Design and Development of a Generalized Clerkship Management System

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ABSTRACT

The objective of this research is to design and develop an online clerkship management system general enough to accommodate the needs of three groups of learners (medical clerks, interns, and residents). This involves relational database design as well as user process flow design. These two design charts were developed with careful consideration of user requirements from the three groups. The Entity Relationship Diagram included several related tables: Levels, programs, learners, administrators, learner absences, learner grades, and learner log entries. The process flow diagram included process flows for several users: applicants, learners (clerks, interns, or residents), faculty, program directors, and administrators. The database-driven website model was used to develop the system using MS SQL for storing and querying data, and ASP as the web programming language. Several online forms and pages were developed to accommodate input and output processes. While information gathering and interaction with eventual users is vital to the accurate and correct design of the system, it is possible to design and develop a generalized online clerkship management system which allows for the management of three different groups of medical learners.

Keywords: Clerkship, generalized, design and development, online management system.

1. INTRODUCTION

The automation of clerkship management processes by utilizing an electronic management system has introduced efficiencies into these programs. Online systems are even better because they allow for remote management of the program [1-5]. Some of these systems focused on learners documenting their experiences (electronic logbook) [4] while others on instruction and documenting learning objectives [2,5] and others focused on clerkship evaluation [3]. The purpose of this project is to design and develop a generalized online clerkship management system which allows for the management of three different groups of learners. These three groups are categorized by their academic level which are clerkships for fifth and sixth year medical learners, interns, and residents of the Faculty of Medicine and Health Sciences, United Arab Emirates University, Al Ain, UAE.

2. METHODS

For several months, data gathering and interviews with key personnel took place in order to understand the specific needs of the users. A relational database system was designed using a suitable entity relationship diagram (ERD) and process flow diagram (PFD). An online system was developed using the ASP online development language. Dynamic web pages for input and output were developed to be clear, consistent, and user-friendly. Finally, user control was taken into account giving each user access to allowed information and processes only.

3. RESULTS

Needs analysis for the three groups produced the following needs list:

1. Applicants need to:
   a. Apply to the program.
   b. Upload their documents during the application process.
   c. Email updated documents after the application process.

2. Program Directors need to:
   a. Check the applications.
   b. Upload applicants’ updated documents.
   c. Update the applicants’ status and add comments.
   d. Approve applicants into specific programs.
   e. Add learners from scratch into specific programs.
   f. View and edit learner records.
   g. Manage rotations and assign learners to rotations.
   h. View logged activities by learners.
   i. Setup and manage multiple choice question exams.
   j. See results and statistics for these exams.

3. Faculty need to:
   a. View learner records assigned to their rotation.
   b. Evaluate learners assigned to their rotation.

4. Residents need to:
   a. View their learner record.
   b. Log activities during the rotation.
   c. Evaluate their faculty and their rotation.
   d. Approve their faculty’s evaluation of them.
   e. Take multiple choice exams online.
   f. See their result for these exams.

A suitable ERD was developed using the results of the needs analysis and relational database theory (partially shown in Figure 1). A suitable PFD was also developed and is partially shown in Figure 2. Figures 3-5 show snapshots of the system.

Figure 1. Partial Database Entity Relationship Diagram.
This project started as an online residency management system developmental project. It was interesting to later discover that clerkships and internships have very similar data and process management needs to residents. It was therefore possible to conduct a needs analysis for these two additional groups and add them to the system design with ease.

Although this is primarily a developmental project, it’s worthy to note that the data gathering stage helped residency, clerkship and internship administrators better organize their programs. This is typical of systems design in that requirements analysis allows administrators to document as well as rethink many of their processes.

The system has been in use for over a year and feedback has been positive. Several suggestions have been implemented in the system to enhance its use. These include enhancing the way online exams are conducted and analyzed, as well as some user feedback issues when performing data entry.

The main obstacle faced was the lack of willingness of some users to use the system and perform simple data entry tasks. This is especially important in the case of program directors when entering rotation information since many of the system’s processes depend on this information. More user training is needed to overcome this problem. Highlighting the advantages of such a system to the users will also help with overcoming this obstacle.

While there are some software packages that assist with the management of some aspects of this project, none satisfy all the needs identified during the requirements analysis phase. In addition, integrating several systems is difficult and customizing them to suit the user’s needs is impossible without having the ability to modify these programs.

It is possible to design and develop a generalized online clerkship management system which allows for the management of three different groups of medical learners which are clerkships for fifth and sixth year medical learners, interns, and residents of the Faculty of Medicine and Health Sciences, United Arab Emirates University, Al-Ain, UAE. Information gathering and interaction with eventual users is vital to the accurate and correct design of the system. This step also allows program administrators to gain a deeper understanding of their programs.

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REFERENCES


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