ECE Accreditation Document Management System

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***Abstract*— For years, paper documents have been the best approach to sort out data. However, using paper is an expensive and inefficient approach to manage information especially with the technological advancement. Document management system is a great method to access the documents faster. It is also more secure and it can help to reduce manpower staffing, cost, time and space. In this paper, document management system is introduced wherein the developed system has the ability to rate the self-survey instruments, upload, view, store, download and print documents online. This system contains documents exclusively needed for accreditation in the Electronics Engineering Department of the Technological University of the Philippines - Manila, such as Self-Survey Instruments that can be easily accessed by the accreditors, administrator and faculty. The developed system also enables secure browsing of files because of the access level that is provided for each user. The front end was created using JavaScript, Hypertext Markup Language (HTML) and Cascading Style Sheets (CSS) and for the back end, Hypertext Preprocessor (PHP), C, JavaScript and MySQL are utilized.**

***Index Terms*— document management system, remote files, electronic document management system**

I. INTRODUCTION

The Technological University of the Philippines is one of the leading state universities in the Philippines, it is regarded as one of the main providers of vocational, industrial, and engineering education [1]. Higher Education Institutions (HEIs) play a significant job in preparing a nation to be competitive worldwide.

Accreditation plays a significant role in every university. It is a nonmandatory education process that institutions of higher education go through to continue providing standards of educational quality [2]. It tells the public that a school has achieved and is maintaining a high-level quality of standards set by an accrediting organization, in this case, the Accrediting Agency of Chartered Colleges and Universities in the Philippines (AACCUP). The accreditation process under the AACCUP requires a lot of time, effort and even papers. It involves generating reports documenting all necessary papers supporting that the institutions meet these standards.

In response to these problems, this study aims to develop a document management system that will help the Electronics Engineering Department of Technological University of the Philippines - Manila during accreditation. The developed system can upload, store, preview, download, print and rate the self-survey instruments necessary for accreditation.

II. RELATED LITERATURE

Various studies were conducted and implemented with regard to document management system. A study by Dew et al., where they developed a web-based management system to allow the collection, organization, evaluation and presentation of the information needed to show compliance with Canadian Engineering Accreditation Board (CEAB) criteria. The researchers used the C # language within the Microsoft .NET framework. Database services are obtained under SQL, web services using IIS and Apache Tomcat, and content management utilizing an in-house tool [3].

Another study by Takramah et al., the researcher developed a student database system to monitor and store student data. This user-friendly, embedded database application is designed for quick access to information. The system was created using PHP, HTML, CSS, and MySQL techniques. The user interface is constructed using PHP, HTML and CSS, and the database was constructed using MySQL [4].

A study by Alberto, et al., where they reexplore the electronic document management system. The researchers introduced additional features such as auto segregation which other document management systems do not support. The said feature organizes the documents that are stored in the data storage. Thus, increasing the speed of document retrieval. With the increase in the speed of document retrieval, it will aid to lessen and save storage space for the developed system. For future work of this study, the authors suggest enhancing the system's backup and security [5].

Another study by A. Nadeem, et al., where they developed a management information system. The system allows the students and faculty's day to day statistical data to be recorded and manage. In addition to this, the paper also presents the computerized solution for saving all the required documents, letters or certificates in the database via a multi-page high speed scanning system that can be recovered and reproduced by a powerful query method. The system has an OCR feature which manages to extract and store the data automatically in the database [6].

R. Mokhtar et al., develop an integrated document management system for controlling the academic quality to

decrease the redundancy of document. The method used in this study is the Scrum method. The best feature of this method is that it still accepts extensive interaction between the design team, development team and customers as well. With the use of the online system, document evidence will be held securely in an embedded database, allowing users to conduct various functions including searching for papers, updating current records, and adding fresh records. For future work of this study, the authors suggest adding more features so that more reports can be generated in just a click [7].

III. METHODOLOGY

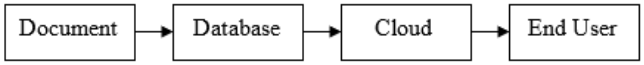

Fig 1. Block diagram of the ECE Accreditation Document Management System

Figure 1 depicts the block diagram of the system. The documents needed for the accreditation such as Self-Survey Instruments will be the input of this study. The soft copy of these documents will now be stored in the database which will be transferred and stored to the cloud. After the files have been transferred to the cloud, the users can now access the system via computer, laptop, tablet or phone.

