

## Automated Student Advising: An App for Greater Efficiency

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### Abstract

*One of the attributes of open and distance e-learning (ODEL) is its adoption and deployment of ICTs. This attribute sits at the very core of ODeL. Thus, quality in ODeL means adequate augmentation of its academic and administrative processes with innovative applications. To administer the conduct of student thesis in the ODeL context where there are many students, an efficient system of assigning research topics to appropriate thesis advisers is required. This paper documents the development and application for academic advising developed by the Faculty of Information and Communication Studies (FICS).*

### Introduction

One of the attributes of open distance e-learning (ODEL) is its adoption and deployment of information and communications technologies. This attribute sits at the very core of ODeL. Thus, it has been argued that quality in ODeL means adequate augmentation of its academic and administrative processes with innovative applications. One such process is academic advising.

Constituting a graduate advisory committee is one of the foremost significant steps a student should accomplish in the initial semesters of a program. One of the adviser's main roles is to assist his/her advisee in identifying the courses they should be taking throughout a program curriculum. The adviser, together with the panel members, help devise and refine the students' theses/dissertations.

Under the Doctor of Communication (DComm), Master of Development Communication (MDC), and Bachelor of Arts in Multimedia Studies (BAMS) programs of the UPOU FICS, students need to choose an adviser and panel committee among the faculty members. They are encouraged to select those who possess substantive and methodological expertise aligned with their area of interest or proposed thesis or dissertation topic.

The DComm and MDC program formerly conducted a face-to-face topic presentation every semester. This aimed to facilitate the students' nomination of advisers and panel members. BAMS faculty members used to meet physically to appoint students' advisers based on the topics the students submitted through the system.

The abolishment of the old practices stated above was concurrent with the curricular changes in BAMS' Special Project course (MMS 200), MDC's Thesis course (DEV 300) and DComm's Dissertation course (Comm 400). Students are now required to take one-time enrollment of the

course (12 units for DComm and 6 units for MDC), unlike the previous practice where students distribute the total units into multiple semesters.

To address the concerns regarding the nomination and designation of the committee, FICS has developed an automatic online advising system called *Online Advisory Committee (AdCom) App*.

### **Benchmarking**

UPOU-FICS, in its commitment to spearhead the evolution of integrated information and communication studies in Southeast Asia, continues to discover ways to provide better services for the students as well as to improve and upgrade the consultation system of faculty members to maximize their time use. The development of the AdCom app is one of the highly encouraged endeavors aligned with this commitment.

Many related works of literature about the development of Academic Advising Systems for Higher Education Institutions are now available thus presenting the importance of addressing the rapidly expanding needs of students for an efficient and satisfactory quality of academic advising. “Good advising yields a good outcome in terms of understanding, planning, and applying strategies for academic success, while bad advising will be frustrating and may have a damaging effect on students’ progress” (Daramola et al., 2014, p.6). They implemented an intelligent Course Advisory Expert System (CAES). Though not used primarily for committee selection, this design used a combination of rule-based reasoning (RBR) and case-based reasoning (CBR) to generate appropriate recommendations based on the student’s academic history. This resulted in satisfactory performance in terms of “credibility of its recommendations and usability”.

A similar system was developed by Ghamdi et al. (2012) which proved that the intelligent computer systems technology to support the academic advising process is “promising in which it assists the student needs in the field of Information Systems (IS) major in selecting their courses for each semester towards the academic degree”(p. 4529).

Various projects were already conducted to improve the information systems within campuses and universities in the Philippines. These include the invention and innovation of online scheduling system (Alcid, 2010; Marquez, 2018); online enrollment system (Abenoja, 2006; Quintos, 2014); online grading system (Duran, 2011; Sumile, 2014); online examination (Castillo-Ramonan, 2006); online faculty profiling system (Esguerra, 2011); a school-based clinical information system (Ibarrientos, 2012); and, a web-based payroll information system (Vibar, 2012), among others.

### **Development of The AdCom Apps for ODeL**

These previous studies revealed the insufficiency in Philippine-based studies about online advising in the ODeL education system. Thus, this paper aims to contribute to the knowledge in the development of online academic advising systems.

