E-Course Evaluation and Analysis Online System

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Summary
Course evaluation is a necessary component at the end of the academic semester/year in each University around the world, which helps to analyze the quality of course delivery and open the doors for further improvements. At the end of each semester, Colleges' management uses the same practice to satisfy the accreditation bodies such as ABET, EECHES formal NCAAA. This practice requires distributing survey papers in thousands as well as it requires enough human resources and time. Even though its analysis results reached to the concerned stakeholder very late. To avoid the waste of all these resources and to automate this complete process for undergraduates and postgraduate students of universities. This research overcomes stated issue by designing and developing E-Course Evaluation System for universities, which have two-fold solutions included Android-based Mobile App, and Web-based interface for admin/management. ECES only actives at a predefined time and completes analysis and forwards the results to concerned stakeholders such as Dean, Chairmen, Faculty, and Quality assurance office timely in an efficient manner. ECES allows the students to evaluate their registered courses/instructors. ECES calculates the results and the performance level using statistical and mathematical techniques to provide reliable and accurate calculations.

Keywords:
Electronic Course Evaluation System ECES, Android, Analysis, Online, and Smart Application

1. Introduction

Each University around the world measures the quality of its performance at the end of each academic semester by using course evaluation. They distribute evaluation forms in order to analyze the course delivery, instructors, and the quality of given services for further enhancements. Universities have different means of course evaluation, some of them use an advanced way like using E-course evaluations, and the others use the classic way like those who achieve course evaluation manually. The start of everything will be classic until realizing the problems and mistakes of the classic way, and this is the purpose of developing advanced ways [1], [2].

The process of evaluation is not an easy task even though could you imagine how it will be if it is done manually? In colleges, at the end of each semester, the members of quality deanship start preparing for the evaluation process from the beginning until the results found out. It seems effortless. However, the process of the evolution goes through many stages to be done. Firstly, quality assurance office members will look for the equipment needed, such as the papers to print more than 10,000 survey sheets. Normally each survey consists of two pages. Then, once the equipment is ready to be used, the members will start making up suitable questions for each kind of survey whether related to courses or instructors. After the quality deanship members have completed the required preparation for the course evaluation, the second stage will begin. The second stage will be done by the members, instructors, and supervisors as well. They will start distributing the surveys among the students at their classes regarding the subject, instructor, and section. Supposedly, at each level, there are four subjects, and for every subject, there are different instructors as well as there will be different sections and 20 students in each one. If we take a quick calculation, there will be ((4 Subjects* 3 sections * 20 students) *8 levels) *2 survey sheets = 3,840 sheets. This is only an approximated number it might be more or less according to previous factors despite this calculation is done only for one division. Once the faculty members finish from the second stage, the last stage will begin, which is the most difficult among all the stages. Faculty members will collect the answered evaluation sheets and return them to the quality assurance office members who will calculate and analyze the results. The quality assurance office members will start dividing the surveys into categories and will start scanning surveys one by one to get the results out. The normal average of scanning the survey sheets goes up to 9,000. However, scanning will work only for the multiple choices section. There is another section that is related to open-ended questions. In this section, there might be mistakes in the survey sheets such as the bad hand-writing of the students which will make the process longer [3]. Figure 1 shows the amount of the evaluation sheets.

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Fig. 1 Evaluation Sheets

After we have seen how difficult the evaluation process accomplished manually. Performing the tasks manually is a big chance to commit mistakes and errors. Moreover, it takes around up to three weeks to analyze as well as more time needed to calculate the result and verify it too. To complete the evaluation process, there are a lot of resources consumed like human resources, the time taken, and the efforts were made. While we are at the age of technology, it becomes imperfection to analyze thousands of evaluation papers manually. As mentioned, it wastes time, the efforts, and other sources in addition to the late delivery to whom responsible. Because the need to use a more efficient way is necessary as well as the stakeholders, including the dean, students, faculties, instructors, and quality assurance office members, should not suffer from this problem anymore, we developed an E-Course Evaluation System (ECES).

ECES is the new entry for the stakeholders to evaluate the quality easily and efficiently. It helps the stakeholders to save their time, efforts, and other sources. Also, it provides reliable and accurate results using mathematical concepts. It is the solution for the wasted time because it is available as an Android-based Mobile App and Web-based interface, which helps the stakeholder to evaluate conveniently. ECES performs many tasks and functionalities. However, there are many other important aspects we will talk about them in later sections in detail, such as the motivation, problem statement, and a comparison between the ECES and other similar examples. The paper is organized as follows. Section two presents the motivation. Section three discusses the problem statement and the cons of using the manual way in the evaluation process. Section four presents a literature review and comprehensive analysis of similar systems to the ECES. Section five presents the proposed system. Section six presents the results and discussion. Section seven presents the conclusion. Section eight defines future work.

