

# E-learning: enhancing medical education through the use of IT



The screenshot shows the E-Learning portal for Christian Medical College. At the top left is the college's logo and the text "E-Learning CHRISTIAN MEDICAL COLLEGE". At the top right are navigation links: "Help | Contact | About | Mobile". The main content area features a login form with fields for "Username:" and "Password:", a "Login" button, a "Guest Access" button, and a "Forgot your password?" link. Below the form is a paragraph of text: "Christian Medical College, with the help of software and support from the Tufts University School of Medicine and School of Public Health has created a dynamic multimedia knowledge management system (E-LMS) to assist faculty and students in teaching and learning. The CMC Vellore Curriculum Website provides a portal to an integrated body of knowledge and easy to personally organize the vast array of health information through its online curricular material and related applications." To the right of the text is a photograph of the college's main building. At the bottom left of the page is the "CMC" logo and a "Useful Links" menu.



**Christian Medical College**  
Vellore

# **PART I**

**AWARD APPLIED BY:**

**PRIVATE SECTOR ORGANIZATION**

# PART II

## INTRODUCTORY INFORMATION

**PROJECT NAME:** “E-learning: enhancing medical education through the use of IT”

**INSTITUTE:** Christian Medical College, Vellore

**AWARD CATEGORY APPLIED FOR:** SKOCH DIGITAL INCLUSION AWARD – Health

**ADDRESS:**

Christian Medical College,

Ida Scudder Road,

Vellore, Tamil Nadu – 632004

India

**Telephone:** 0416-2282010

**Email:** [director@cmcvellore.ac.in](mailto:director@cmcvellore.ac.in)

**PROJECT COMMENCEMENT DATE:** 2006

**PROJECT COMPLETION DATE:** 2012

**DETAILS OF RESPONDENT:**

Dr. Sunil Chandy,

Director,

Christian Medical College,

Vellore, Tamil Nadu – 632004

India

**Telephone:**0416-2282010

**Email:** [director@cmcvellore.ac.in](mailto:director@cmcvellore.ac.in)

# **E-LEARNING: ENHANCING MEDICAL EDUCATION THROUGH THE USE OF IT**

## **Brief overview of the project**

The Christian Medical College, Vellore (CMC) E-learning unit began as a project with Tufts University, Boston, to enhance the effectiveness of medical education through the use of information technology. This project commenced in the year 2006 and was completed over the next few years. Through the E-learning initiative, CMC has been able to increase the efficiency of curriculum delivery, create locally relevant learning resources, incorporate their use into the curriculum, and spur educational innovation.

## **Challenges faced before deployment of the project**

The challenges faced before deployment of the project were identifying faculty who were interested in E-learning as a tool to enhance learning, identifying the infrastructure requirement (which included dedicated computer systems, servers, and good internet connection), identifying a dedicated area to house this facility, finding funding for the project, and training of faculty and staff.

## **The objectives of the project**

1. To develop and deliver high-quality curricula appropriate and relevant to local health care needs in India.

2. To increase CMC faculty's capacity to manage both the technical and content creation components of TUSK (Tufts University Sciences Knowledgebase) – a multimedia knowledge management system.
3. To share these resources with secondary hospitals networked to CMC and other medical colleges in India, so as to disseminate knowledge and reach needy areas of the country
4. To make the entire curriculum and academic procedures like exams, assignments, patient logs, thesis and assignment, online and paperless.

### **Description of the implemented project**

E-learning has brought about a revolution in the field of education, by allowing learners 24x7 access to high quality educational material, at a fraction of the cost of traditional classroom based teaching. It also allows a more personalized learning experience, by allowing each learner to proceed at their own pace, using the learning style best suited to their needs. This, paradoxically, reduces the time required by learners to understand concepts – a phenomenon known as learning compression. E-learning has also been shown to enhance learners' ability to apply the knowledge gained, and to retain information for longer periods. Over and above all these benefits, E-learning helps save trees by saving paper, thus reducing an educational institution's carbon footprint.

Christian Medical College, with support from the Tufts University School of Medicine and School of Public Health, used the Tufts University Sciences Knowledge Base (TUSK) open source software platform, which was developed by the Tufts University Hirsh Health Sciences Library. TUSK is a dynamic multimedia knowledge management system to support faculty and

students in teaching and learning. Using this system, the CMC Vellore E-learning project provides a portal to an integrated body of knowledge through its vast array of online curricular materials and related applications which are accessible via the Internet at <http://e-learning.cmcvellore.ac.in>.

The E-Learning database contains different types of learning resources. Teachers can directly upload their lecture slides/presentations on the E-learning site using their log-in credentials and rights, and students can access lecture presentations, download them onto their computers, or print them out as lecture handouts. Several videos related to patient examination are available on E-learning to enrich student learning, and students can assess their comprehension of the subject matter through interactive quizzes. As students learn, they can store their study notes online, and save flash cards with relevant facts to aid in topic review at a later date. The portal also posts the class schedule, announcements, instructions, assignments, and discussion forums for students. Since E-learning is available on the Internet, it is easy for faculty to manage course content either from work or home. One of the highlights of the portal is its accessibility through handheld devices, with facilities for live streaming of videos on the e-learning server; thus helping students learn interactively.