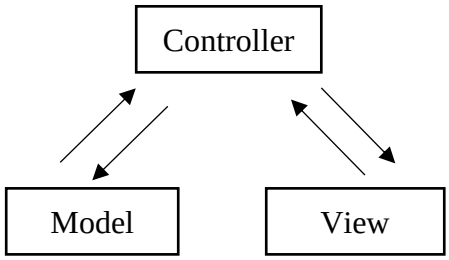

Fig. 2 MVC Framework

Figure 2 shows the MVC (Model-View-Controller) Framework. In this study, the researchers used the MVC framework. The Model component corresponds to the manipulation of all data necessary in the ECE DMS database. The user interacts with the View component while the Controller component is responsible for the communication between the Model and View component. The data will flow between the View and Model component.

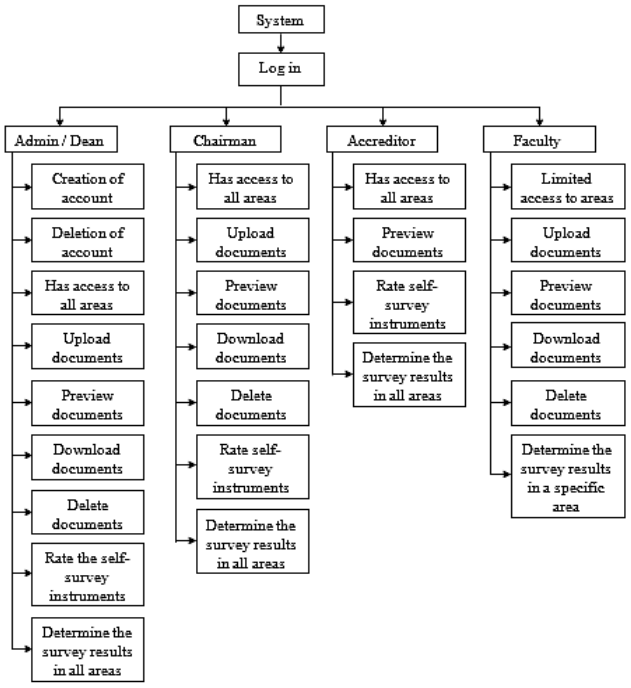

Fig 3. User Roles

Figure 3 shows the roles of the users in the study. In the figure, four different user categories are allowed access to the system; (1) the admin or dean, (2) chairman, (3) accreditor and (4) faculty. The admin or dean has the highest privileges and can access all the areas from 1 to 10. He can create or delete any kind of user, edit any user role's information in the database and can also upload, preview, download and delete documents. The admin or the dean are allowed to rate the self-survey instrument and determine the self-survey rating given by the chairman and the accreditor in all areas. While the chairman can also access all the areas from 1 to 10. Just like the admin or dean, he can upload, download, preview and delete documents. He can also rate and determine the results of the self-survey instrument. On the other hand, the accreditor can also access all the areas from 1 to 10 however, he can only preview the documents uploaded by the dean, chairman or faculty which will serve as the evidence that will help him in giving a rating on that area. The accreditor can rate the self-survey instruments and determine the survey results in all areas. Lastly, the faculty can only access the area assigned to him by the dean. He can upload, download, preview and delete documents. However, he cannot give ratings to the self-survey instruments but he can see the self-survey ratings given by the chairman and the accreditor but limited only to the area where he is assigned.

A. Software Development

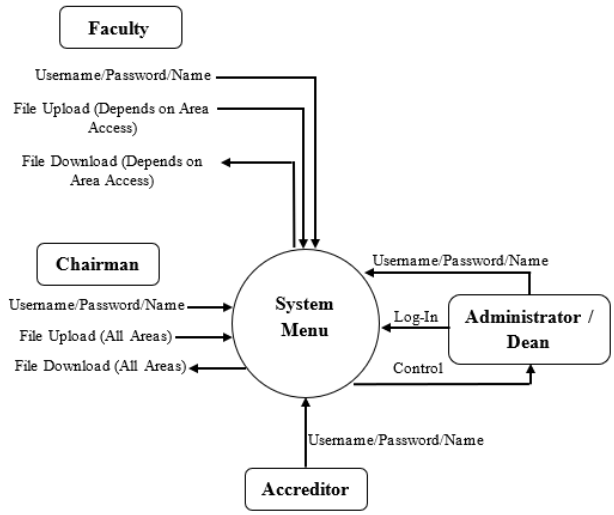

Fig. 4 Main Data Flow Diagram of the System

Figure 4 illustrates the main flowchart data flow diagram of the ECE Document Management System. The administrator or dean, chairman, accreditor and faculty must enter a valid username and password to access anything in the system. The administrator is the only one who has the authority and control to the system.