### **Features and Functionalities**

The Advisory Committee (AdCom) Application was developed to address some problems encountered during the previous process of advisory committee designation. This automated student advising system provides a more efficient system of academic advising to address the difficulties faced by the UPOU students, faculty members, and support staff especially in record-

keeping, management of the faculty load, reduction of human errors, and immediacy of response. Thus, the following features and functionalities were incorporated:

1. enables the students to select their advisory committee online;
2. enables the students to familiarize themselves with all the faculty members by including photos, names, and research interests and specializations in the user interface;
3. enables the faculty to accept or decline the nomination through an automated email sent after the student has nominated the faculty member;
4. implements a “quota” filter in the system, which would take into consideration the availability and load equity among the faculty members; and
5. automatically generates Form 1 (Nomination and Designation of Dissertation Committee Form) for record-keeping.

### **Design and Development of the AdCom**

There is an immediate need to deliver the basic functionalities of the AdCom App to keep up with the newly implemented curricular changes in BAMS, MDC, and DComm. Thus, the Iterative Incremental Model was employed as a framework for the development of the application (see Figure 1). User categories and system requirements were first identified. Then the process proceeded to Analysis, Design, Coding, and Software Iterations.

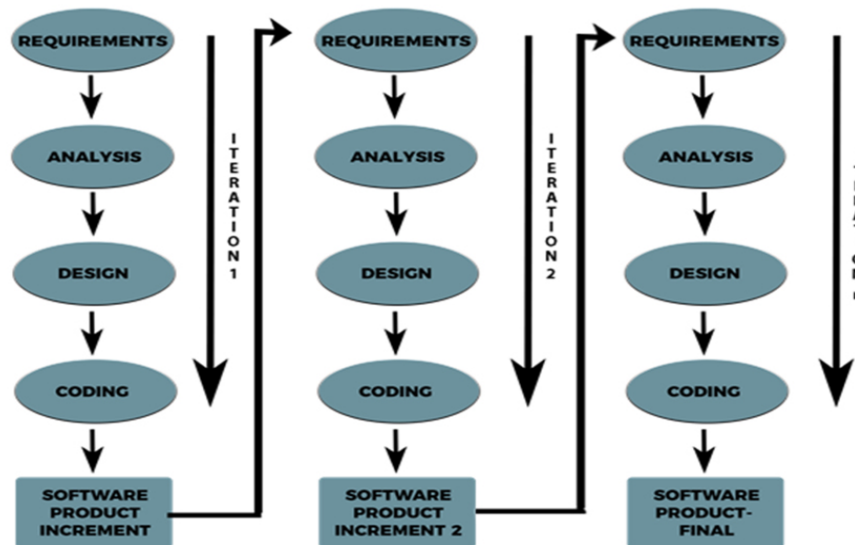
FICS determined the basic and most prioritized requirements for the automatic advising system. The layout of the interface was analyzed and created based on its most prioritized use. It is important that the layout be user-friendly and straightforward, considering the users who range from millennials, generation X, to Baby Boomers. The software developer then started building the application. After the system was ascertained to be in a deliverable state, it was partially and initially implemented so the enrolled students could make use of it early in the semester.

The system is continuously being developed based on the issues encountered throughout the deployment period and the feedback from students and faculty members. New requirements were then determined to resolve the issues that came up. These requirements are expected to evolve over time. The process is then repeated to deliver the software product increment.

As the application is currently on its beta-testing period, this process or iteration is and will be repeated throughout the length of the development schedule.

**Figure 1**

*Iterative Incremental Model*



**Classifying Users and Characteristics**

Users were classified into 3 categories: Student, Adviser, and Administrator. Each user category can perform tasks differently from one another. Students may only access the welcome page where they will select their preferred advisory committee members in order of preference. Once accepted by a chair, they will receive an automated email containing the details of their final committee. Advisers will receive an email that contains a link directing to the page where they can accept or decline a student’s nomination. The administrator, who oversees and manages the system, is the only one that can log in to the website.

**Table 1**

*User Classes and Characteristics*

User	Key Functions and Features	Requirements
Student	<ul style="list-style-type: none"> <li>Text fields to input student information</li> <li>Selecting committee members from a list of advisers (name, picture, and specialization)</li> </ul>	<ul style="list-style-type: none"> <li>Method for extracting and processing data from the form</li> </ul>
Adviser	<ul style="list-style-type: none"> <li>Declining a student’s nomination by clicking a button</li> <li>Accepting a student’s nomination by clicking a button</li> </ul>	<ul style="list-style-type: none"> <li>Method for processing the adviser’s decision</li> <li>Method for determining the validity of the link</li> </ul>
Administrator	<ul style="list-style-type: none"> <li>Edit the maximum number of advisory committees an adviser can chair</li> <li>Restrict the form registration only to a specified set of students</li> </ul>	<ul style="list-style-type: none"> <li>Method for validating the syntax of the student numbers</li> <li>Method for changing the site preferences (access, restriction, quota)</li> </ul>

