of students who agree and strongly agree outweighs the other responses, proving the point that the scholarship form is in fact difficult to fill.

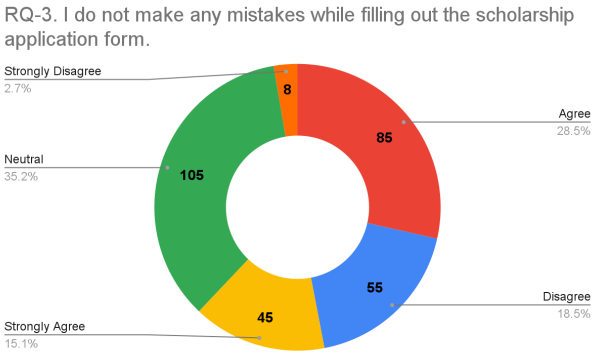

Fig. 6. Student Questionnaire question 3.

In figure 6, 2.7% of students strongly disagree that they do not make any mistakes while filling out the scholarship application form, while 28.5% agree. 35.2% of the students are neutral about their response to do not make any mistakes in filling out the scholarship form and 15.1% of students strongly agree with this question, with the percentage of the student who disagrees with this being 18.5%. The results support the notion that mistakes are made by students while filling the scholarship form.

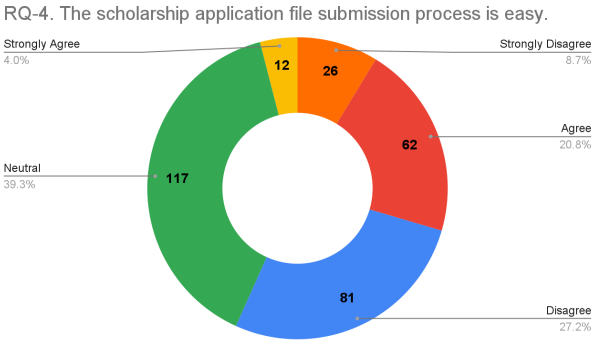

Fig. 7. Student Questionnaire question 4.

In Figure 7, 8.7% of students strongly disagree that the scholarship application file submission process is easy, while 20.8% agree. 39.3% of the students are neutral about their response and 4.0% of students strongly agree with this question, with the percentage of the student who disagrees with this being 27.2%. The idea is difficult to infer as most of the students are neutral which means they might have no problem in filling the scholarship form.

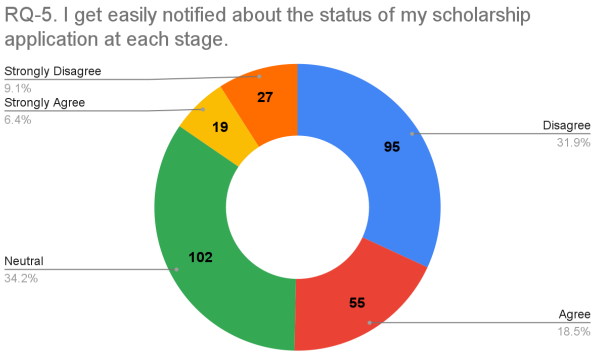

Fig.8. Student Questionnaire question 5.

In Figure 8, 9.1% of students strongly disagree that the status of their scholarship application at each stage gets easily notified, while 18.5% agree. 34.2% of the students are neutral about their response to being easily notified about the scholarship application form at each stage and 6.4% of students strongly agree with this question, with the percentage of the student who disagrees with this being 31.9%. This makes it evident that the students are not notified about their scholarship applications.

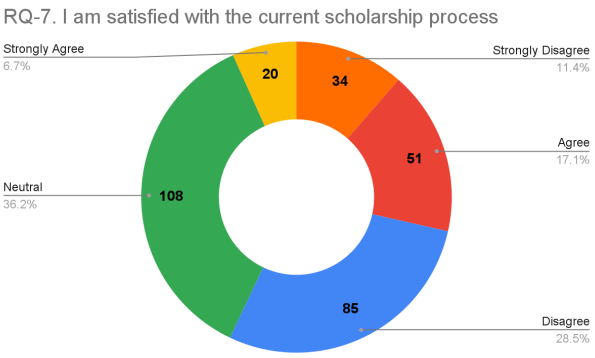

Fig.9. Student Questionnaire question 7.

From figure 9, it is visible that 11.4% of students strongly disagree that they are satisfied with the scholarship process, while 17.1% agree. 36.2% of the students are neutral about their response to being satisfied with the scholarship process and 6.7% of students strongly agree with this question, with the percentage of the student who disagrees with this being 28.5%. The positive response to this question shows that the students are not satisfied with the current scholarship system.

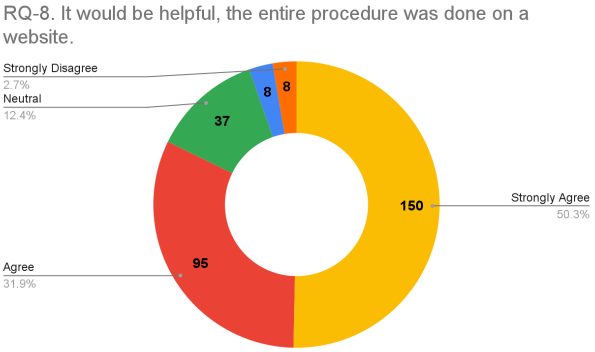

Fig.10. Student Questionnaire question 8.