2. Motivation

Approximately twelve credit hours are the minimum number allowed for the students at colleges to register in the semesters. This means each student will not have less than four courses per semester. At the end of each semester, the students must evaluate their respective courses and their instructors in order to analyze the quality of course delivery and open the doors for further improvements. So, if we assume that the process of preparing, distributing, filling and collecting the course evaluation surveys will take twelve minutes for one section. There are five sections for each course, and in each course, there are two classes theoretical and practical which means the total number of the taken minutes from the classes on each batch study is four hundred minutes and it will be four thousand for all batch study. If we make some calculations to find the number of the lost academic hours, it will be sixty-six hours, which equivalent to approximately five weeks.

Wasting all those weeks is a major problem and not suitable for both students and instructors, and it is also against the aim of the evaluation process, which is to improve the delivery of the courses. Since we are computer science students, we can operate the technology to minimize and facilitate the evaluation process that takes a huge effort and time by developing an online course evaluation and analysis system that allows the student to evaluate at any time without interruption on the classes freely.

3. Problem Statement

At the end of each academic semester, the Colleges must distribute evaluation sheets among the students for all their registered courses in order to get feedback from them about the courses and their instructors to track the quality of the courses and to improve the teaching quality. However, the process of evaluation is not as easy as it sounds. It requires a huge amount of paper, time, and people to distribute and then collect the papers from the student to get data for the analysis operation. It also needs a full staff to calculate the evaluation results. So, as much as the course evaluation is important as it is exhausted.

We as computer science students who know all the required concepts to program and develop a system. We minimize and facilitate the evaluation process by developing an E-Courses evaluation and analysis system (ECES) see Figure 2. The system have a mobile app for the students to log in and evaluate their courses. The system also have a web-based interface that stores the data in a database that automatically calculates the result and sends it to the concerned stakeholders.

ECES opens for the students in a specific period where they can evaluate at any time during that period.

Only the registered courses for the student are shown to them. By using ECES, the students do not have to color circles on evaluation papers by using pencils in order to fill in their feedback, they can easily just tap on the wanted answer, and it will be recorded by one click. After the students submit the evaluation papers to the ECES, the result stores in the database where the concerned stakeholder can access the data.

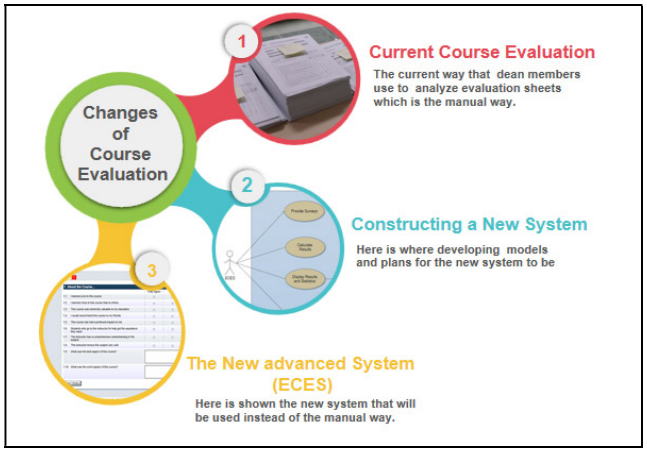

Fig. 2 Changes of Course Evaluation

4. Literature Review

At the end of every semester, quality assurance office members give an order to distribute thousands of evaluation sheets among the students and ask them to fill in these evaluation sheets in order to evaluate their courses and their assigned instructors. Quality assurance office members take these sheets and calculate the results manually in order to measure the quality of teaching and the level of the student's satisfaction with the subjects. This long process may continue until the beginning of a new semester.

The result of the evaluation sheets of the previous semester becomes useless because the result comes late, so quality assurance office members cannot use it to improve the quality of teaching of the new semester. For that, we came up with the idea of this system to help in simplifying this long process and make the result more powerful and used to help in increasing the quality of teaching in colleges. Many evaluation systems are developed in order to improve the quality of teaching in different universities around the world.

4.1 Examples of Evaluation Systems:

This section discusses some systems which are similar to ECES and provides detailed information about these systems. In this section, we put all of these systems in comparison and provide critical analysis of all the systems. We studied the systems from different perspectives like the system type, the main function, the non-functional requirements, and the user interface.

4.1.1 Open Faculty Evaluation System by shrenik181986:

This is a Desktop E-Course and Evaluation System. The system has two different sign-in pages, one for the students and the other one for the admin. The available pages for the students are different than the pages that are available for the admin. The students and the dean/management need to download this system in order to use it. This system allows the students to evaluate their assigned courses. After the evaluation process, the dean can access the result of the evaluation. [4]

The system is simple and focuses only on the main function, which is evaluating the courses. The system does not perform any sort of analysis on the result. It only simply shows the result. The techniques used to build this system are quite simple and old. The admin can control the system in the Admin Panel page, where everything can be managed. The design of this system considered to be bad. The interface is not user-friendly, and it is quite difficult for the user to interact with the system. [4]

The Human-Computer Interaction rules are not followed in this system. See Figure 3 that shows the bad design and the bad interface that the system has. This Figure shows the Admin Panel Page, where the Admin can manage the system. [4]

Fig 3 Admin el Page [4]

4.1.2 Role-based Evolution system (ROES) by Thomas Price, Jeromie Walters and Yingcai Xiao:

ROES is an ASP.NET Web-Based Application that allows the students to evaluate their assigned instructors. All users of the system are considered to be roles.