User	Key Functions and Features	Requirements
Administrator	<ul style="list-style-type: none"> <li>■ Turn off or on the form access</li> <li>■ CRUD of the student and advisers</li> <li>■ Generate Form 1 for all students that submitted the form after the specified date.</li> </ul>	<ul style="list-style-type: none"> <li>■ Method for adding, editing, and deleting a student</li> <li>■ Method for adding, editing, and deleting an adviser</li> </ul>

### **Identifying the Tools Used**

The following are the software applications and tools used in developing AdCom:

- PHP 7.0.30-ubuntu0.16.04.1 for performing server-side operations.
- Laravel Framework 5.5 as the PHP framework.
- MySQL Ver 14.14 Distrib 5.7.23 as the database management system.
- Supervisor v 3.2.0 for monitoring jobs that will send emails.
- Crontab for checking for expired links every hour.
- DomPDF for generating the PDF file containing the Form 1 of students.
- DataTables for styling the tables of students and advisers.
- HTML5 for creating web pages.
- CSS and Bootstrap v3.3.7 for styling the web pages.
- Javascript and JQuery for performing client-side operations.

A README is included in the source code folder for setting up in other computers.

### **Identifying Functional Requirements**

The following list offers a brief outline and description of the main functionalities and features of AdCom.

- As a student, register and select their advisory committee
- Check the availability of the choices and send an email to the chair
- As a chair, decide whether to accept or decline a nomination
- If the nomination is accepted:
  - Send an email to the student and committee members
  - If the adviser has reached the quota, decline all other nominations automatically
- If the nomination is declined:
  - Assign a new chair from the other choices, or generate a random Chair
  - Send an email to the new chair

### **Identifying Additional Functions**

- Admin functionalities
  - CRUD (create, read, update, and delete) Student & Adviser
  - Turn off/on form access
  - Restrict student access (using student numbers)
  - Edit the maximum number of advisory committees an adviser can take
  - Generate Form 1 of students

- Check for expired links/nominations (3 days validity) - if a link has expired, it will automatically decline the nomination
- Raise the quota if the last available adviser rejected the student.

### Determining the Quota

The upper limit of the number of advisees per adviser was determined based on the number of active students over the total number of the faculty who are qualified to Chair a committee.

### Design

Figure 2

Flowchart for Choosing an Adviser

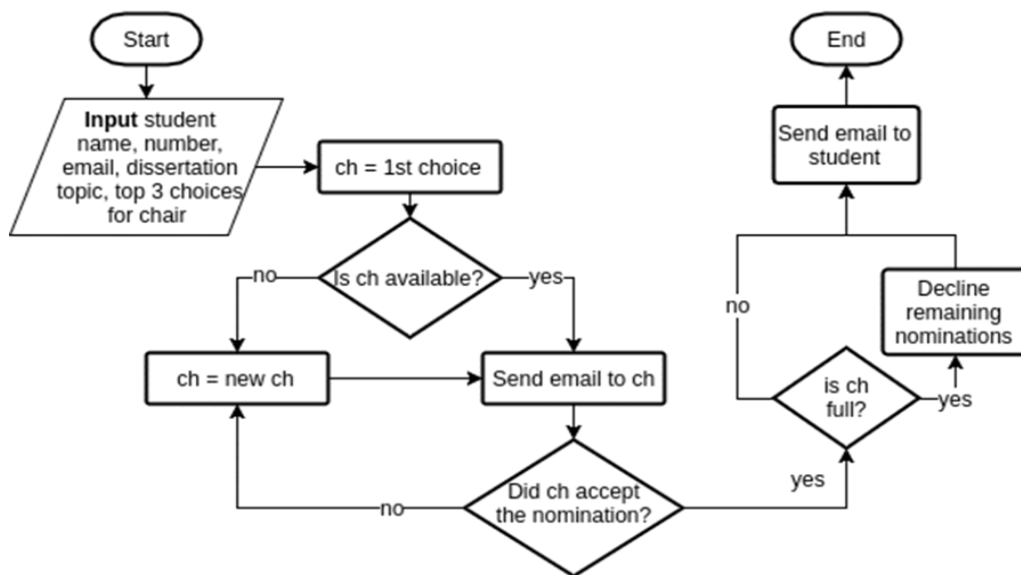
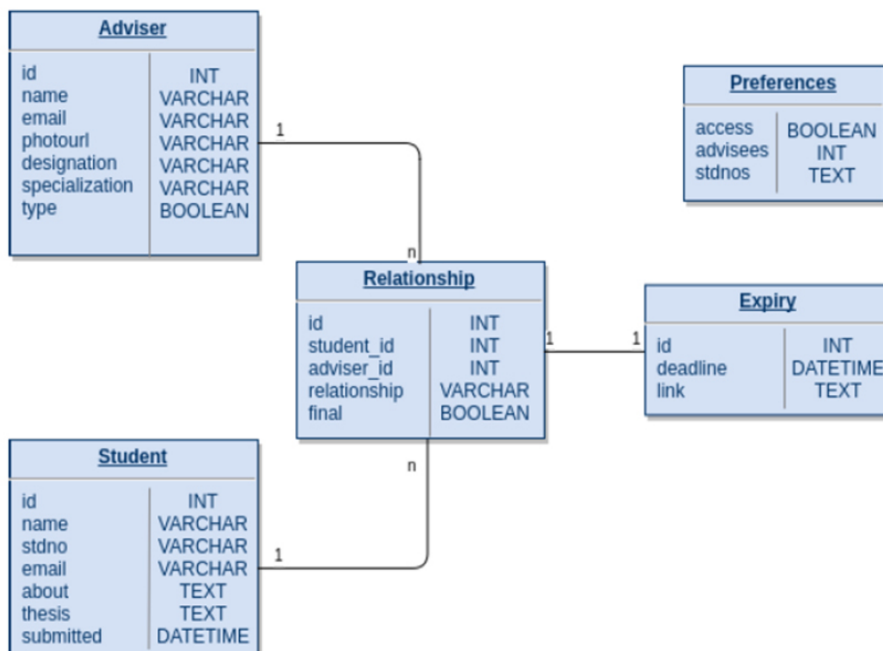


