RESEARCH ARTICLE

WEB BASED LEARNING IN ANATOMY

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ARTICLE INFO	ABSTRACT
	Aims: Is to determine whether web-based education in anatomy is a practical, effective and implementable study aid for medical students. **Materials and Methods:** An interactive website with a built in Learning Management system was designed. All I MBBS students (2015-16batch) of Sri Ramachandra medical college, Porur were registered as users. A wide bouquet of e –learning content in the form of power point presentations, interactive lessons with audio narrations, videos, multiple choice quizzes, high resolution digital microphotographs, question banks were uploaded to the interactive website. **Results:** 95% students found the interactive website extremely useful for learning the subject and examination point of view. 98% students rated the academic content as excellent . About 52% of the students accessed the website more than once in a week. 86% students opined that if free internet services are provided within the campus, they would prefer to access the website more frequently. **Conclusion:** The study concludes that web based academic content will greatly help students in their learning process. The present generation of students are more inclined toward computers and internet based education. With highly affordable access devices and better connectivity and speeds, web based learning along with traditional teaching will add immense value to the learning experience.

INTRODUCTION

Edutech is the new buzzword in the field of education. People from all walks of life are increasingly taking advantage of the tremendous benefits of e-learning to teach, learn and collaborate more effectively than ever before. In India, all cities and towns have high speed internet connectivity. Broadband connectivity is steadily and rapidly making inroads into the remote areas of the country. Travel, shopping, banking and almost every sphere of human activity has been transformed by the digital revolution. Schools and colleges are increasingly leaning on e-learning to enhance the learning experience of their students. A large number of commercial rapid authoring tools are available which allow production of high quality e-learning material by faculty who are not familiar with computer programming and designing. Learning Management systems are computer programs which allow course directors to effectively monitor the content and usage. MOODLE, an acronym for modular object oriented dynamic learning environment is one of the world's most widely used free open source learning management system. The reduction in time frame for teaching anatomy coupled with a perpetual paucity of adequate and motivated teaching faculty prompted us to undertake this exercise. The aim of this project was to determine if web-based education in anatomy is a practical, effective and implementable study aid for medical students.

MATERIALS AND METHODS

After a suitable domain name was purchased and web-hosting permissions obtained, a MOODLE based learning management system was uploaded to the website. All students of I MBBS (2015-16 batch)were registered as users on the site (Fig.1). Within the site, three broad sections on gross anatomy, histology and embryology were created. Various types of education content in the form of power point presentations, custom made e-lessons with animations and audio narrations, high resolution labelled digital microphotographs of tissues along with audio, multiple choice questions etc were uploaded to the website (Fig.2). SCORM compliant E-lessons were prepared with help of commercially available rapid authoring tools. Student feedback about the utility and efficacy of the web-based LMS was sought in the form of a questionnaire.

RESULTS

All 250 students of the I MBBS class answered the feedback questionnaire. The student responses to the various questions are summarized below.