Different users are assigned to perform different actions based on their roles. The users should create their account in the system to be able to use the system. [5]

For the creation of the forms, the system automatically generates questions for the evaluation forms by using the help of Excel sheets. Administrators can create their evaluation forms. The students do not put a lot of effort to access the evaluation forms because the system is supported with a user-friendly interface and a good Graphical User Interface. Reliability and Anonymity are very important for ROES. [5]

Since Anonymity is a very important factor for the system, the developers made a creative way that helped in achieving Anonymity. Which is that after the students submit their response, the system generates an automatic number for their response and stores the result according to the automatic number so no one will know about the identity of the student. The responses will be stored according to automatically generated numbers, which do not give any sign about the students. [5]

The disadvantage of this system is that it focuses more on the user interface and pays less attention to the way the results are shown.

4.1.3 Quality Evaluation of Online Courses through Rubrics and ADDIE model:

This article shows how the students in the past four years preferred to do the course evaluation online because they found it more suitable and easy to use. So we expect the students to use our system for online evaluation according to the following article.

The increasing number of college students who choose to take their courses online reached to 150% and the reasons behind this is that the students can take it anywhere and anytime [6]. So, this paper contains several strategies used in order to measure the quality of teaching of online courses. The proposed techniques are the Quality Matters Program and rubric QMRubric. They have opened techniques that can be applied to any system even for course evaluation systems.

The Quality Matters Program states standards to be considered to help in designing course evaluation systems. On the other hand, the QMRubric states eight general standards that are important to be considered when developing online course evaluation systems. See Table 1 that shows the eight standards of the QMRubric [7].

Table 1: The general standards of the QMRubric [7]

General standard	# specific standard
Course overview and introduction	8
Learning objectives	5
Assessment and measurement	5
Resources and materials	6
Learner engagement	4
Course technology	5
Learner support	4
Accessibility	4

4.1.4 Unifying Program-Level ABET Assessment Data Collection, Analysis, and Presentation by Ken Christensen, Rafael Perez, Purushottam Panta, and Pummy Bedarahally:

This paper presents the system of the University of South Florida that used to improve the quality of the college activities. The system is a web-based system that used to collect data, analyze the data, and finally, present the data in a format that similar to ABET's format. ABET is a non-profit organization that has the aim of providing the students with all the required standards to enter the global workforce [8].

The developers of the system clarified the requirements of the system. They had discussions with the faculty members and the dean members in order to form the system requirements [9]. The system has two views, one view for the visitors and the other one for the administrator. The two views are mostly the same but on the administrator view, there are some more features like uploading files, deleting files, and editing files.

The system provides access to all the college's programs from one page that leads the users to the ABET criteria as shown in Figure 4.

The developers used Microsoft IIS web server and Microsoft SQL database server to implement the system. They used ASP.NET for the server-side programming. The system has three layers which are Presentation layer, Business Logic layer and Utility layer.

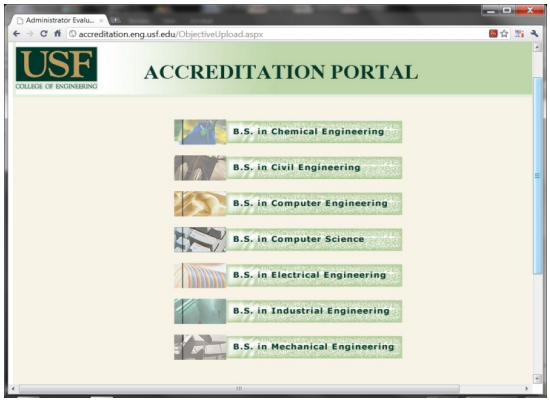

Fig. 4 Program Page for Accreditation Portal [9]

4.1.5 A Web-Based Course and Instructor Online Evaluation System by Sahar A. El_Rahman:

This paper presents the system of courses and instructor online evaluation (COES) in the College of Computer and Information Sciences at Princess Nourah bint Abdulrahman University. They started using an online course evaluation system in order to save many wasted resources like time and the exhausting process of course evaluation. COES system has a big role in helping the college to simplify the process of course evaluation. The system performs some analysis on the result in order to get accurate data [10].

The system sends a reminder to the students to remind them about the course evaluation activation to encourage them to evaluate their assigned instructors and registered courses. After that, the system sends the result to the faculty members. The admin of the system has the job of entering the required data into the system like the information of the instructors and the students. The system has a good error handling, it shows error messages for the students when needed to guide them to the right way of doing the evaluation.

The developers of the system used many programming languages and different programming environments like ASP.NET in order to implement this system. The developers used SQL databases to build the system's database. They used Photoshop in order to design an attractive system interface. The system has a user-friendly interface. The system is supported by good and understandable error messages, and it presents the results in a good way and does analysis in order to get accurate results. See Figure 5 on the next page that shows the user-friendly interface that the system has.

