WEB-BASED UNDERGRADUATE ACADEMIC ADVISING SYSTEM

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Abstract ¾ Web advising for students is gaining popularity in recent times among Universities. Academicians are contemplating to introduce this for various benefits although only few Universities have Web-based advising system at present. The department of Computer Science and Engineering at Florida Atlantic University are working on a project that integrates conventional advisor advising and Web-based advising to form a student-centric advising model to engage undergraduate students actively in their education process. The primary focus of the system is to provide educational planning and advising resources in support of student's academic objectives. The system's goals include: to minimize repetitive tasks performed by advisors, to minimize inconsistencies in the advising process, and to encourage students to adopt a proactive attitude towards advising. A prototype of the proposed system has been developed and the system is in the beta test stage. Survey results from questionnaires answered by students and faculty advisors who have used this advising system show a very positive attitude toward the design, correctness, and usefulness of this system, including constructive comments and suggestions for future improvements.

Index Terms ¾ Academic advising, proactive advising, Web-based advising.

INTRODUCTION

Academic advising is an important and time-consuming task and different tools and techniques can be used to make it an effective and efficient process. Most of the process, however, relies on personal interactions between students and advisors, which leads to problems such as inconsistencies among different advisors and poor utilization of resources, since very often a good portion of the advisors' time is spent answering recurrent questions and solving trivial class scheduling problems. In response to these problems, the Department of Computer Science and Engineering (CSE) at Florida Atlantic University (FAU) has been working since 1999 on a project that supplements the conventional advising process with a Web-based advising system. The CSE department at FAU currently has approximately 700 undergraduate Computer Science (CS) and 300 undergraduate Computer Engineering (CE) students. Advising undergraduate CS and CE students is an important and time-consuming task in the department. To accomplish it effectively and efficiently several different

schemes have been tried in the past few years, ranging from totally distributed to totally centralized. Starting in the 1999-2000 academic year, the CSE department made another move by assigning all undergraduate advising to three faculty members. Two advisors share the responsibility for the CS students while the third is primarily in charge of the CE students. Other than adding more faculties to participate in the undergraduate advising, the department also welcomed innovative ideas that could help improving the efficiency of the advising process. One of these ideas was the creation and maintenance of a Web-based advising system for undergraduate CS and CE students, described in the remainder of this paper.

This paper is organized as follows: Next section surveys the current Web-based advising systems. The system architecture and implementation features are discussed in the next two sections, followed by the assessment of a prototype of the proposed system. The final section concludes the paper with some closing remarks.

RELATED WORK

Many universities have recently started to use the Web to help in advising. The following section shows the tasks some universities fulfill in their advising systems on the Web.

Indiana University: The Indiana Student Information Transaction Environment (INSITE) [1] is a Web-based service for Indiana University students, faculty, and staff. It provides secure access to student information. For students, access to information is protected by Student ID number (SIDN) and PIN. The following information is available through INSITE:

- To produce an advising report for a student's current major.
- To produce an advising report for a different major.
- To produce an advising report for a special purpose program.
- To produce an advising report for a program under development.
- To produce an advising report for a special purpose program under development.
- To generate a student transcript (course history).
- To see how in-progress courses apply to a student's advising report.

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Brigham Young University: The Student Planning System [2] at Brigham Young University (BYU) combines the benefits of College Advisement Centers and integrates other academic services including the use of the AIM system, Advisement by Computer (ABC) report, and faculty advising to provide direction and support to each student's academic progress. These resources are specifically geared toward addressing specific academic needs and contribute to the quality of each student's overall university experience. Route Y is the BYU's campus intranet. It is designed to be a secure and personalized information source for current BYU patrons. Patrons include current BYU students, faculty and staff. To help monitor students' general education and major progress, BYU has created the Advisement by Computer (ABC) report. Students can view and print their ABC report by using the Route Y AIM system.

California State University, Monterey Bay (CSUMB): CSUMB's Planner Web [3] for student advising is the first step in the Advising and Registration process for continuing and newly admitted CSUMB students. All undergraduates and second BA/BS candidates must submit their proposed schedule in order to register.

Duke University: Duke's Pre-Major Advising Center [4] doubles as a question site and an appointment site. Students can access advising FAQs and they can make appointments with their advisors.

West Washington University: The Academic Advising Center [5] at West Washington University provides academic advising that is one of the most important services students will receive. The process of academic advising is a shared responsibility where a student works with faculty and staff academic advisers. Freshmen are assigned a faculty adviser at orientation who serves until a major is declared.