(a) Registration and User satisfaction: All students registered on the website. 88% of students found the registration process simple and user friendly.
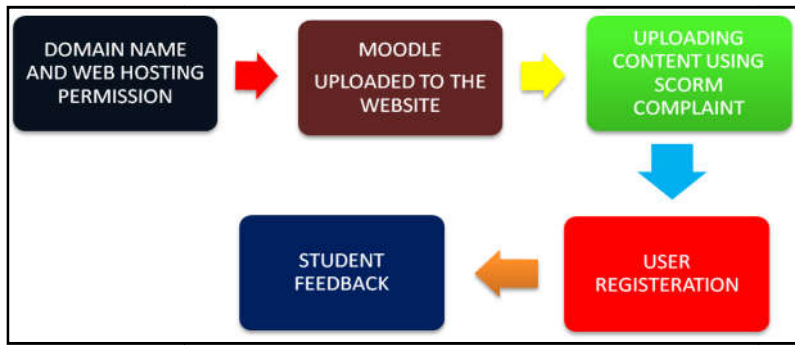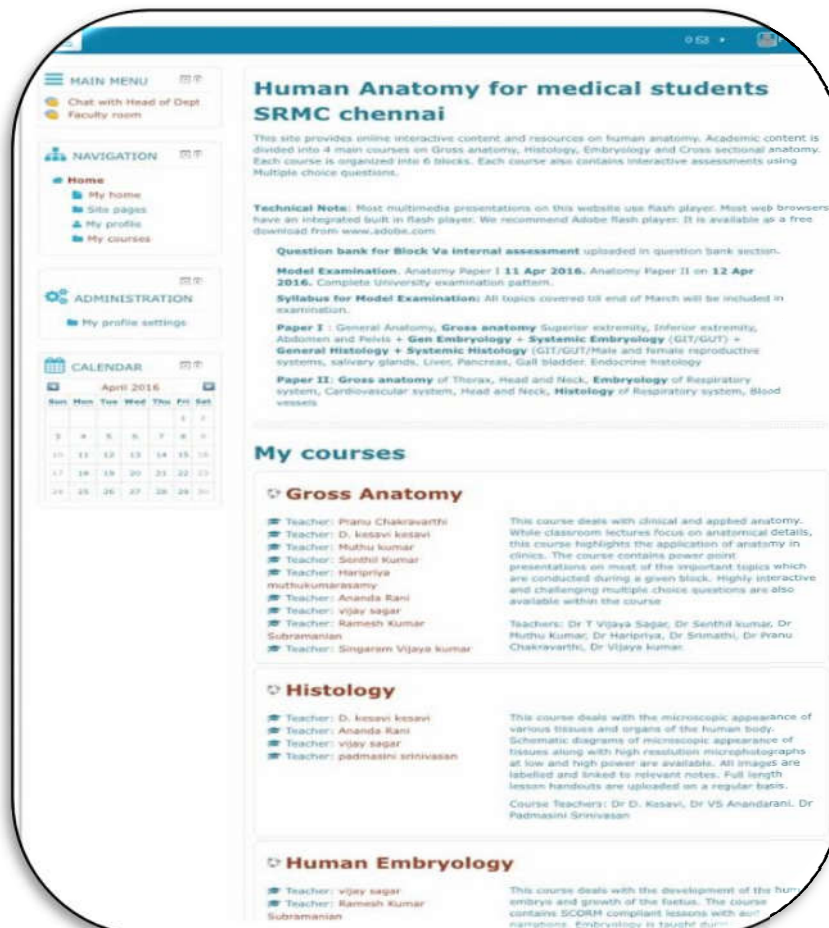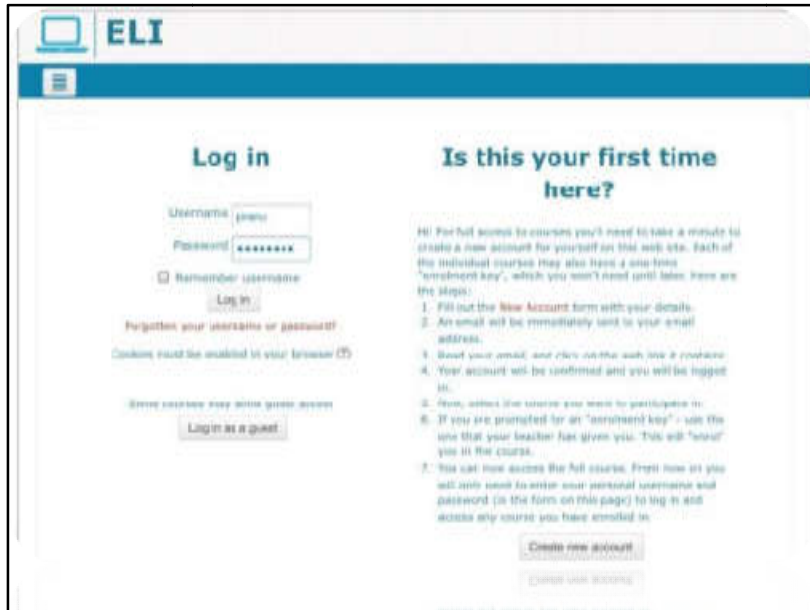
Fig.1.Steps to start a web based learning site

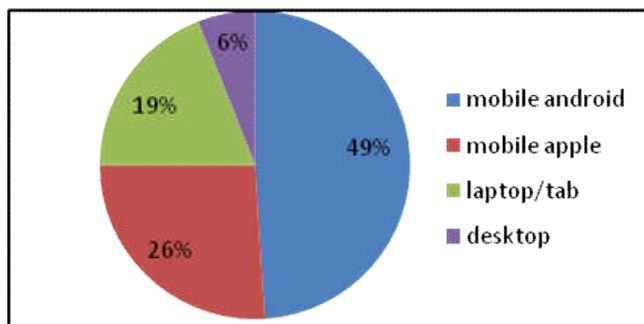**Fig. 2. Picture representing the content in the website**