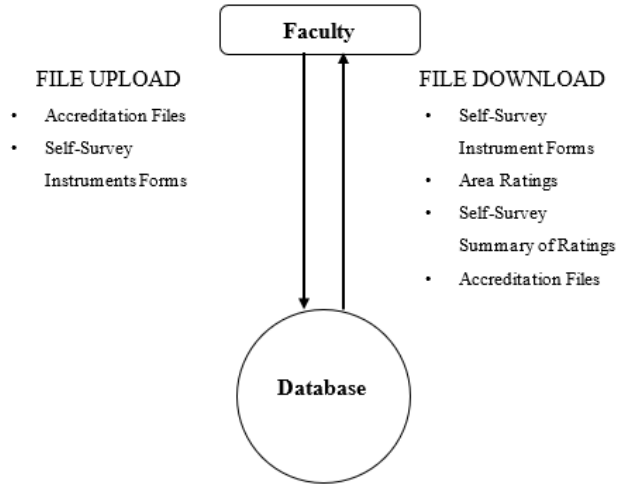

Fig. 5 System Flow for the Faculty

Fig. 5 shows the system flow for the faculty. The faculty has the ability to access the accreditation files but limited only to the area assigned to him by the administrator or dean. The faculty can also upload and download the said files as shown in the diagram. Also, the proponents created a program where the faculty have the access to determine the ratings of self-survey of his/her assigned area.

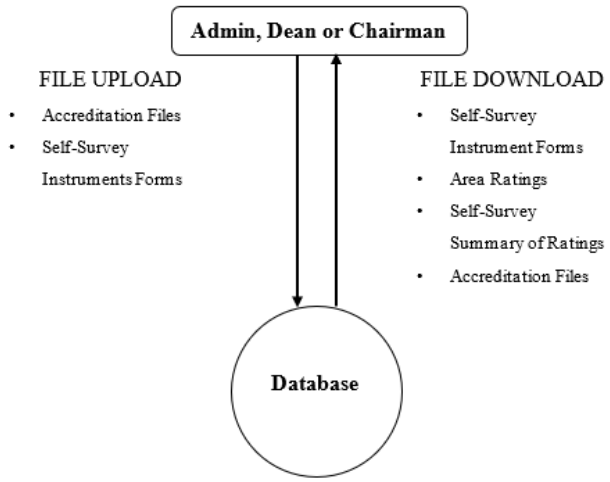

Fig. 6 System Flow for the Admin, Dean or Chairman

Figure 6 shows the system flow for the users – admin, dean and chairman. These users have almost the same functions to faculty except, they can access all the areas from 1 to 10.

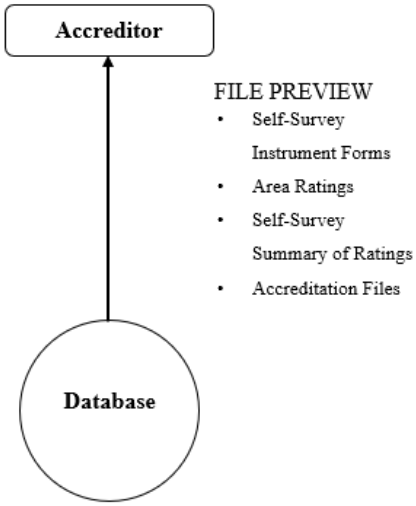

Fig. 7 System Flow for the Accreditor

Figure 7 shows the system flow for the accreditor. The accreditor can only view the files uploaded by the admin, dean, chairman or the faculty.

B. Hardware Setup

For the hardware part, the hardware necessary to run the developed system are:

- Processor: Ryzen 9
- RAM: 16GB
- SSD: 250GB
- HDD: 2TB

This computer will serve as the main server. A 3-in-1 printer (Canon Pixma G2010) is also provided whenever the user wants to scan a document that will serve as input or

produce a hard copy of a document that will serve as an output.

IV. Results and Discussion

A. *Developed System*

The following figures demonstrate the system's feature, design and Graphical User Interface (GUI).

Fig. 8 Homepage of the system

Figure 8 depicts the homepage of the system. This is where the users will log in or sign in first to be able to use the system.