North Carolina State University: The Advising Central [5] at NC State is designed to provide Web and Internet based advising to NC State undergraduate students. The goals of Advising Central are to:

- Make academic policies clear and meaningful for the students.
- Help students navigate through NC State's human resources to locate and secure advice from the most knowledgeable person in a particular field or college, and help students identify sources that will aid them in clarifying their academic direction and strengthening their academic skills.

In summary, there are currently many universities in the United States with Web-based advising systems at work. Most of the pages entitled *Web-based advising* are typically a bulletin board with advising-related announcements; a repository of official documents in PDF or HTML format; a collection of useful links that help students get official advising-related information off the Web; or a combination of those. They hardly include any scripts or Web server programs to process specific student information and produce customized advice for students. Indiana University

is an exception, but the Web system is only for advisors to get their advisee's information, it is not designed for students.

SYSTEM ARCHITECTURE

The logical structure of the Web-based advising system is a three-tier system. It consists of user interface, a Web server and back-end data. Tier one is user interfaces, which are supported by the Web browser. Users directly interact with the GUIs whose functionality is to collect users' input data for processing. Tier two is the processing logic part, which resides on the Web server. The Web server will interpret the information it receives from the browser, execute the commands and send the results back to the browser. Tier three is backend data, which are stored in the tables in the database.

The Web-based advising system is composed of three subsystems: the FAQ subsystem, the Course subsystem and the Advising subsystem. Each subsystem has its own set of functions and they are three-tier systems too. All the three subsystems can be accessed from the system main page, and from every other page of the system. Each subsystem consists of its own GUI, control programs and its own tables. The system structure is shown in Figure 1.
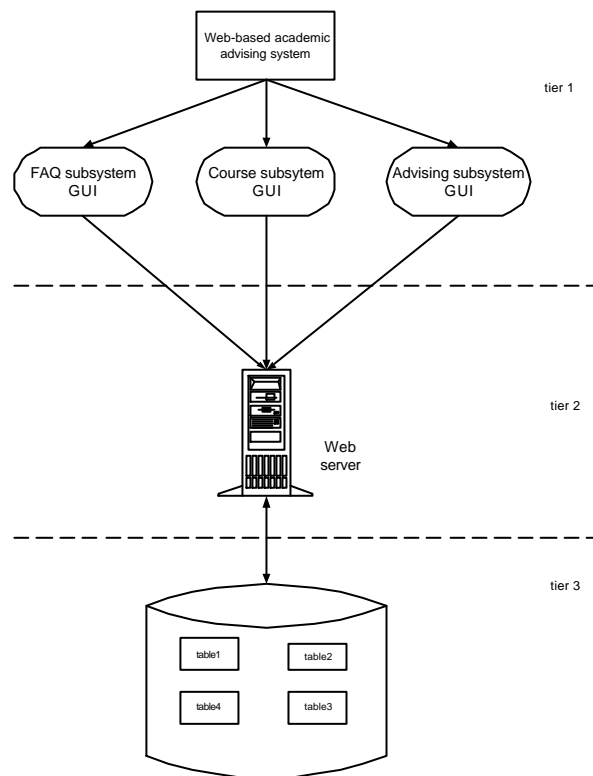

FIGURE I
THREE-TIER SYSTEM ARCHITECTURE

THE FAQ SUBSYSTEM

The FAQ (Frequent Asked Question) subsystem is a system that maintains a list of FAQs of undergraduate student advising. Students can view the FAQs, which are stored in the database while secretaries and advisors can edit them. Since questions may change when university requirements change, an editing tool to help the FAQ maintainers to update relevant FAQs is thus needed. This subsystem is designed for those who are not familiar with HTML to finish all tasks easily and conveniently.

Students can access to the system's main page, and then a top link will guide them to the FAQ page, which includes all the FAQs for both Computer Science and Computer Engineering students. If they have any questions, they can click a button to send an email to their advisors directly. The email gateway will provide them quick and satisfactory service for contacting their advisors without leaving the Web browser.

Advisors can browse the FAQs the same way as students do. And they can also login to a user interface, which is designed specifically for them. It is very straightforward for them to add, delete and update target FAQs.