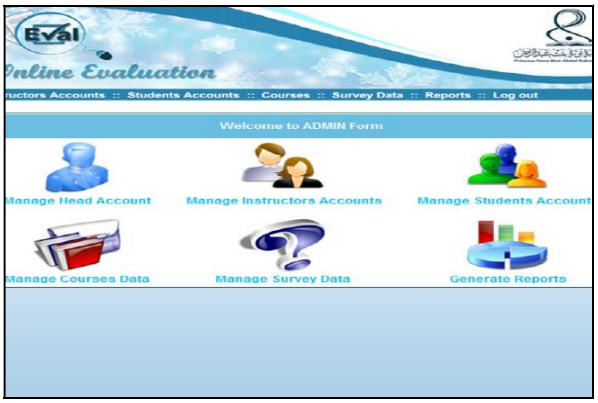

Fig. 5 The user-friendly interface of COES system [10]

4.1.6 Enhancing ABET EC2000 Preparation Using Web-Based Survey Reporting Tool by Fong Mak, Stephen Frezza, Wook-Sung Yoo:

This paper presents a web-based system that gives a chance for the students to evaluate their registered courses and their instructors to measure the outcome of departments. The faculty members and the students are required to complete the online surveys in order to help in improving the quality [11]. This system uses a tool called IO. This tool has a role in helping the system in the process of gathering and analyzing the data. This tool helps the system to get accurate results. The Electrical and Computer Engineering Department at Cannon University uses this system to reduce the effort done in order to get the student's feedback about their courses and their instructors and to make sure that the college satisfies the ABET criteria [11].

This System consists of three sides which are faculty side, student side, and dean side. For the faculty's side, the faculty members are authorized to use the system in order to set up the information of all the courses. For the student's site, the students will receive an electronic mail that reminds them of the evaluation of the courses if they did not do the online evaluation of their registered courses and assigned instructors. Privacy is important for this system for this reason, the students are provided with anonymity. For the dean side, the dean will have the right to manage the system. Furthermore, the analysis achieved through this system will help the Rubric requirements for the academic accreditation, as well improve learning skills and curriculum development [12-14]

4.2 Critical Analysis / Comparison of our proposed system and other systems:

This section compares ECES with other E-Course Evaluation Systems discussed in Examples of Evaluation Systems section.

Table 2: Critical analysis between ECES and other similar systems

Systems \ Caritas	Ease of use	Type of the system	The flow of the system	Result's Analysis	Security
• Open Faculty Evaluation System	No	Desktop Application	Bad	No	Missed
• Role-based Evolution system (ROES)	Yes	Web-based System	Good	No	Exist
• Quality Evaluation of Online Courses through Rubrics and ADDIE model	Yes	Web-based System	Good	No	Missed
• Unifying Program-Level ABET Assessment Data Collection, Analysis, and Presentation	No	Web-based System	Good	Yes	Exist
• Web-Based Course and Instructor Online Evaluation System	No	Web-based System	Bad	Yes	Exist
• Enhancing ABET EC2000 Preparation Using Web-Based Survey Reporting Tool	No	Web-based System	Good	No	Exist
• Proposed System, E-Course Evaluation & Analysis System (ECES)	Yes	Web-based System for the management and Android-based System for the students	Good	Yes	Exist

5. Proposed System

Our proposed system is built with two-fold solutions, which are an Android-Based Application for the students and a Web-Based System for the dean/management. We provide the students with their preferred option which is a system built as a Mobile-Based Application. So, the students have access to the system easily, anywhere, and anytime. They do not have to put a lot of effort in order to evaluate their registered courses and their assigned instructors. Within a short time, the students can finish the evaluation.

On the other hand, we built a Web-Based System for the dean/management to manage the system. The dean/management needs a Web-Based System to do the job of managing the whole system because it is better to do the job of managing on Desktop Computers or laptops with big screens. This choice is more comfortable for the dean/management. Building a system that satisfies all the user's needs is one of our goals. For this, we chose to build a two-fold solution for the users.

ECES provides a web-based interface for the admin, faculty and dean/management to enable them to interact with the ECES. ECES provides an android-based mobile app for students to enable them to interact with the system to evaluate their registered courses and assigned instructors. Management are classified under department-level managers or a dean. The department-level managers can only view the result and the analysis of their department's courses. While the dean can view the result and the analysis of all the courses. Faculty members can have access to the web-based system and view their courses' evaluation results. Students can have access to the ECES by downloading and using the Android-based Mobile App. Students can evaluate their registered courses and assigned instructors only once per course. Students will be able to view their registered courses' evaluation page once the dean or the admin activates the system to start the course evaluation period. When the dean or admin activates the ECES system, the ECES system sends activation email messages for the students that contain their username and password to inform them about opening the system for accepting course evaluation. Once the dean or admin close the evaluation period by deactivating the ECES system, the ECES will no longer accept students' evaluation. ECES will inform the students

that the Evaluation system is closed. The ECES generates a report for the dean, managers, and faculty members of the names of the students who did not evaluate their registered courses. The ECES system performs analysis upon the stored evaluation results to give a success rate for each faculty member in college. Also, it gives a rate of success for each course taught in college. Finally, it gives a rate of success of the overall college in the academic semester.