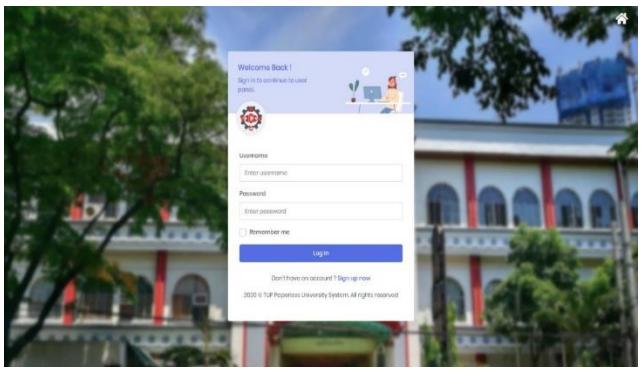

Fig. 9 Log in page

Figure 9 shows the system's interface for log-in. It consists of text fields such as username and password to be filled up by the user to log-in an account.

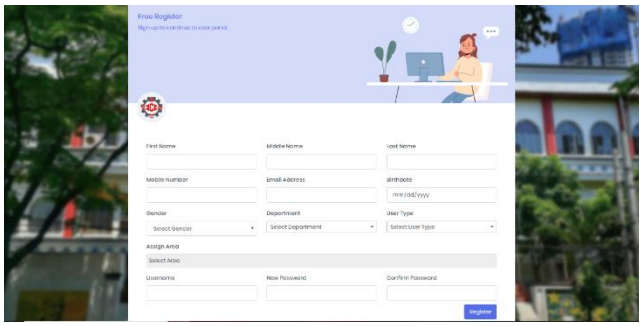

Fig. 10 Sign-up Page

Figure 10 shows the sign-up page. It permits users to enter the necessary information including their first name, middle name, last name, mobile number, email address, birth date, gender, department, username, password and position. This will act as the users' record. The admin will validate this information first before a user can access the system.

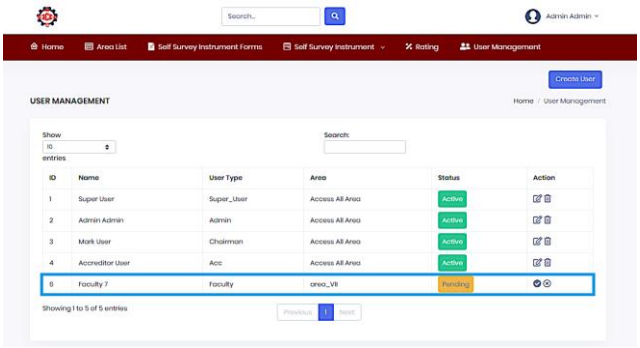

Fig. 11 Admin's User Management Sign up Request Validation Page

Figure 11 shows the interface of the admin's user management. In this part, the admin can permit or forbid a requested account. The admin can also create an account.

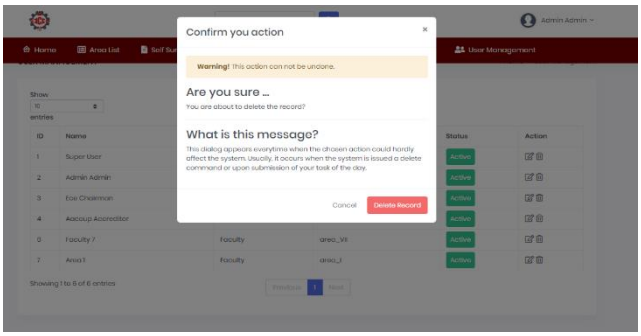

Fig. 12 Deletion of Account

Figure 12 shows the interface where the administrator or the dean can delete an account. Only the administrator and the dean are authorized for this function.

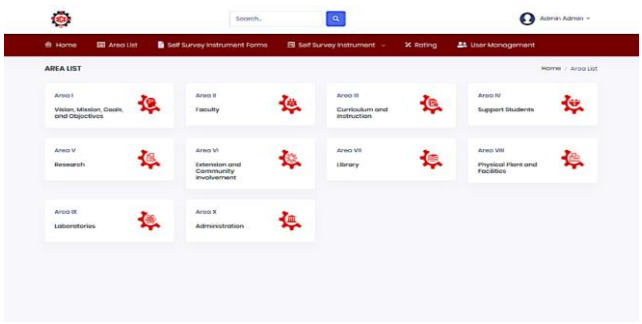

Fig. 13 Area List Page

Figure 13 shows the area list page. Area list is a set of benchmark statements with supporting evidence which is a document from Area 1 to Area 10. Depending on the access level, for example, if the user is an admin or dean and a chairman, that user will be able to access all the areas while if the user is a faculty member, that user can only access his assigned area. However, the accreditor does not have this feature.