Figure 3

Database Design



## System Features

- Register
  - Lets the student register and select their advisory committee
  - Functional Requirements
    - The form will not submit if there is an error in the input: if there is a blank field or 2-3 panel members are the same.
    - The system will generate an error if the student number is not included in the list of allowed student numbers or has already been registered.
    - If there are no errors, an email will be sent to the chair.

**Figure 4**

User interface of the form with valid input

The screenshot shows a registration form with the following fields and values:

- Full Name:** Juan Dela Cruz
- Student Number:** 2013-12345
- Email Address:** jdelacruz@gmail.com
- Thesis Topic:** Lorem Ipsum: Dolor sit Amet Consectetur Adipiscing Elit
- Master's Degree:** MS Development Commun 2013
- University:** University of the Philippines Los Baños
- Chair/Adviser:** A list of three names: Flor, Alexander G, PhD; Libro, Felix R, PhD; Maranan, Diego Silang C, PhD.
- Submit:** A red button at the bottom.

**Figure 5**

User interface of the modal window with available adviser

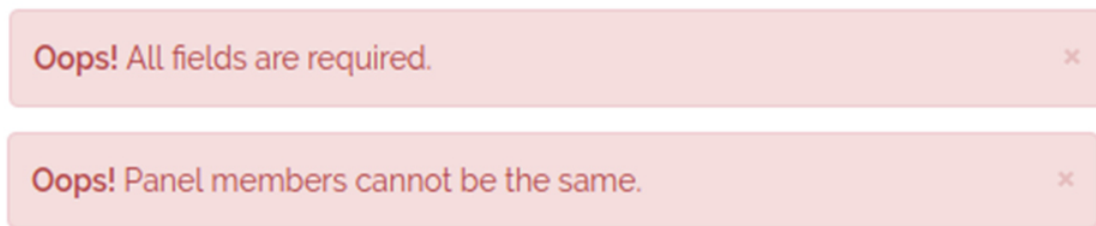
The grid displays the following advisers and their details:

<p><b>Alfonso, Grace J, PhD</b> Film and Media Studies, Gender</p>	<p><b>Bandalaria, Melinda D, PhD</b> Advocacy &amp; Social Mobilization, CSR, Communication</p>	<p><b>Borromeo, Rita Mae, PhD</b> Data Engineering, Crowdsourcing Process Management, Includ Human-Computer Systems, Knowledge Discovery in Databases</p>
<p><b>Flor, Alexander G, PhD</b> Environmental Communication, Knowledge Management (KAM), Med Methods Research</p>	<p><b>Flor, Benjamina G, PhD</b> Governance, Communication, Monitoring and Evaluation</p>	<p><b>Jamias, Sertie B, PhD</b> Network Analysis, Qualitative Methods</p>
<p><b>Lumanta, Melinda F, PhD</b> Organizational Communication, Knowledge Management</p>	<p><b>Maranan, Diego S, PhD</b> Interaction and Design, Human-Computer Interaction, Embedded Digital, Web-based Technologies and Semantics</p>	<p><b>Pernia, Elena E, PhD</b> Communication Research</p>
<p><b>Saludarez, Jean A, PhD</b> Agency Framework in Organizational Communication Research</p>	<p><b>Dall'Agata, Davide, D.Comm.</b> Strategic Communication, Communication and Global Security, Social Media, Tools for Political Communication, Communication and Intelligence, New Media and Psychological Operations</p>	