Fig.3. Pie diagram showing the device used for accessing the website.
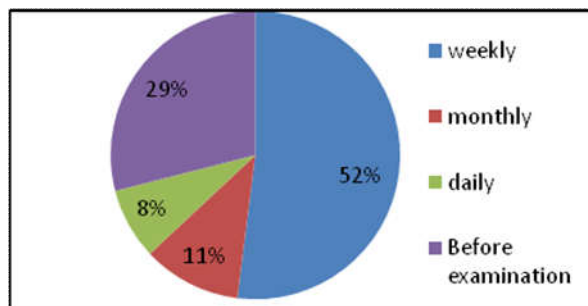

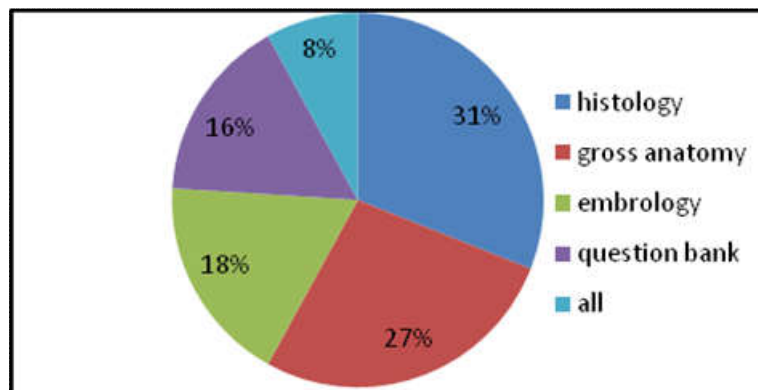
Fig. 4. Pie diagram showing the Frequency of use

Fig.5. Pie diagram showing the content useful

(b) Device used for accessing the website: (Fig.3)

(c) Content Access on the website: While 71% of students did not encounter any problems while accessing the content, 29% responded that they could not access the programs easily.

(d) Usefulness of content and Utility of program for examinations: 95% of students found the academic extremely useful and they also responded that the program was extremely helpful from the examination point of view.

(e) Frequency of use: (Fig.4)

(f) Internet availability: Almost 86% of students responded that free internet is not available to them. They also opined that if free internet with adequate bandwidth is provided to them, they would be happy to access the content on a daily basis.

(g) Content type found to be useful: (Fig.5)

(h) Other e-learning resources: Students accessed a number of online resources on anatomy such as you tube, Wikipedia, Kaplans atlas, Acklands video atlas of anatomy.

DISCUSSION

Medical teachers face a different set of hurdles as compared to their predecessors (Jorge ruiz *et al.,* 2012). Rapid advances in medicine, changes in health care delivery systems, re-structuring and downscaling of requirements of teachers by the Medical Council of India have resulted in a unique set of constraints. Traditional Instructor led training (ILT) is paving way for experiential learning which puts the learner fully in control of their learning.

Advantages of E-learning: Administrators, Teaching faculty and students are increasingly finding that multimedia based interactive e-learning enhances both teaching and learning. Interactive e-learning shifts the focus from a passive teacher centred model to one that is more active and learner centred.

E-learning is more efficient because the students acquire knowledge, skills and undergo required changes in attitudes faster than methods employing ILT. This improved efficiency is bound to translate into higher levels of motivation and performance (Psychological myths in e-learning, 2012). One of the biggest advantages of e-learning is the learning content delivery which includes increased accessibility to required and recommended information, ease of updating content and standardisation of content (Rosenberg, 2001). For the students, it allows control over the content, learning sequence, pace of learning and flexible timings. For the teachers, e-learning is indeed a blessing considering the perpetual paucity of trained and motivated teachers. The reduction in the number of required faculty in pre-clinical subjects by the Medical Council of India has placed an additional burden on an already overloaded system. E-learning allows for standardisation of the teaching content. Preparing online content is a time consuming process but once prepared the same modules can be used repeatedly. Minor changes and content updates can be easily incorporated. Online assessments, automated tracking of users online access to courses lessen the administrative burden on the faculty. Importantly, e-learning can be so designed to include outcomes assessment to determine whether or not learning has occurred (Gibbons, 2000).

Learning Management Systems and Rapid Authoring tools: Learning Management system (LMS) is at the core of the internet based e-learning. It is an internet based software that facilitates delivery and tracking of e-learning in an institution. Beyond delivering e-learning, LMSs can simplify and automate administrative and supervisory tasks, track students progress and achievement of desired competencies and function as a respository of instructional resources which are available any time.