In figure 10, it is evident that 50.3% of students strongly agree with the idea of a website about the latest scholarship available. 31.9% agree with this idea, while 12.4% were neutral to the notion. Only 2.7% strongly disagree and 2.7% disagree with this question. So, the majority are in favour of this scholarship portal.

5B. APPLICATIONS RESULTS

The literature review and survey results provided the necessary requirements for the development of the Online ERFA for SZABIST's ERFA Department and students.

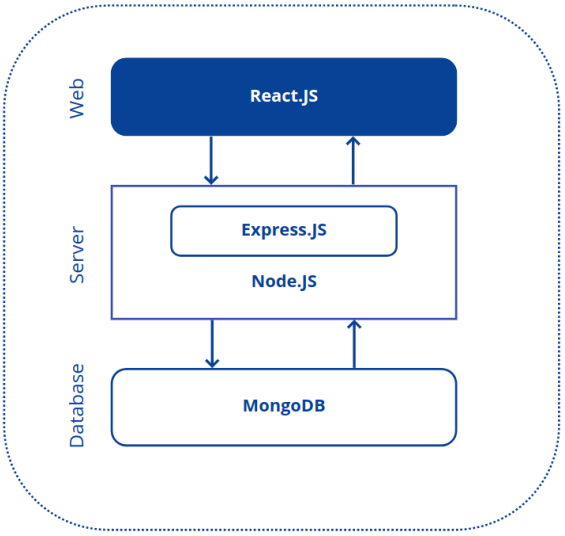

Fig.11. MERN Stack Framework

Online ERFA System was designed under MERN Stack Framework, where MERN stands for MongoDB, Express.JS, React.JS, and Node.JS. As shown in Figure 11, MongoDB is the database which is a NoSQL database, Express.JS is a Node.JS library for website routing, React.JS is a client-side JavaScript library for the front end of the application, and Node.JS is the event-driven I/O server-side Javascript environment. A Progressive Web Application (PWA) was also developed to support desktop, mobile and tablet applications regardless of the user's operating system. It did not require additional development as MERN Stack Framework supports PWA.

The communication interface for the Online ERFA is the HTTP protocol through which the user can access the website from the servers. To access the website through the HTTP protocol the user must have an active internet connection and a web browser or they should have an Online ERFA application installed on their systems.

