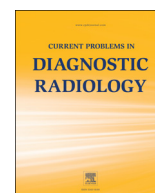




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The Use of an Integrated Website to Enhance the Educational Experience in a Medical School Radiology Clerkship Course

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The purpose of this study was to demonstrate the feasibility of creating an integrated website for the medical students enrolled in a core radiology clerkship and to assess the impact of this website on students' overall educational experience. An integrated website was created for the medical students and hosted on the main departmental website. The components of the website included: announcements and password-protected schedule, curriculum, student assessment, information about different radiology sections, digital resources, and fourth year opportunities. The schedule section was created using Google Calendar to facilitate automatic syncing and real-time updates to the students' mobile devices. Weblinks for resources and assignments were incorporated into the calendar entries, which could be "pushed" to students in real time. Student attitudes were assessed via an exit survey. Various website usage statistics were collected. A total of 35 students who have rotated through the month-long clerkship thus far have used the website. Overall, 80% of students accessed the website once or multiple times a day. Over 90% of students thought that the website was well organized and easy to use; having access to the schedule on a smartphone had a positive impact on overall clerkship experience; the website had an overall positive impact on their clerkship experience; and they would recommend it to visiting medical students. Since July 2013, there have been a total of 9740 page views with 4113 unique visits to the website (an average of 17 visits per day from 6 visitors per day). The authors conclude that the creation of an integrated website has a positive impact on students' overall educational experience.

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Introduction

The internet has gained widespread use and acceptance in medical education and has become an integral part of medical students' professional lives.¹ As described by various surveys, medical students have come to expect web-based and computer learning as an important part of their medical curriculum.² Indeed, well-planned and well-designed web-based instruction has shown to be equally and in some cases more effective than traditional lecture-based curriculum.^{3,4} With the recent proliferation of portable devices and compatible web-based technology, there has been continued development of resources for all levels of medical education. However, if these resources are not designed with the specific needs of medical students in mind, there is a risk that the resources will not be optimally used and that the students will not receive the full educational benefit.⁵

Medical students enrolled in a radiology clerkship rotate through more than 10 different radiology sections and are expected to not only gain familiarity with the radiology department and observe and

understand different kinds of services that radiologists provide but also obtain an understanding for the appropriate use of radiology resources in an academic health care environment. Student survey data, obtained before the implementation of the specific web portal dedicated to the radiology clerkship, highlighted "course organization" as the lowest rated aspect of the radiology clerkship. Specifically, "the overload of material" and "scheduling" were consistently mentioned as areas for improvement. Without a well-organized web portal dedicated to the clerkship, pertinent information, including web-based teaching resources and complex scheduling details, was inconsistently communicated to the students, resulting in a less-organized and less-fulfilling educational experience.

We sought to create a highly customized and integrated website for the medical students enrolled in the core radiology clerkship to improve the overall clerkship experience for the medical students, clerkship coordinator, course directors, and faculty. Optimal consolidation of resources and organization of schedules was the most important educational goal in creating the website. A secondary goal was to facilitate course management for the clerkship coordinator, improving communication among course directors, faculty, and students and thus improving students' perception of radiology. We also hoped to minimize the time and labor of the course coordinator in creating and maintaining the course material over the monthly iterations of this ongoing clerkship.

The purpose of this study was to determine if such a website enhances the educational experience of medical students enrolled

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in a radiology clerkship; improves communication among the students, faculty, and administrators; and minimizes administrative tasks of the course coordinator.

Methods

To create the website, web editors used online content management software called TeamSite (Interwoven, San Jose, CA). Approximately 25 man-hours were spent on website design meetings and the creation of this website. Hosting the website on our hospital server incurred no additional monetary cost. As per hospital policy, the web editors were required to use the hospital's template while retaining the ability to edit the right-sided navigation bar and the main content section within the template (Fig 1). The following menu items were created for optimal organization of content: Welcome, Announcements, Schedule, Curriculum, Student Assessment, Radiology Sections, Maps and Directions, Student Resources, Fourth Year Opportunities, Contact Us, and Department of Radiology Home.