- The form with valid input (Fig.4) welcomes the users visiting the site. If the Choice 1 Button is clicked, a modal (Fig.5) with the available chairs will appear.
- If a chair cannot be selected (the button is disabled), it means that he/she cannot accept any more nominations for chair.
- If the Choice 2 or 3 Button is clicked, any faculty member may be selected.
- The two alerts below (Fig. 6) will be displayed at the top of the form if there is any invalid input. An alert can be dismissed by clicking the x on the right.
- The student will then see if their registration has been processed successfully (Fig. 7).

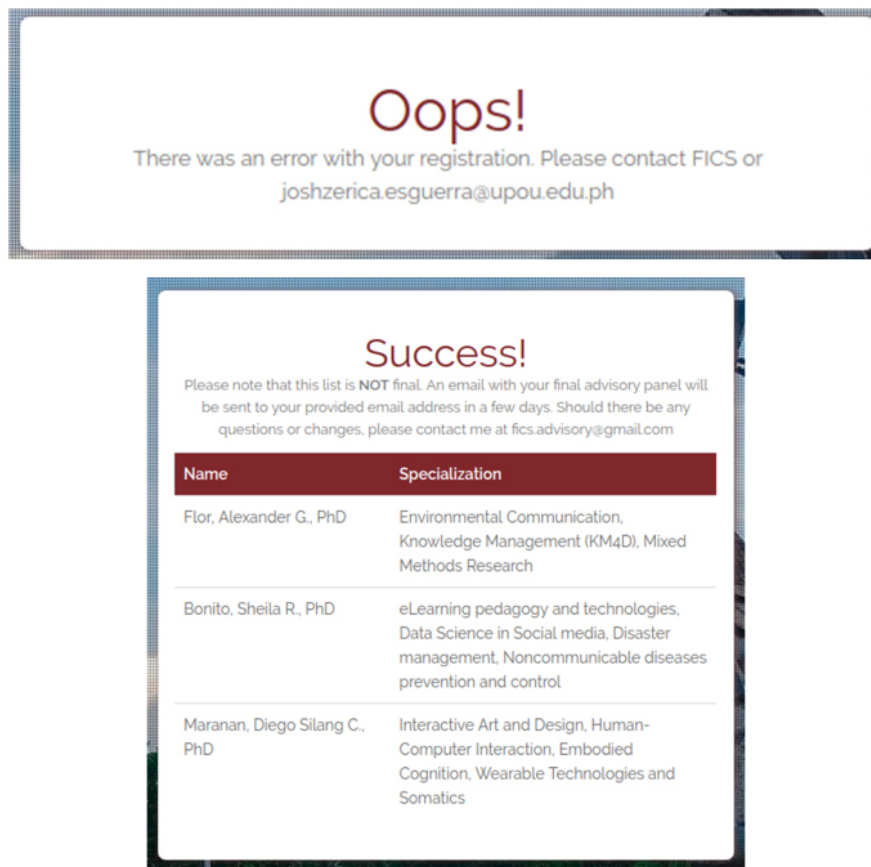
**Figure 6**

Display alerts



**Figure 7**

Display of error or confirmation of success



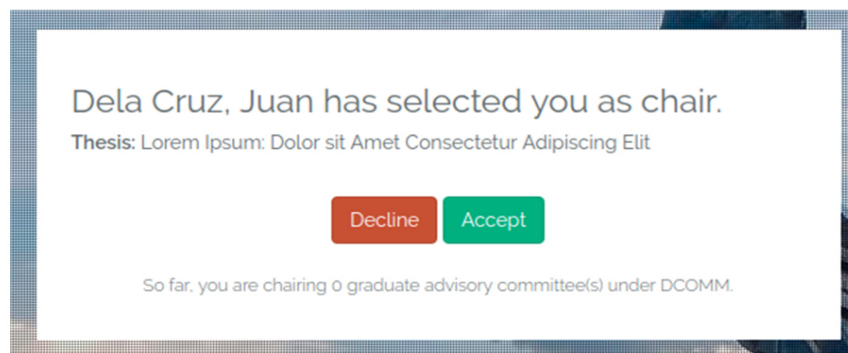
- **Accept Nomination**
  - Lets the adviser accept a nomination by clicking the button on the page that was sent to their email.