- **ECES Functions of the Android-Based System:**

1-The system should allow the students to access the Android-Based Application using their University ID and Password.
2-ECES should allow the students to evaluate the courses that they are enrolled in.
3-ECES should allow the students to evaluate their instructors.

- **ECES Functions of the Web-Based System:**

1- The system should allow the dean/management to access the Web-Based System.
2-ECES should allow the admin to assign instructors to courses.
3-ECES should allow the admin to activate and deactivate the evaluation period.
4-ECES should perform efficient mathematical operations in order to reduce detailed result analysis.
5-ECES should allow access to dean/management for managerial reports.

The system architecture of ECES gives a complete idea about the system's models and their access to the system. This architecture shows that ECES has four models. ECES has a student model, faculty member's model, management model, and admin model. This architecture shows how these models are connected in ECES.

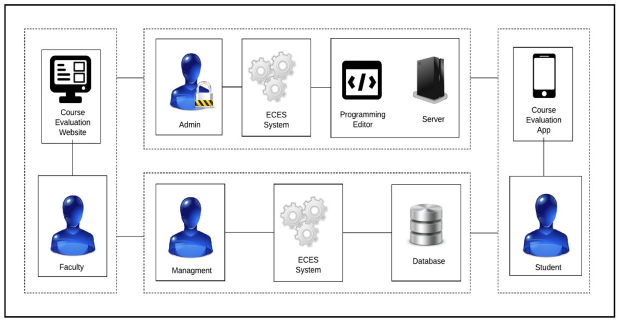

Fig. 6 Architecture of ECES

The Use Case of ECES shows the actors and their assigned functionalities. It shows a complete idea about the users and the job that they can do using the system.

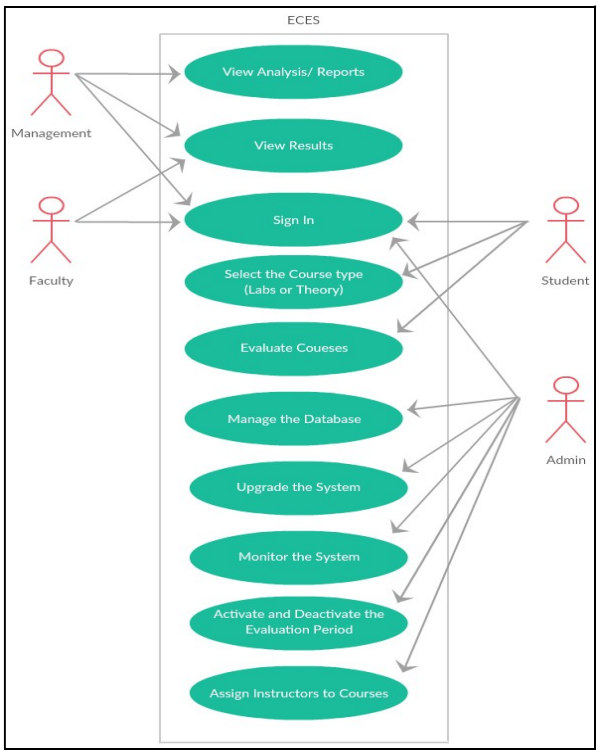

Fig. 7 Use Case of ECES

The The faculty members should sign in to the Web-based System of ECES in order to use the system. They can access the courses that they teach and access the overall analysis.

Figure 8 shows the flowchart of the students through the Android-based System of ECES. The students should sign in to the Android-based System of ECES in order to use the system. They can choose a course to evaluate and submit their evaluation.

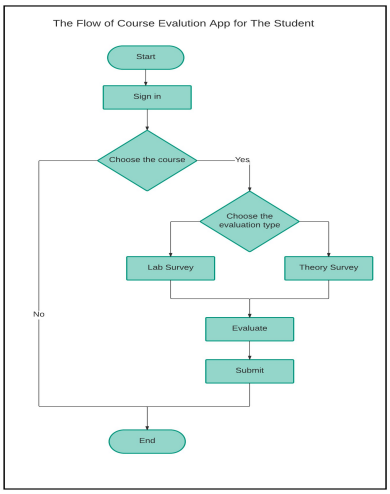

Fig. 8 Flowchart of the student model

Figure 9 shows the flowchart of the management through the Web-based System of ECES. The students should sign in to the Web-based System of ECES in order to use the system. They can access the system's data and the evaluation result.