The announcements section was created using Google Docs, giving the course directors and the clerkship coordinator the ability to quickly post announcements, while allowing students to view these announcements through a computer or mobile device. Additionally, a password-protected schedule section was created using Google Calendar to facilitate automatic syncing and real-time updates to the students' portable devices such as iPhone or iPad (Fig 2). Weblinks for different resources and assignments were incorporated into the individual calendar entries, which could be "pushed" to students in real time, making it convenient for students to access these resources on their portable devices. Lastly, a restricted faculty resources section was created to serve as a central repository for all lectures and case conferences given to the medical students. All portions of the website, including the password-protected schedule and faculty resource section, can be accessed on and off campus on any internet-connected device, including laptops, smartphones, and tablets.

Student attitudes toward the new website were assessed using a 5-point Likert scale survey 9 months after the website was created. Website usage statistics such as unique page views, visits per day, visitors per day, and geographic location of the visitor were analyzed using a web statistical analysis program called Urchin (Google Analytics, Mountain View, CA).

Results

Student survey

A total of 35 students who enrolled in the clerkship from July 2013 until February 2014 were asked to participate in a 14-question survey about the new website. All the students completed the survey. Overall, 28 (80%) students accessed the website once or multiple times a day, 6 (17%) students accessed the website a few times a week, whereas 1 (3%) student accessed it a few times a month. Reasons for visiting the website included the following: to check for new announcements (16 students, 46%), to view the calendar (33 students, 94%), to view details of the curriculum (21 students, 60%), to view details about grading (13 students, 37%), to view details about different Brigham and Women's Hospital radiology sections (7 students, 20%), to view maps and directions (10 students, 29%), and to view online and print resources (14 students, 40%). Overall, 17 (49%) students primarily accessed the website via portable devices whereas 13 (37%) students used a hospital computer and 9 (26%) students used a home computer.

As demonstrated in Table 1, most students (more than 90%) agreed with the following statements: (1) the website is well organized and easy to use, (2) having access to the schedule on my smartphone had a positive effect on my overall clerkship experience, (3) having the course content available on the website is preferred to having it available in a hard copy, (4) the calendar and the educational materials are easy to access from home, (5) I would recommend this website to a visiting medical student planning to do a radiology elective, and (6) the website had a positive effect on my overall clerkship experience. Overall, 32 (91%) students rated the quality of website content as "very good" or "good" and thought that the website was "much better" or "slightly better" than other clerkship websites.

Website usage statistics

Since July 2013, there have been 9740 page views with 4113 unique visits to the website (an average of 17 visits per day from 6 visitors per day) (Table 2). Although specifically designed for students enrolled in the radiology clerkship, the website was viewed not only locally but also throughout the US as well as in Asia, Europe, and South America (Fig 3). Within the website, the welcome page was the most frequently visited location, followed by the schedule, student resources, and case presentation guidelines (Fig 4).

Clerkship coordinator's experience

According to the clerkship coordinator, creation of the website has made course organization more efficient. For example, it is easier to input calendar entries into Google Calendar for each monthly iteration of the ongoing clerkship by setting up recurrent entries. This option was not available before the implementation of this website. By having a centralized location for the student schedule, the faculty members giving the lectures are able to reschedule their lectures with minimal involvement from the clerkship coordinator. Lastly, having a dedicated website section on fourth-year opportunities has significantly decreased administrative tasks for the course coordinator, such as providing the information via telephone and e-mail.

Discussion

The internet has become an invaluable resource in disseminating and organizing educational curricula.⁶ The proliferation of portable devices and compatible web-based technology has led to the development of vast resources for all levels of medical education. Medical schools are increasingly integrating these web-based resources into their curricula, and medical students have come to expect web-based and computer learning as an important part of the medical curriculum.² As the number and types of resources grow, however, the student cannot distinguish which learning opportunities are particularly valuable. In an academic radiology department, the inherent diversity among the various divisions and the amount of knowledge to learn create an organizational challenge for the medical student beginning the study of radiology. Thus, optimal organization of the materials for the student is essential to maximize the educational effect of these tools. Creation of a single dynamic web portal not only allows medical students to access information in one convenient location but also leads to better awareness and efficient use of these educational resources. The ability of medical students to access all pertinent clerkship information in one centralized location is

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