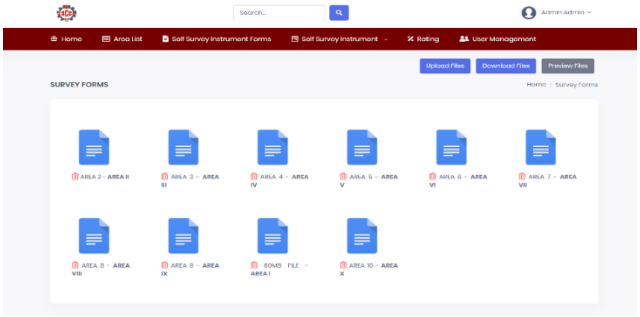

Fig. 14 Self Survey Instrument Forms Page

Figure 14 shows the self-survey instrument forms page. Self-survey instrument forms are forms from AACCUP consisting of benchmark statements from Area 1 to Area 10. Depending on the access level, for example, if the user is an admin, a dean, a chairman or a faculty member, that user will be able to upload, view and download files. However, if the user is an accreditor, that user can only view the documents.

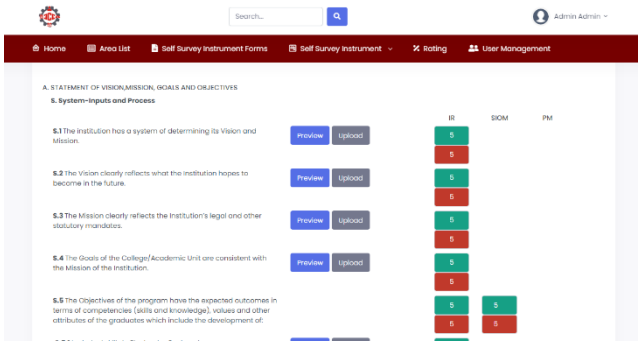

Fig. 15 Self Survey Instrument Page for the Admin

Figure 15 shows the self-survey instrument page for the admin under Area 1. The admin can upload and view the documents, rate the AACCUP's self-survey instrument and see the ratings given by the chairman and the accreditors. However, the admin cannot change the ratings given by the accreditors.

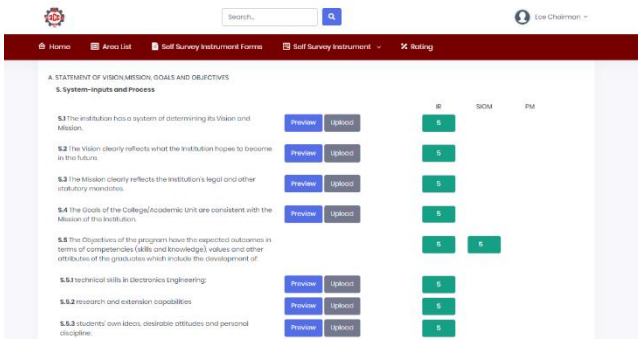

Fig. 16 Self Survey Instrument Page for the Chairman

Figure 16 shows the self-survey instrument page for the chairman. The chairman can upload and view the documents and rate the AACCUP's self-survey instrument.

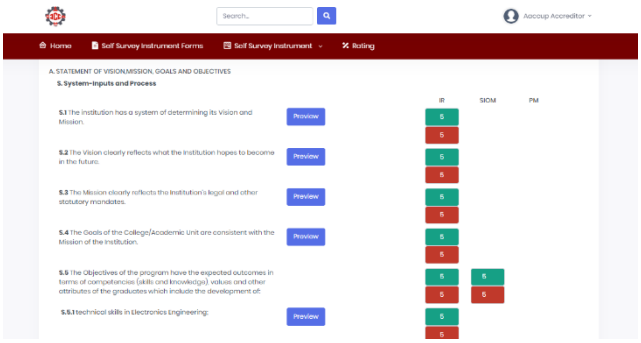

Fig. 17 Self Survey Instrument Page for the Accreditor

Figure 17 shows the self-survey instrument page for the accreditor. The accreditor can view the documents and rate the self-survey instrument. The accreditor can also see the ratings graded by the admin or the chairman. However, the accreditor cannot change the ratings given by the admin or the chairman.