THE COURSE SUBSYSTEM

The Course subsystem is a system similar to the FAQ subsystem. However, it is used by advisors or administrators who will maintain the course information. Students do not have privileges to go directly into this subsystem. This system is dedicated to support the Advising subsystem. Therefore the students use the Course subsystem indirectly by getting advised. The main functionality of this system is to maintain the information of all the courses that the undergraduate Computer Science and Computer Engineering students need to take, including core courses, electives, prerequisites, relevant university requirements etc. Administrators can login to the system and update the course information such as credits, prerequisites, etc.

The Course subsystem has a front-end GUI to manage the system. The GUI is designed to help the administrator maintain the underlying database with ease.

THE ADVISING SUBSYSTEM

The Advising subsystem is the most important subsystem among the three subsystems since it is the place where students get advised. Different GUI will be generated dynamically according to different degree requirements. User input of the courses a student has taken will be captured by the GUI and sent to a control program, which will process the input using a dedicated algorithm and access the data in the database to produce a final result of advising. The advising process succeeds with students getting their expected advising results.

The Advising subsystem put its emphasis on the algorithm to sift all the information, rules, and to get a reasonable and correct result. The Advising subsystem does not produce the final result simply by doing the subtraction, it can "think" intelligently under different scenarios by using the rules and requirements stored in the database.

SYSTEM IMPLEMENTATION

A prototype for the proposed system has been implemented. Its framework basically consists of a main page (Figure 2) – from which all the options are accessible – and a set of supporting HTML pages, forms, and ASP scripts.
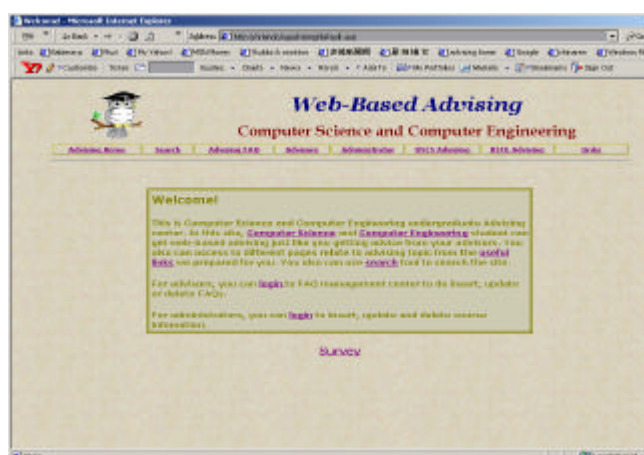
FIGURE 2
WEB-BASED ADVISING SYSTEMS'S MAIN PAGE

The main page has links to each major's degree requirements and career guide, other advising-related information of interest, the FAQ page, and the forms to input course information and get customized advice on next courses to take.

The system supports three different types of users:
- **student users**: who will use the system to get academic advising,
- **faculty users (advisors)**: who will post, update, and manage information used by the FAQ subsystem, and
- **administrative users (secretaries)**: who will access, update, and manage information used by the "next courses to take" subsystem.

Each different type of user has a different GUI, a set of privileges/rights, and a set of possible actions. Access to classified or sensitive information (maintained by faculty and/or administrative users) is password-protected.

THE FAQ COMPONENT

The advising FAQ page is generated on the fly by an ASP script that extracts information from a database of FAQs created and maintained by the advisors. Advising questions

are divided in three types or categories: *general*, *CS-specific*, or *CE-specific*. Each record in the database contains:

- a number (key) to uniquely identify it,
- the question's type or category,
- the question itself,
- its answer, and
- two fields to record who did the last update and when.

Advisors can add, delete, or update questions using a friendly front-end (Figure 3). When editing an FAQ, advisors can format the answers in HTML or use plain text. Students check the advising FAQs by clicking on a hyperlink in the advising home page. If they do not find the answer to their questions, they can press a button that will open an email gateway that allows them to email the question to their advisors right away.

FIGURE 3
FAQ MAINTENANCE FRONT-END

THE "NEXT COURSE TO TAKE" COMPONENT

This is the core component of the Web-based advising system. It consists of a set of forms and ASP scripts that allow the students to input information on the courses they have already taken using a friendly GUI and get advice on which courses to take next.

Students can input information on the courses they have already taken using a friendly GUI that resembles the worksheets used by CSE advisors and press the "Advise me" button to get advice on which courses to take next. There are three types of worksheets per major: one for *four-year students*, one for *transfer students*, and one for *second bachelor students*.

The ASP script associated with each form reads the information input to the system, compares it against the degree requirements for the specific major and student type, and returns a list of courses to take next, based on their prerequisites and availability.