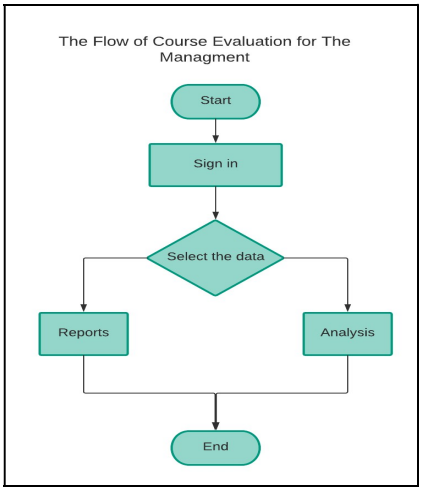

Fig 9. Flowchart of the management model

ECES aims to provide a real solution that saves resources like time is taken and effort. It also provides accurate results of the evaluation of the courses, makes it easy for the dean to access the results, makes it easy for the students to evaluate their courses and their assigned instructors, and increases the student's level of participation in the process of courses evaluation. ECES is implemented to:

- Be able to perform several functions that serve the students and the quality assurance office members.
- Save many resources like time taken to do the evaluation of the course, time is taken to deliver the result, and the huge number of papers that used for the evaluation.
- Make an analysis and generates an accurate and trustworthy result for the evaluation of the course.
- Be easy to be used by the students and has a user-friendly interface.
- Provide the students with their privacy by only allowing the dean/management to view the result.
- Provide quick access and quick use of the result that the system generates.

6. Results and Discussion

This section shows the ECES system with its corresponding design and results. The users have to choose whether they are admin, faculty or management in order to be directed to their login page to provide their username and password to have access to their profiles. The users are provided with the ability to reset their passwords if they forgot their passwords.

The admin page enables the admin to perform all its own operations like importing the data in a form of excel sheets into the database. Performing the four basic operations which are inserting, updating, selecting and deleting the database's records. Cleaning the database records and activating and deactivating the ECES. Figure 10 shows the activation/deactivation page.

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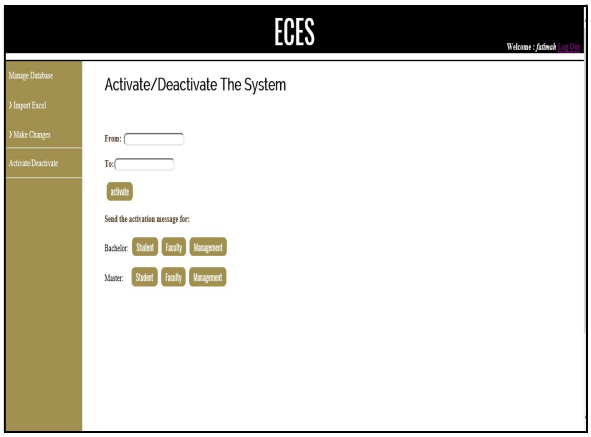

Fig. 10 Activate/Deactivate page of the ECES

The students need to have an access to the ECES in order to be able to evaluate their registered courses and assigned instructors. The activation message that the admin sends for the students when the evaluation period is on inform the students about downloading the ECES App from the Play Store in order to be able to evaluate their registered courses. The students need to have the ECES App installed on their smartphones as shown in figure 11.

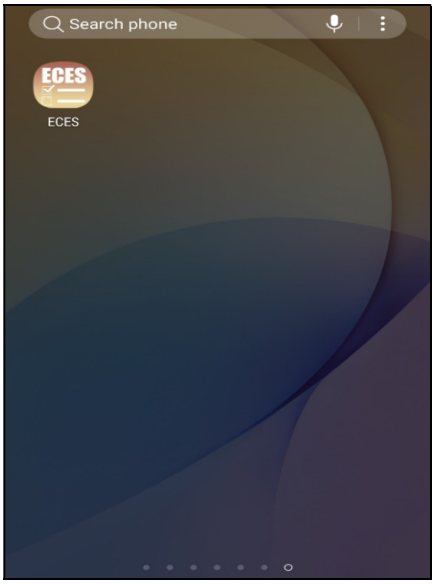

Fig. 11 ECES Application

The ECES application will redirect the students to their home page where they can view their registered courses see figure 12. The students can choose to evaluate the theory classes of a particular course by clicking on theory that will redirect the students to the theory survey. Also, they can evaluate the practical classes by clicking on practical that will redirect them to the practical survey. The students have to evaluate both the theory and the practical classes of the courses in order to be done with the evaluation. In case that some courses have only theory classes, only theory surveys will be there for the students to access, and the students will only be required to evaluate the theory classes of these courses.

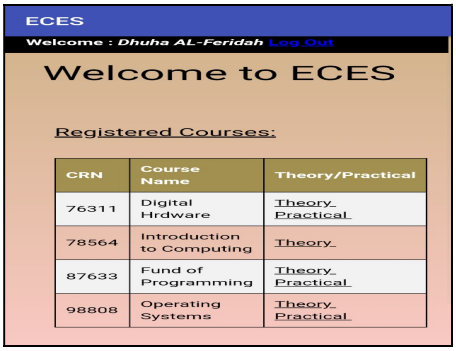

Fig. 12 Student's Home Page of the ECES Application

After choosing to evaluate a particular course, the system will open the evaluation form for the students to enable them to evaluate and send their evaluation to the database, see figure 13. In the evaluation form, the system defines the student's information like name and ID number. Also, the system defines the course details like the course number, course name, and instructor name.