A large number of LMSs are available as commercial products and free versions. The present project used MOODLE as the LMS on the website. MOODLE is an acronym for modular object oriented dynamic learning environment. It is the world's largest free and open source LMS. A large number of software developers from all over the world have contributed to the development of MOODLE. Since it is an open source software, it is undergoing continuous development and improvements. MOODLE features a number of themes on learning management styles and one could choose a theme which best suits an institutional requirement. A large number of added resources called Plug-ins are also available. Some Plug-ins are free while some need to be purchased. While the MOODLE software itself is free for use, most medical professionals may not have the technical competence to deploy it on their websites. The help of computer software companies specialising in MOODLE can be sought for deploying the software. Once deployed, site administration is a relatively easy task which can be learnt over a couple of days. The biggest benefit in deploying a readymade LMS like MOODLE is the huge cost saving. Getting a custom made LMS prepared by computer software firms along with course administration features will cost approximately INR 1.5 to 2.0 lakhs. Getting a Moodle based website will cost substantially cheaper.

(a) Rapid Authoring Tools are computer software programs which allow production of highly professional looking e-learning programs without any knowledge of software programming. A variety of options like power point presentations, audios, videos, animations, images can be imported into the software. Most rapid authoring tools provide a vast warehouse of software tools which can be used to build high levels of interactivity into the final product. The final products can be exported in .exe format to be used via a stand-alone delivery mode like CD/DVD ROMS. Final products can also be exported in a web ready HTML format. Another advantage offered by rapid authoring tools are that all the exported lessons are SCORM compliant, which means that the exported lessons can be used in any LMS without any compatibility issues. SCORM has been developed by the Advanced distributed learning centre in the USA. It is a group of specifications funded by the United States department of defence. E-learning material built to scorm specifications will interact with a conform ate LMS (Fallon and Brown, 2003).

Internet and Access: Successful delivery and implementation of e-learning, either in the synchronous or asynchronous mode depends on

(a) *Availability of high speed broad band internet access*: Most SCORM compliant e-lessons are fairly large sized files which are uploaded in a compressed format. At the time of use, these e-lessons are decompressed and streamed from the server to the user computer. Streaming is an internet technology that allows viewers to begin viewing the audio or video files while they are being transferred rather than waiting for the download to be completed. The quality of the learning experience will depend on infrastructural factors like quality of the original source material, compression rate, bandwidth of the internet connection and server processing capabilities. In our particular case, while the quality of the original source material and server processing capabilities were excellent, the variable bandwidth of the internet connection did not facilitate a smooth learning experience. Most students were accessing the internet via different Internet service providers via mobile phone connections. While most mobile phone internet connections are adequate for routine email and surfing requirements, they do not adequately support fast streaming of large volume e-learning files. SCORM compliant e-learning files require a fast and stable internet connection for seamless performance. At an institutional level, our recommendation would be to install a high speed wired broad band set up with multiple high speed hi fi routers. Though a costly proposition, there is scope for a tremendous return on investments in terms of a long term, highly effective and smooth learning experience for the students. The cost saving benefits include reduced instructor training time, travel costs, labour costs, reduced institutional infrastructure and possibility of introducing and expanding new programs with the same infrastructure (Ward *et al.,* 2001).

(b) *Internet Access devices*: Almost 75% students in our project were accessing the e-content of the website via Android and Apple based mobile phones while only 20% were accessing the content via Laptops/Tablets/ Desk top computers. While technological advances have produced highly capable mobile hand held devices, the monitor screen size is an important element in the learning process. The average 5-6 inch screen size of a mobile device screen is highly inadequate for e-learning. The relatively small screen will result in eye fatigue and will discourage users from using the program for longer periods of time. For e-learning to be effective on a long term basis, we recommend students to use either a laptop computer or atleasta android/mac based tablet with a minimum screen monitor size of 10 inches.

Institutional Support: For successful adoption and implementation of e-learning, large investments in faculty and infrastructure need to be justified to the institutional administrators. Hence support from the highest levels has to be sought and obtained. The institutional management needs to provide adequate facilities so than technology delivers 24 X 7. The money spent can well be recovered in terms of a better learning experience for its students and an overall improvement in the standing and reputation of its institution.

Conclusion

Students are highly satisfied with E-learning. Able to recap the contents at anytime anywhere. Most students do not see e-learning as a replacement for the traditional instructor led training. Centers of excellence in e-learning can provide national support for design, development implementation and evaluation.

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