ASSESSMENT OF PROTOTYPE

The assessments of the prototype are based on questionnaires designed for both advisors/administrators and students. Questions include the graphic design part, the functionality part and future improvement part. The survey for advisors/administrators and the survey for students have some questions in common and some are specific to each group of users. About twenty-four students, five faculty advisors and one administrator who have used the prototype answered a set of questions ranging from the graphical design, functionality to usability of the prototype. Their feedbacks are analyzed and tabulated for the assessment purpose of the proposed advising system.

QUESTIONNAIRE FOR STUDENTS

The following questionnaire was used for students.

1. What is your general impression of the site's:
   I) **Graphical Design:** (HTML pages, forms, graphics, colors, etc)
      A) Excellent   B) Good   C) Poor
   II) **Functionality:** (navigation, structure, internal and external links)
      A) Excellent   B) Good   C) Poor
      Comments : _____

2. What is your opinion about the **advising results**?
   I) **Correctness:**
      A) Excellent   B) Good   C) Poor

   II) **Completeness:**
      A) Excellent   B) Good   C) Poor
      Comments: _____

3. Does it work well as a **portal** containing (links to) all the advising related information?
   A) Yes   B) No   C) Not Sure
   Comments: _____

4. Does it take **less time** to get advice from the system than it would take to get advice from the advisor?
   A) Less   B) Same   C) More
   Comments: _____

5. Do you think the system will allow you go to see the advisor **less often**?
   A) Yes   B) No   C) Not Sure
   Comments:_____

6. Will you use the system in the future?
   A) Yes   B) No   C) Not Sure
   Comments: _____

7. Do you think we should **launch** the site as it is? If not, please specify.
   A) Yes   B) Yes but later   C) No
   Comments: _____

8. Have you visited **other advising sites**? If so, please specify which.
   A) Yes   B) No   C) Not Sure
   Comments: _____

9. Do you think the system needs improvements? Which **changes, improvements, corrections** that you believe are necessary and why.
   A) Yes   B) No   C) Not Sure
   Comments: _____

10. What do you like the **most/least** about the system?
   Most: _____

   Least: _____

FIGURE 4
QUESTIONNAIRE FOR STUDENTS

The answers for each question are summed and tabulated in the following table, followed by a summary of the results. Note: The table does not include the comment portion that some questions have.

TABLE 1
STUDENTS SUVEY RESULTS

Question #	Choice #1	Choice #2	Choice #3
	Excellent	**Good**	**Poor**
1 (I)	7	17	
1 (II)	5	18	1
2 (I)	6	17	1
2 (II)	5	18	1
	Yes	**No**	**Not sure**
3	20	3	1
5	19	1	4
6	20	2	2
8	1	23	
9	11	6	7
	Less	**Same**	**More**
4	21	2	1
	Yes	**Yes, but**	**No**
7	13	7	4

The survey results from students are summarized below. In general the feedbacks are very encouraging. It amounts to a positive recognition of the proposed system.

- The graphical layout, color, and HTML pages are impressive to the students. (All students rated the graphical design either excellent or good.)
- The system's functionality is good as to provide students a consistent and effective experience while using the system. (23 out of 24 students gave functionality of the system a positive score.)
- The correctness of the system is good. (23 out of 24 students rated the correctness of the system good.)
- The system provides complete coverage on advising-related information. (23 out of 24 students answered the completeness of the system is good.)
- The system functions as a portal for undergraduate Computer Science and Computer Engineering students. (20 out of 24 students agreed that the site works like a portal.)
- The system will make students see their advisors less often, therefore less the traffic to advisors' office. (19 out of 24 students responded that they would see their advisors less often in the future.)
- The system attracts the student users. (20 out of 24 students said that they would use the system in the future.)
- The system brings advantages into students' academic life in FAU. (21 out of 24 students found it taking less time to get advice than from their advisors.)

QUESTIONNAIRE FOR ADVISORS/ADMINISTRATORS

The following questionnaire was used for advisors and administrators.