- If the link has expired, the adviser has reached the quota before the button is clicked, or the adviser has already accepted/declined the student, the system will not process the decision.
  - If the adviser reached the quota after accepting the nomination, all other students that nominated the adviser will be declined.
- **Decline Nomination**
    - Lets the adviser decline a nomination by clicking the button on the page that was sent to their email.
    - If the link has expired or the adviser has already accepted/declined the student, the system will not process the decision. A new chair will either be selected from the other committee members or randomized.
    - Members that have already rejected the student or cannot serve as a chair will not be selected.
    - If the adviser is the final available chair but he/she has already filled the upper limit, then the quota will be raised.

### Figure 8

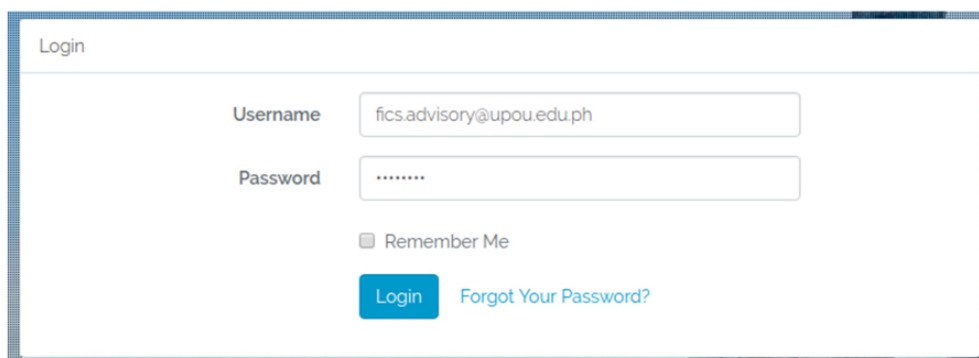
User interface for Accept/Decline Nomination feature



- **Login**
  - Lets the system administrator log in to the site.
  - Only the admin will be able to log in. There will be no user registration, and the admin was added when the database was seeded.

### Figure 9

User interface for Login feature



- **Change Preferences/Settings**
  - Lets the system administrator restrict or turn off/on the access and set the quota for chaired committees.
  - Keeping the student numbers field blank will not restrict the access, and allows all students to submit the form.

**Figure 10**

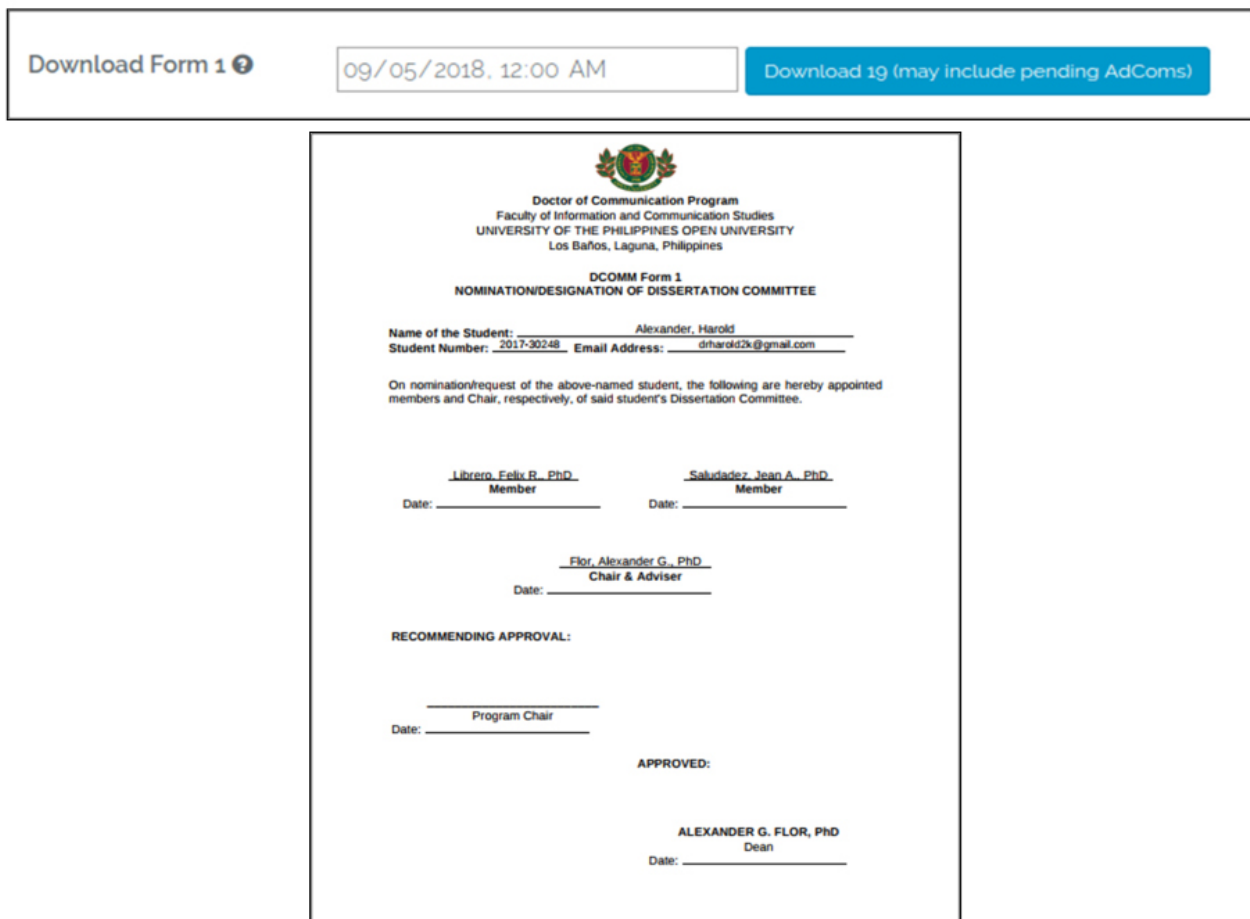
User interface for Change Preferences/Settings feature