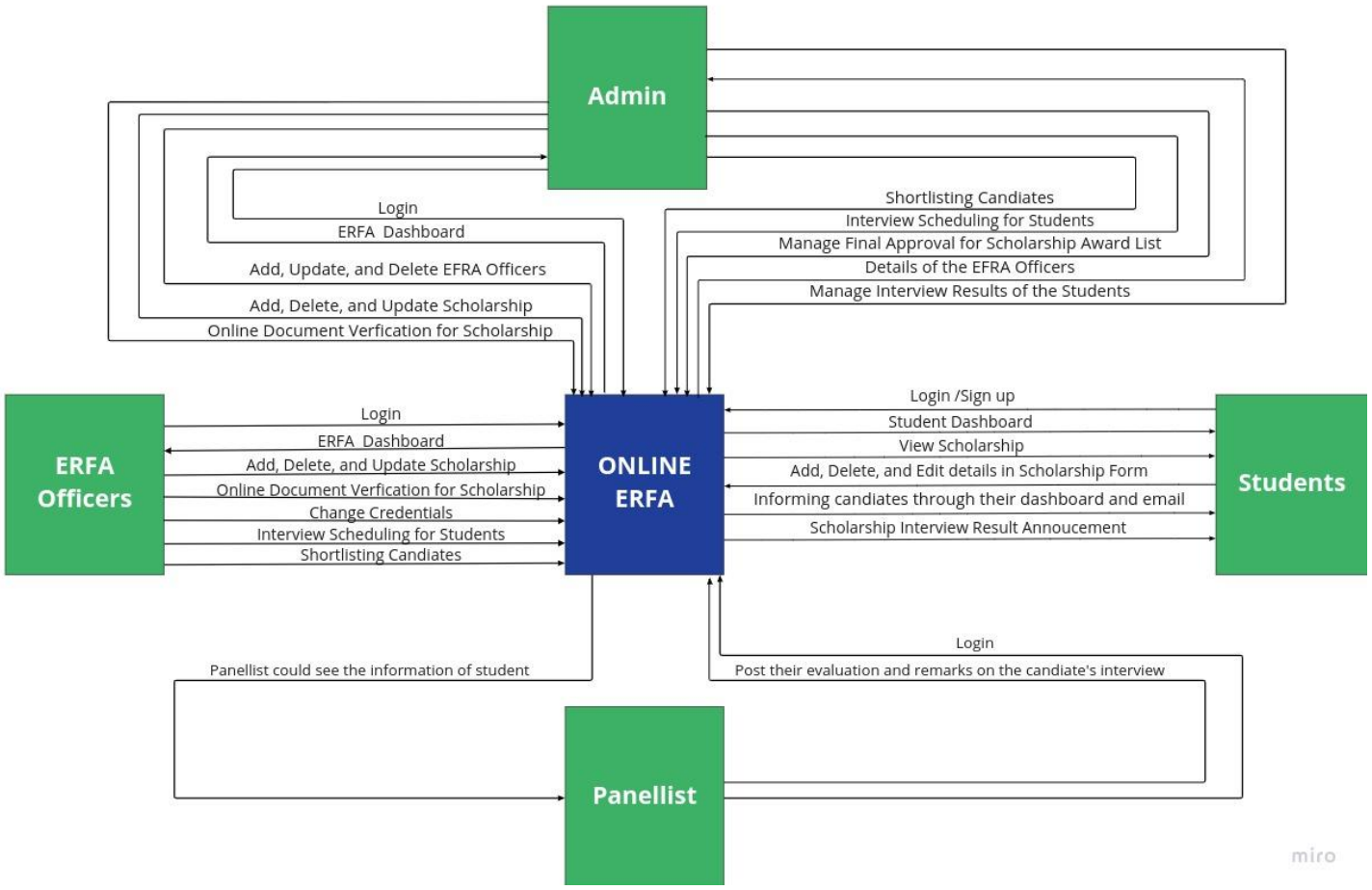

Fig.12. System Diagram Online ERFA

As shown in figure 12, ERFA Officers would have the right to add, delete, and update a scholarship post. After the student has applied for the scholarship program, they would verify whether the candidate has provided the necessary documents or not. They would have the ability to shortlist candidates for an interview. The admin would have the same feature set with additional functionalities like approval of the final scholarship awarding students, the view of interview results, and management of other employee information. The interview panellist would be able to fetch the interviewee candidate's information at the time of the interview and post their assessment of their interview on the website. Students would be able to apply for a scholarship program in which they are eligible. They will be notified about each stage of their application on the dashboard and on email.

6. Limitations

This research faced immense challenges in form of time schedule. Many respondents of the survey were not native English speakers, so there is a possibility that they may not understand the questions and answers. After the cluster sampling was performed on student questionnaire results, the majority of the respondents were BSCS students, there would be a chance of biases in the results as the clusters were not equal in size.

7. Conclusion and Future Work

In this paper, the need for a scholarship based application that can cater to both the management and the students has been proposed with the motivation of digitizing the scholarship system of the university. By conducting a survey and going through past references on the scholarship system, the outcome of the research was resourceful for SZABIST's ERFA Department and students.

The evidence presented in this paper proves that the students would highly favour a scholarship portal. So there is an encouragement factor which can allow students the ease of applying for scholarships. According to past work done in this area, the portal is more sophisticated and features the exact needs of the ERFA Department's scholarship system. In compliance with past references, many renowned institutes had made applications that provide students with a digitalized scholarship system however, most of them do not provide all the stakeholders with the proper necessary features to their scholarship system. Online ERFA is made to serve both the students and the management of the ERFA department to ensure that the whole procedure of the ERFA department is fully digitalized for both the actors.

Further enhancements can be done over Online ERFA including a document verification by using a machine learning model, online interview option, and Data Science techniques that could be utilised to find patterns and improve planning and allocation of resources for the ERFA Department.

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Gantt Chart

ID	Name	Start Date	End Date	Duration
28	Research Report	Feb 14, 2022	Jun 15, 2022	122 days
29	Phase 1	Feb 14, 2022	Mar 02, 2022	17 days
30	Literature Review	Feb 14, 2022	Feb 28, 2022	15 days
31	Identify weakness of the current process	Feb 14, 2022	Mar 02, 2022	17 days
32	Phase 2	Mar 09, 2022	May 06, 2022	59 days
33	Survey	Mar 09, 2022	Mar 31, 2022	23 days
34	Data Cleaning	Apr 01, 2022	Apr 21, 2022	21 days
35	Data Visualization	May 02, 2022	May 06, 2022	5 days
36	Phase 3	May 09, 2022	May 30, 2022	22 days
37	Research Writing	May 09, 2022	May 30, 2022	22 days
38	Introduction	May 09, 2022	May 11, 2022	3 days
39	Scope	May 12, 2022	May 14, 2022	3 days
40	Methodology	May 17, 2022	May 19, 2022	3 days
41	Literature Review	May 20, 2022	May 24, 2022	5 days
42	Results Dicussion	May 25, 2022	May 28, 2022	4 days
43	Limitations	May 29, 2022	May 29, 2022	1 day
44	Conclusion and Future Work	May 30, 2022	May 30, 2022	1 day
45	Phase 4	Feb 28, 2022	Jun 15, 2022	108 days
46	Application Development	Feb 28, 2022	Jun 15, 2022	108 days
47	Requirements	Feb 28, 2022	Mar 09, 2022	10 days
48	Design	Mar 09, 2022	Mar 31, 2022	23 days
49	Development	Apr 01, 2022	Jun 15, 2022	76 days
50	Testing	Jun 15, 2022	Jun 15, 2022	1 day

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