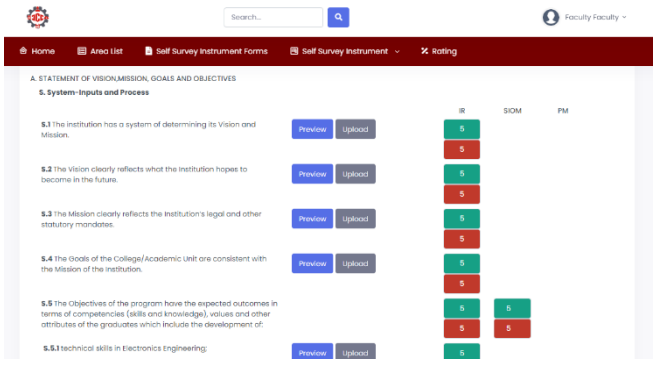

Fig. 18 Self Survey Instrument Page for the Faculty

Figure 18 shows the self-survey instrument page for the faculty which in this case is assigned on Area 1. The faculty member can upload and view the documents but cannot rate the self-survey instrument. The user can also see the ratings given by the admin, dean or the chairman and the accreditors but cannot change its ratings. In addition, this user can only access the area assigned to him by the admin.

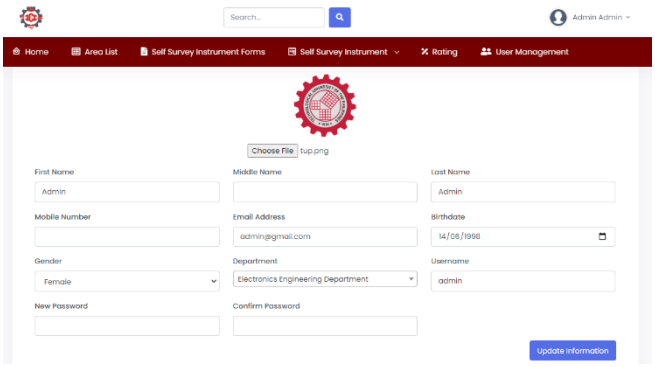

Fig. 19 Updating the Details of the User Page

Figure 19 shows the interface for changing the user's details. The user is allowed to change his picture, his personal information and his password. The user must fill up the password before clicking the update information for it to be saved and successfully change the details.

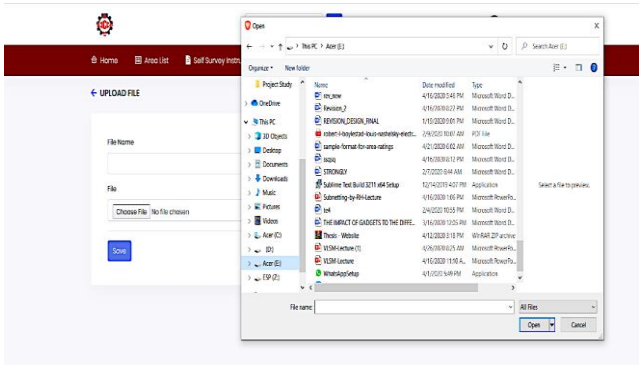

Fig. 20 Uploading a File

Figure 20 shows the interface where the user is uploading a file. The default window will pop up where the user can choose a file to upload from a particular drive.

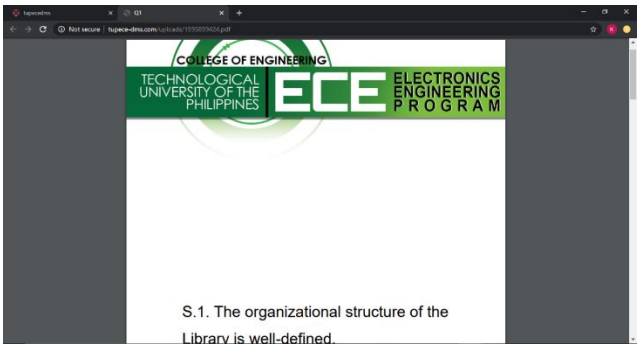

Fig. 21 Previewing a File

Figure 21 shows the interface when the user wants to preview a file.

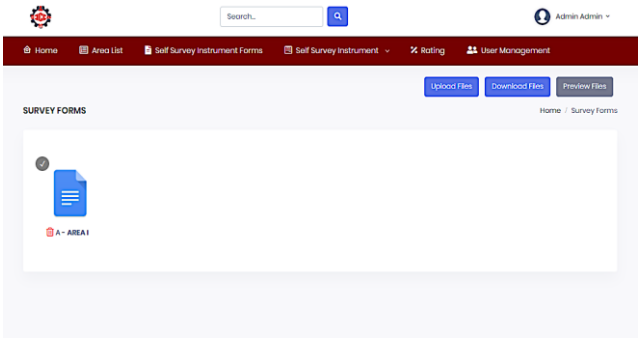

Fig. 22 Downloading a File

In figure 22, the user must select a file then click the download button on the upper right corner. Upon clicking the download button, the file will start downloading immediately.