- **Generate Form 1**
  - Lets the system administrator generate and download the PDF file containing the Form 1 of all students that submitted the form after the specified date and time.
  - The admin can filter the students using the datetime input.

**Figure 11**

User interface for Generate Form 1 feature



- **CRUD a Student**
  - Lets the admin view, add, update, or delete a student.
  - The list of students is displayed in a DataTable wherein the user can sort or search the data. When the admin clicks on a student (table row), a modal, or a pop-up message, containing the student’s information will open. The admin can edit the information or advisory committee, but this will automatically mark the committee as final and is not subject to the availability and agreeability of the Chair. The admin can also delete a student using a button at the bottom of the modal.
  - A student may be added by clicking the green + button at the top right of the section. This is also not subject to the availability and agreeability of the chair.
  - The red trash button beside it will allow the adviser to delete all students and advisory committees.
  - A student row that is red means that they are not yet accepted by the chair (See Fig. 12 below)

**Figure 12.1**

User interface for CRUD a student feature

Name	Student Number	Topic	Chair	Member 1	Member 2	
Esguerra, Joshze Rica	2013-45829	Lorem	Bandalaria, Melinda dP, PhD	Bonito, Sheila R, PhD	Alfonso, Grace J, PhD	2018-08-28 12:01:38
Villamor, Graceal	2013-68249	Sed varius semper vestibulum.	Serrano, Joane, PhD	Bonito, Sheila R, PhD	Bandalaria, Melinda dP, PhD	2018-08-28 13:15:07
Tomagos, Angeli Mae	2013-54892	Sed varius semper vestibulum Sed varius semper vestibulum.	Alfonso, Grace J, PhD	Bandalaria, Melinda dP, PhD	Portus, Lourdes M, PhD	2018-08-28 13:15:39
Lawas, Leanseay	2013-74923	Sed varius semper	Librero, Felix R, PhD	Bandalaria, Melinda dP, PhD	Pernia, Elena E, PhD	2018-08-28 13:27:43
Mendoza, Almer	2013-43908	Sed varius semper vestibulum.	Suva, Madeline M, PhD	Pernia, Elena E, PhD	Bonito, Sheila R, PhD	2018-08-28 13:31:36

Showing 1 to 5 of 9 entries

**Figure 12.2**

User interface for CRUD a student feature

**Student**

The student and will be added directly to the database without considering the availability and agreeability of the chair. Do **not** edit a student that has not yet been accepted (marked as red).

Full Name

Student Number

Email Address

Thesis

Master's Degree

Chair/Adviser

**Student**

The student and will be added directly to the database without considering the availability and agreeability of the chair. Do **not** edit a student that has not yet been accepted (marked as red).