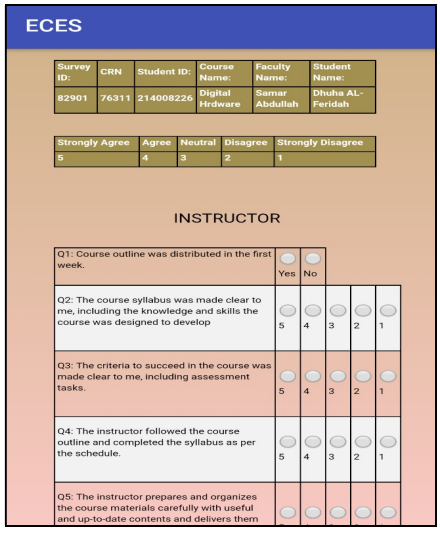

Fig. 13 The evaluation form page of the ECES Application

The ECES application places a true green sign beside the courses that the students finished evaluating and prevent the students from visiting the survey page of these courses again as shown in figure 14.

If the students try to go back to the evaluation page to try to submit different responses multiple times, the system will reject the other duplicated responses. It will redirect the students to a page that informs them that they cannot submit multiple responses, and they are only allowed to submit one response per the course.

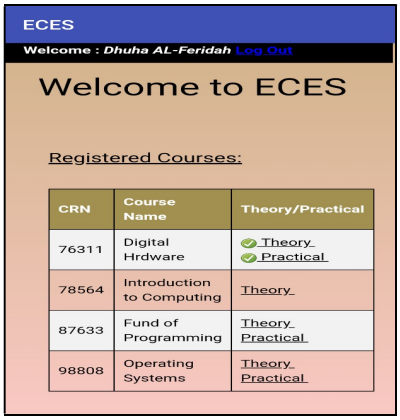

Fig. 14 Home page with some evaluated courses of the ECES Application

There is a hierarchy for the management in the ECES web-based system. There are department-level managers and a dean. The department-level managers can only view the result and the analysis of their department's courses only. On the other hand, the dean can view the result and the analysis of all the courses.

The dean/management needs to access the system and view the result of the courses. After the dean/management access their page, they will be able to choose a particular course to view its result. After choosing a course, the system will ask the dean/management to choose a particular section of the chosen course to view its result. Then the system will do analysis and show the result of the theory and practical classes of the chosen section on 3D charts for the dean/management see figure 15.

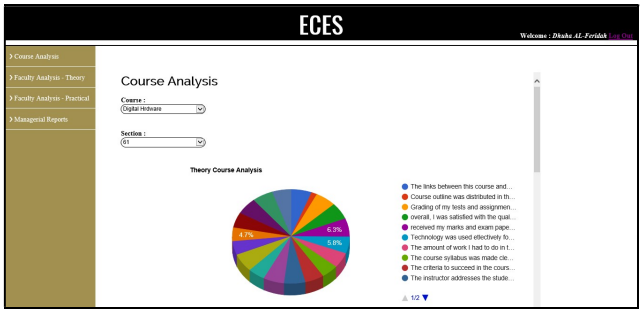

Fig. 15 Course analysis of the ECES

The dean/management can access the rate of success of faculty members in theory classes and practical classes. The system calculates the rate of success of all the faculty members and shows the result for the dean/management. In order to calculate the rate of success of the faculty members, the system calculates the rate of success of the courses that the faculty members teach. The ECES calculates the rate of success of the colleges based on the faculty member's rate of success see figure 16 and figure 17.

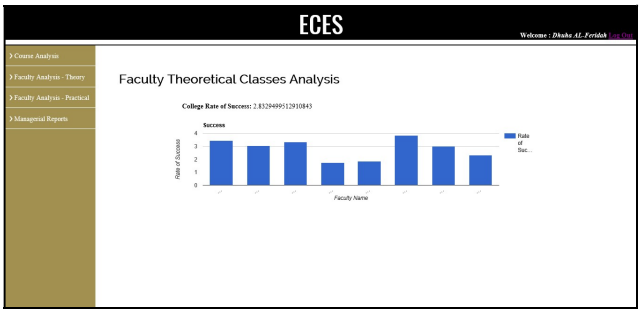

Fig. 16 Theoretical classes' rate of success of faculty member's page of the ECES

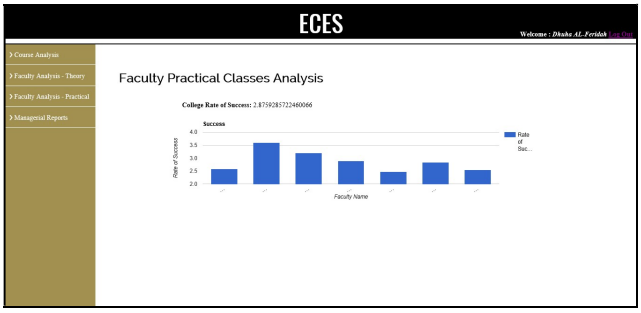

Fig. 17 Practical classes' rate of success of faculty member's page of the ECES

The faculty members have to choose a course to view its result by clicking the view option. After clicking the view option, the ECES web-based system will redirect the faculty members to the course analysis page where they can view the result and the analysis of the particular course that they chose to view its result see figure 18.