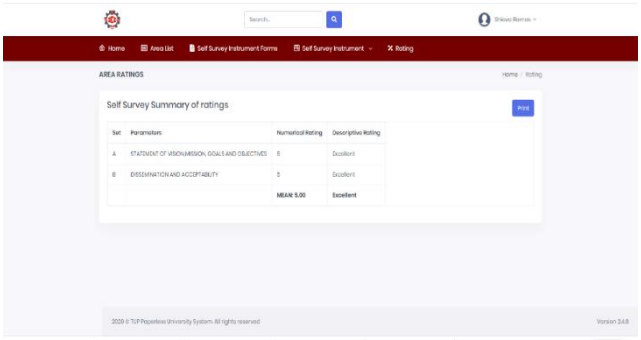

Fig. 23 Area Rating Page

Figure 23 shows the area rating page. In area rating, the user will find the numerical rating and the descriptive rating of each area.

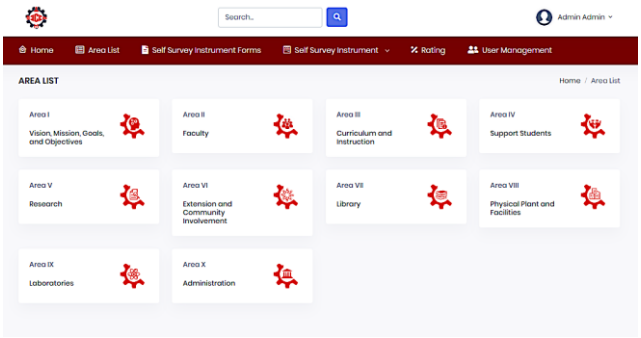

Fig. 24 Search Bar

In figure 24, the search bar can be used whenever the user wants to find a file and if the user wants to know who uploaded a particular file. The user can locate the content by searching for specific words or phrases.

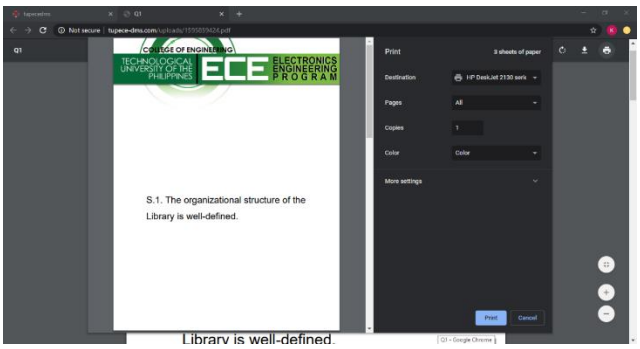

Fig. 25 Printing a File

Figure 25 shows the interface where the user can print a file. The admin, the dean, the chairman and the faculty member of the ECE department are the only authorized users who can print a file from the system.

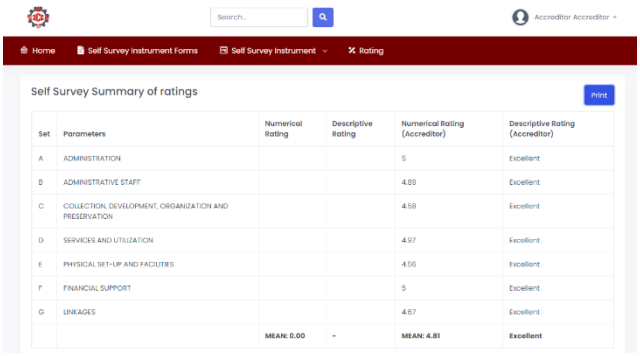

Fig. 26 Area Rating Page

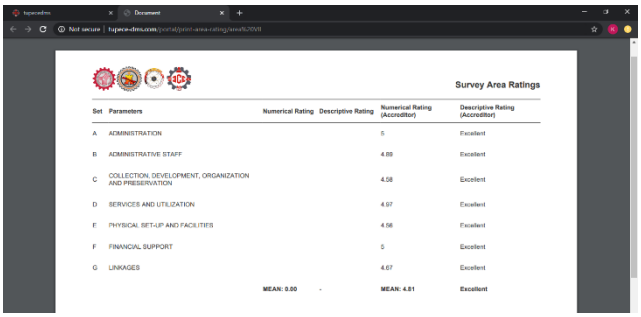

Fig. 27 Printing of Area Rating

Figures 26 and 27 shows the area rating page of Area 7 using the user – accreditor.