Full Name

Student Number

Email Address

Thesis

Master's Degree

Chair/Adviser

- *CRUD an Adviser*
  - Lets the admin view, add, update, or delete an adviser.
  - The list of advisers are displayed in a DataTable wherein the user can sort or search the data. When the admin clicks on an adviser (table row), a modal containing the adviser’s information will open.
  - The admin can edit the information but cannot upload a new picture.
  - The admin can also delete an adviser using a button at the bottom of the modal.
  - An adviser may be added by clicking the green + button at the top right of the section.

**Figure 13.1**

User interface for CRUD (Create) an Adviser feature

**Add Adviser**

Full Name: Last Name, First Name

Designation: Instructor/Professor/Associate

Email Address: jdelacruz@upou.edu.ph

Specialization:

Can be panel chair?  \* check if yes

Display Picture: Choose File No file chosen  
Please use a SQUARE photo.

Add

**Figure 13.2**

User interface for CRUD (Update, Delete) an Adviser feature

**Edit Adviser**

Full Name: Flor, Alexander G., PhD

Designation: Professor

Email Address: flora@nada.email

Specialization: Environmental Communication, Knowledge Management (KM4D), Mixed Methods Research

Can be panel chair?  \* check if yes

Update Delete

## Implementation and Iterations

### Communication

Once the application has been created and was deemed deliverable, it was a crucial part to communicate the information of its deployment to the users: students and advisers. This was done through emailing the list of the students regarding its deployment, its link and further instructions on how to login.

### **Progress Monitoring**

Since the user interface of the admin shows the list of the students, their topic, chosen chair and members, it would be easy for the admin to monitor the progress of the responses in the app. An email reminder would be sent to those who still have not responded.

### **Troubleshooting and Risk Management**

Communication between the students, faculty members, and the admin is done through email. An automated email is sent to the students and the faculty members displaying contact information of the admin.

### **Iterations**

As soon as the problems have been identified through users' feedback, the developer is now ready to identify new requirements needed for the system. Then the process of developing the software iterations will begin again.

### **Application and QA Implications**

AdCom is geared towards improving the quality of student support in UPOU-FICS, particularly for students who are in the last legs of their coursework. As a response to the difficulties faced by the users (students, faculty members, and the support staff) in designating an advisory committee for each student, this automated student advising system provides a more efficient and substantial systemic change in academic advising processes, especially in record-keeping, management of the faculty load, reduction of human errors, and immediacy of response.

This technology-enabled system of academic advising provides a more convenient method of student support. The students have the liberty to choose the advisory team that will suit their needs, with the information already at hand. This maximizes the resources available, and the paperless record-keeping system allows for a more sustainable practice.

The accept or decline feature sent to the email of the faculty members enabled the faculty to weigh their advising load. The implemented quota system—determined by the number of active students over the number of advisers, took into consideration the availability and load equity among the faculty members. However, an additional feature could permit the admin to raise the quota if the last available adviser rejected the student. Finally, to formalize the nomination of the student to their committee panel, AdCom enabled the admin to generate a physical copy of form 1 or the *Nomination and Designation form*.

Overall, the AdCom app was able to deliver its main function to enable the students to choose and formulate their thesis/dissertation committee online. The user interface included the names, photos, and area of specialization of each FICS faculty member to help them choose an adviser who can be complementary to their thesis/ dissertation topic.

However, future efforts are still needed to be done. This best practice initiative needs to be continuously improved to adapt to time and the current needs of the UPOU students and faculty members. The AdCom application is still in its beta-testing period and is expected to have more iterations in the future. Thus, the following follow-up studies and additional features for

application upgrade are suggested: A study about the evaluation of the AdCom application by the users (students and faculty members) should carry through to have further information of the issues which came up throughout the process and identify ways to resolve it; automated computation of the upper limit to determine the quota for each faculty member should be developed; automatic maintenance of the database should be developed; further iterations should be analyzed to upgrade the software from its basic features (i.e. Using Gale-Shapley algorithm or “Stable Matching” method which guarantees a stable and most apt matching between the adviser and advisee with regard to the student’s topic and the adviser’s area of specialization) (Ishida & Ikeno, 2016); and inclusion of the advisers’ comprehensive details regarding their area of specialization and research interests. The app may also include their educational background to better help the students decide on their choice of committee.

The AdCom app serves as a more efficient alternative solution to the usual problems of an open and distance education system. Quality performance will be better with the use of this application. The implementation of this practice would not only augment the student-adviser relationship in UPOU but would also contribute to the development of an efficient academic advising system in other HEIs.

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