Online tests are conducted for some students via e-learning. This simplifies both the conduct and correction of the test as both are instantaneous; besides saving huge amounts of paper. The E-learning unit also regularly solicits student feedback in order to improve on existing teaching-learning strategies.

# FEATURES OF CMC'S E-LEARNING PORTAL

## ACADEMIC SCHEDULE

MBBS 2011 ACADEMIC SCHEDULE						
<a href="#">Schedule Help</a>						
2012-02-20 to 2012-02-24						
<b>View:</b> <a href="#">Academic Accreditation</a> <a href="#">Weekly Lecture Objectives</a>						
<a href="#">Subscribe To This Schedule</a> <a href="#">Download This Schedule</a>						
<b>Print:</b> <a href="#">This Week</a> · <a href="#">Multiple Weeks</a>						
2012						
<a href="#">Prev</a> <a href="#">Next</a>						
Jan						
S	M	Tu	W	Th	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				
Feb						
S	M	Tu	W	Th	F	S
		1	2	3	4	
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29			
8 am	ANATOMY Embryology - 2 Development of eyeball @ 8:00 Anatomy Department	BIOCHEMISTRY Topic 17: Regulation of pH @ 8:00 Varghese Biochemistry Department	PHYSIOLOGY Physiology @ 8:00 Physiology Department	BIOCHEMISTRY Topic 18: Regulation of water and electrolyte balance @ 8:00 Jacob Biochemistry Department	PHYSIOLOGY Physiology @ 9:00 Physiology Department	
9 am	PHYSIOLOGY Physiology @ 9:00 Physiology Department	PHYSIOLOGY Physiology @ 9:00 Physiology Department	BIOCHEMISTRY Clinical discussion 7 @ 9:00 Biochemistry Department	PHYSIOLOGY Physiology @ 9:00 Physiology Department	PHYSIOLOGY Physiology @ 9:00 Physiology Department	
10 am	ANATOMY Hospital Visit @ 10:15 Hospital Visit	ANATOMY Dissection: Orbit p.104- 115 @ 10:15 Anatomy Department	ANATOMY Dissection: Orbit p.104- 115 @ 10:15 Anatomy Department	ANATOMY Dissection: Organs of hearing and equilibrium- p.171-183 @ 10:15 Anatomy Department	ANATOMY Dissection: Organs of hearing and equilibrium- p.171-183 @ 10:15 Anatomy Department	
11 am						
12 pm						
1 pm						

## LECTURE PRESENTATIONS

<b>E-Learning</b> CHRISTIAN MEDICAL COLLEGE		<a href="#">Home</a> <a href="#">Browse All Courses</a> <a href="#">Search</a> <a href="#">Manage Content</a>																																										
<b>COMMUNICATION</b> <a href="#">Announcements</a> <a href="#">Discussion</a> <a href="#">My Groups</a> <a href="#">Schedule</a> <a href="#">Teaching Sites</a>	<b>MATERIAL</b> <a href="#">Content</a> <a href="#">Quizzes</a> <a href="#">Cases</a> <a href="#">Grades</a> <a href="#">Assignments</a> <a href="#">Patient Logs</a>	<b>INFO</b> <a href="#">Objectives</a> <a href="#">Faculty List</a> <a href="#">Attendance Policy</a> <a href="#">Description</a> <a href="#">Equipment List</a> <a href="#">Grading And Evaluation</a> <a href="#">Other</a> <a href="#">Reading List</a> <a href="#">Tutoring Services</a>																																										
<b>ANATOMY &gt; CONTENT</b> <span style="float: right;"><a href="#">Upload</a></span>																																												
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Type</th> <th style="width: 80%;">Document</th> <th style="width: 10%;">Authors</th> </tr> </thead> <tbody> <tr> <td></td> <td><a href="#">Suggested Syllabus</a></td> <td></td> </tr> <tr> <td></td> <td><a href="#">Lectures: 2011-12</a></td> <td></td> </tr> <tr> <td></td> <td><a href="#">Lectures 2010-2011</a></td> <td></td> </tr> <tr> <td></td> <td><a href="#">"Complete" Set of Lectures</a></td> <td></td> </tr> <tr> <td></td> <td><a href="#">Other Lectures and Teaching Material</a></td> <td></td> </tr> <tr> <td></td> <td><a href="#">Previous University Question Papers</a></td> <td></td> </tr> <tr> <td></td> <td><a href="#">Gross anatomy videos</a></td> <td>Tripti M. Jacob</td> </tr> <tr> <td></td> <td><a href="#">Histology Slides</a></td> <td></td> </tr> <tr> <td></td> <td><a href="#">Cross Sectional Anatomy</a></td> <td></td> </tr> <tr> <td></td> <td><a href="#">Clinical Anatomy</a></td> <td></td> </tr> <tr> <td></td> <td><a href="#">Dr.Harsha's Archives - Lecture Slides</a></td> <td>Bertha Rathinam; Suganthy</td> </tr> <tr> <td></td> <td><a href="#">Dr.Harsha's Diagrams</a></td> <td></td> </tr> <tr> <td></td> <td><a href="#">Intelligent Design</a></td> <td></td> </tr> </tbody> </table>			Type	Document	Authors		<a href="#">Suggested Syllabus</a>			<a href="#">Lectures: 2011-12</a>			<a href="#">Lectures 2010-2011</a>			<a href="#">"Complete" Set of Lectures</a>			<a href="#">Other Lectures and Teaching Material</a>			<a href="#">Previous University Question Papers</a>			<a href="#">Gross anatomy videos</a>	Tripti M. Jacob		<a href="#">Histology Slides</a>			<a href="#">Cross Sectional Anatomy</a>			<a href="#">Clinical Anatomy</a>			<a href="#">Dr.Harsha's Archives - Lecture Slides</a>	Bertha Rathinam; Suganthy		<a href="#">Dr.Harsha's Diagrams</a>			<a href="#">Intelligent Design</a>	
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# DISCUSSION FORUM