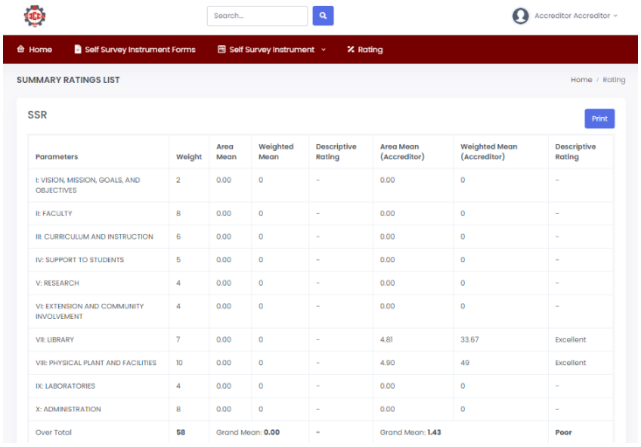

Fig. 28 Summary of Rating List Page

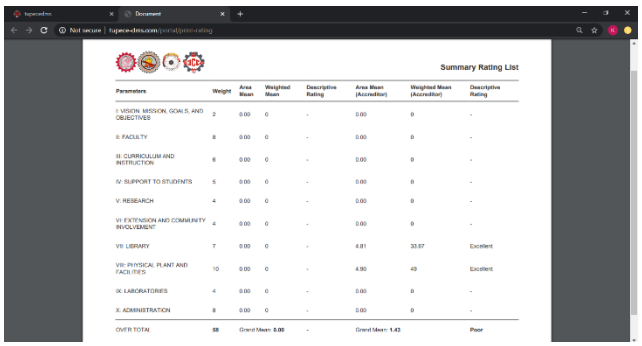

Fig. 29 Printing of Summary of Rating List

Figures 28 and 29 shows the summary of rating list using the user – accreditor. The numbers on the figures are actual data that the researchers gathered.
**Note:* The researchers weren't able to gather all the ratings due to the pandemic. Thus, affecting the computation of the grand mean.

B. Survey Results

A web-based document management system designed for accreditation purposes is the result of this study. Analysis, design, building and testing of the system is observed. An evaluation has been performed accordingly to guarantee that the system meets all the requirements.

PARAMETER	PROFESSOR							AVERAGE	DESCRIPTIVE RATING
	A	B	C	D	E	F	G		
Ease of Use	5	4	4	5	5	5	4	**4.571**	**Excellent**
Accuracy	5	5	4	5	4	5	3	**4.429**	**Very Satisfactory**
Sustainability	4	5	3	5	3	5	4	**4.143**	**Very Satisfactory**
Content	4	3	3	4	4	5	4	**3.857**	**Very Satisfactory**
Appearance	5	5	5	5	5	5	4	**4.857**	**Excellent**
Accessibility	5	4	5	5	4	5	4	**4.571**	**Excellent**

Table 1. Tabulation of Results

The system was evaluated by the following parameters:

- Ease of Use – The system is easy to use.
- Accuracy – The information given by the system is accurate.
- Sustainability – The system works well without any bugs or errors.
- Content – All the files needed for the accreditation are completely registered in the database.
- Appearance – The system is visually appealing.
- Accessibility – Availability of the system to the faculty.

The respondents evaluated the system by rating the parameters utilizing the following scale value interpretation: 1 – Poor, 2 – Fair, 3 – Satisfactory, 4 – Very Satisfactory, 5 – Excellent. There were 7 respondents from the Department of Electronics Engineering who tested the system.

C. Interpretation of Results:

Based on the ratings that the researchers gathered: Most of the respondents agree that the system is user-friendly and accessible to them garnering an average of 4.571. For the accuracy of the system, it has an average of 4.429 and 4.143 for its sustainability. While in terms of appearance, most of the respondents gave a rating of excellent. And some of the respondents gave a rating of very satisfactory with the content of the system garnering an average of 3.857.

Moreover, based on the ratings, the researchers believe that the system developed will be a big help to the Electronics Engineering Department and can facilitate accreditation.

V. CONCLUSION

Based on the results, the researchers conclude that the system is effective and accurate, and it can be used during the accreditation. The system has a well-built interface that enables users to communicate with the system through the use of the Internet and a web browser. It is useful especially to the Electronics Department of Technological University of the Philippines – Manila and it will help both the faculty and the accreditors to efficiently store and organize data than doing it manually.

VI. FUTURE WORKS

For further research of this study, the researchers suggest adding additional features such as a scan button which will directly scan the documents and stored it in the database. Second, make it dynamic so that the authorized user can add questions. And lastly, make it a mobile application.

VII. ACKNOWLEDGMENT

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VIII. REFERENCES

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