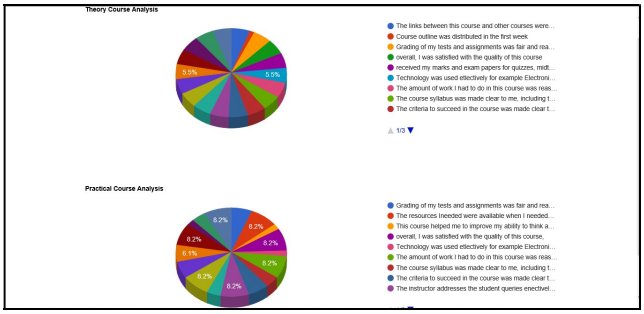

Fig. 18 Faculty member's courses analysis page of the ECES

6.1 Research Achievements:

The admin, dean/management, faculty members, and students can sign into the system and interact with the system. The admin is able to manage the system and the

database. The admin can activate and deactivate the evaluation period. The admin can insert data into the database in a form of excel sheets. The admin can perform the basic database operations on the database records. The dean/management can view the results and the analysis of the course evaluation in their pages. The students can view their registered courses and evaluate the theoretical and practical classes that they are enrolled in. The faculty members can view the result and the analysis of the courses that they teach. These all support one of the expected outcomes, which is the one that says the system will be able to perform several functions that serve the students and the quality assurance office members.

Once the evaluation period is on, the system will allow the students to evaluate their registered courses at anytime and anywhere. Once the dean/management wants to view the results and the analysis, the system will show the results and the analysis quickly within one click. This will save time and deliver the results quickly. No papers will be needed in order to facilitate the process of course evaluation. This supports the second expected outcome that says the system will save many resources like time taken to do the evaluation of the course, and time is taken to deliver the result and the huge number of papers that used for the evaluation.

Analyzing the evaluation results is one of the most important requirements where the dean/management can have access to the result and the analysis. The system generates trustworthy and accurate results. The system analyzes the course evaluation results and calculates the rate of success and measure the performance of the faculty members. The system calculates the college rate of success in the academic semester. The system allows the faculty members to view the result of the courses that they teach. This supports the third expected outcome that says that the system will make analysis and generate an accurate and trustworthy result of the course evaluation.

The system has a friendly user interface that makes it easy for the admin, dean/management, faculty members, and students to interact with the system. The system is implemented with simple and easy to interact with the interface. This supports the fourth expected outcome that says that the system will be easy to be used by the students and has a user-friendly interface.

Privacy is important where only the dean/management can view the result and the analysis. The result can be viewed on the dean/management page. The department-level managers will only be able to view the result of the subjects that belong to their departments and the common courses. On the other hand, the dean will be able to view the result and analysis of all the college's courses. Also, the dean/management will be able to view the faculty's rate of success and the college's rate of success. Also, the faculty members can view on their page the result of the courses that they teach. All people who have access to the result and analysis are authorized. This supports the fifth expected outcome that says that the system will provide the students with their privacy by only allowing the dean/management to view the result.

The dean/management can have access to the result and analysis quickly. The system, clearly displays the results, and the way to access the result and analysis is simple. This supports the last expected outcome that says the system will provide quick access and quick use of the result that the system generates.

7. Conclusion

Mistakes and Errors can be found in everything, everywhere, even in human beings. They existed to lead us to be better as it is for course evaluation. Course Evaluation in some colleges is being done manually today, which is considered to be imperfect. For this reason, this research aims to design and develop such a system which may address the stated issues, safe time efficiently and produce better results while using minimal available resources. ECES system helps in improving the process of course evaluation of the colleges. The team members understand how much this system is important and how much the colleges need it.

The ECES can be opened for a specific period for the students to evaluate their registered courses and assigned instructors. The ECES can generate an accurate and trustworthy result of the course evaluation and can give access for the management and faculty members to the result. ECES can calculate the rate of success of faculty members in the theory classes and in the practical classes. ECES can calculate the college rate of success in the academic semester. ECES can generate managerial reports that contain the information of the students who did not evaluate their registered courses.

8. Future Work

The ECES is completely implemented. Both the web-based system and the android-based mobile app are implemented, and their expected outcomes are achieved. We implemented all the functionalities and achieved all the ECES outcomes. For the future, there are some work that can be done for the ECES. IOS-based mobile app can be developed to do the same functionalities that the android-based mobile app does. Also, the system can be expanded to provide analysis for master courses in the colleges.

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