1. What is your general impression of the site's:
   I) **Graphical Design:** (HTML pages, forms, graphics, colors, etc)
   A) Excellent   B) Good   C) Poor
   II) **Functionality:** (navigation, structure, internal and external links)
   A) Excellent   B) Good   C) Poor
   Comments: _____

2. What is your opinion about the **advising results**?
   I) Correctness:
   A) Excellent   B) Good   C) Poor
   II) Completeness:
   A) Excellent   B) Good   C) Poor
   Comments: _____

3. Does it work well as a portal containing (links to) all the advising related information?
   A) Yes   B) No, Explain   C) Not Sure
   Comments: _____

4. Do you think the advising system will take you less time to advise students?
   A) Yes   B) No   C) Not Sure
   Comments: _____

5. Do you believe the system as it is will reduce the traffic of students seeking academic advising to your office?
   A) Yes   B) No   C) Not Sure
   Comments: _____

6. Will you use the system in the future?
   A) Yes   B) No   C) Not Sure
   Comments: _____

7. Do you think we should launch the site as it is? If not, please specify.
   A) Yes   B) Yes but later   C) No
   _____

8. Have you visited other advising sites? If so, please specify which.
   A) Yes   B) No   C) Not Sure
   _____

9. Do you think the system needs future improvements? Which **changes, improvements, corrections** you believe are necessary and why.
   A) Yes   B) No   C) Not Sure
   _____

10. What do you like the **most/least** about the system?
   _____

11. Will you recommend students using the site in the future?
   A) Yes   B) No   C) Not Sure
   Comments: _____

12. Do you feel comfortable adding, deleting and updating the FAQs using the front end?
   A) Very Comfortable   B) Comfortable
   C) A little uncomfortable   D) uncomfortable

13. Do you like to use the Course subsystem to add, delete, and update course information?
   A) Yes   B) No   C) Not Sure

14. Any other features you think should be added to the FAQ subsystem?

15. Any other features you think should be added to the Course subsystem?

16. Any other features you think should be added to the Advising subsystem?

FIGURE 5
QUESTIONNAIRE FOR ADVISORS/ADMINISTRATORS

Again, the answers for each question are summed and tabulated in the following table, followed by a summary of the results. Similarly, the table does not include the comment portion that some questions have.

TABLE 2
ADVISORS SUVEY RESULTS

Question #	Choice #1	Choice #2	Choice #3
	Excellent	**Good**	**Poor**
1 (I)		5	
1 (II)		4	1
2 (I)		4	1
2 (II)		4	1
	Yes	**No**	**Not sure**
3	5		
4	5		
5	3		2
6	5		
8	1	4	
9	3	2	
11	5		
13	4		1
	Yes	**Yes, but**	**No**
7	2	3	
	Very Conf.	**Comfortable**	**Uncomfortable**
12	5		

General survey results are summarized as follows:
- Overall graphical design is favored by all advisors and administrators. (All advisors/administrators rated the graphic design good.)
- Functionality of the system is good. (4 out of 5 advisors rated the functionality of the system good.)
- The system provides correct advising results to students. (4 of 5 advisors were satisfied with the correctness of the system.)
- The system covers a complete advising-related information and tool. (4 out of 5 advisors had no comments on the completeness of the system.)
- The system functions like a portal containing links to all the advising related information. (All advisors agreed the site functions like a portal.)
- The system will take less time to advise the students than advisors will do. (All advisors agreed that the system could take less time to advise the students.)
- The system might reduce the traffic to the advisors' offices. (3 out of 5 advisors agreed that the system might reduce the traffic to their offices.)

Overall, there are encouraging responses from the use of the Web-based Advising system prototype. Feedbacks for the graphic design and timesaving effect for advisors are all positive. Some advisors show great excitement of the project, which brings a brand new tool for them. They have some experience visiting other advising Web sites before, but this site is better comparatively. The functionality and completeness is very satisfactory. The Web-based advising system actually **does** the advising and integrates variety of information into the site.

CONCLUSIONS

We have designed and developed a Web-based academic advising system to supplement the conventional advising process. Major benefits brought by this system include:
- Availability of accessing official advising information from any place, using a Web browser.
- Ability to quickly find answers to most common advising questions.
- Reduction in the amount of time and energy spent by advisors on repetitive tasks.
- Reduction of inconsistencies, omissions, and ambiguities, in the advising rules and procedures.
- Reduction of traffic in advisors' offices during critical periods (e.g., (advance) registration).
- Concentration of relevant advising information, in electronic format, in a single place.

A prototype of the proposed system has been implemented and is in beta test stage. Experimental runs have indicated that this Web-based advising system is a successful project, based on survey feedbacks from students, advisors and administrators. Students and advisors are satisfied with the system and will use it in the future. Comments regarding changes and upgrades have been recommended to make the system more complete and useful. Furthermore, we will take seriously some constructive comments with respect to the future extension of the system.

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