Discussions Help Search Blog Messages Options

Topic Courses / PBL for Dermatology - Cases / 2.1) History of case 2 (154 hits) ⊕ ⊖ ⊞

Add Poll Tag Subscribe New Posts Unread Posts Flagged 1 2 ⊕ ⊖ ⊞

Stick Lock Move Merge Delete

**By @Shalini Nithyanandan** Date 2010-02-18 02:51

What are your impressions?  
Would you like to do any clinical test?  
Do you want to examine any other structure?

Reply Edit Delete Attach Flag

**By @Laxmisha Chandrashekar** Date 2010-02-18 04:00 ⊕

Dear all,

history is there. There is an option to zoom you just have to be patient for the image to zoom. please post ur comments prompt and do some reading regarding your thoughts. There are some questions to assist you. let all the brilliant minds get into action. you will have a short quiz at the end of the post please post ur answers. good luck

Reply Edit Delete Attach Flag Report Branch

**By NALINI NEWBIGGING** Date 2010-02-18 11:17 ⊕

we check for auspitz's sign...

Reply Edit Delete Attach Flag Report Branch

**By @Laxmisha Chandrashekar** Date 2010-02-18 11:23 ⊕

not bad at all way to go! where are the other guys

Reply Edit Delete Attach Flag Report Branch

**By SUSHEEL SUDHEESH** Date 2010-02-18 11:50 ⊕

looks like some kind of psoriasis all right...  
We should do the gartage test and also check for auspitz sign...☺

# IMAGE LIBRARY

Microbiology | Images | Bacteriology | General Bacteriology | A. Media | Spotter 30

**SPOTTER 30**

PREV UP NEXT

Keywords >

Objectives >

Notes >

Linked From >

Image Zoom >

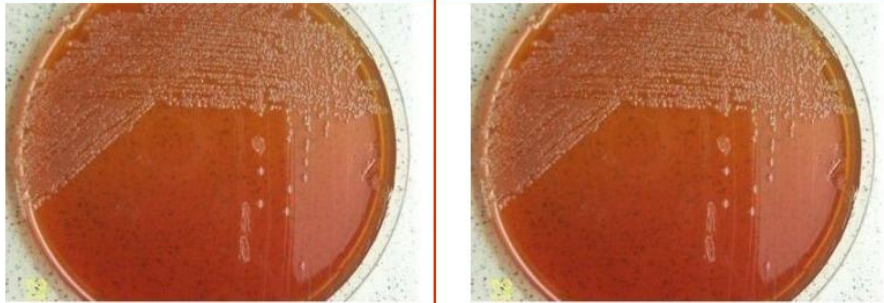
My Folders >

My Flash Cards >

Print >

History >

Info >



1) Identify the spotter.  
2) Mention two salient features about it.

Show Overlay

Created: Monday May 25, 2009

1) Non-lactose fermentin colonies on MacConkey Agar  
2) Features:  
- some organisms like Salmonella, Shigella and Pseudomonas produce Non-lactose fermenting colonies on MA which appear pale on the medium. This is because they dont utilize the sugar lactose in the medium.

Hide Overlay

Created: Monday May 25, 2009

Done



# QUIZZES

The screenshot displays the 'E-Learning Case Simulator' interface. At the top, there is a navigation bar with 'E-Learning Case Simulator' on the left, 'Welcome' in the center, and 'HELP | CONTACT US' on the right. Below the navigation bar, the main content area is titled 'E-learning Home | Course - E-Learning Playground' and 'Treatment Quiz - (PREVIEW)'. The left sidebar contains several expandable panels: 'Case Overview' (A Demo Case), 'Case Navigation' (A Demo Case, Instructions, History, Chief Complaint, Physical Exam, ABDOMINAL EXAMINATION, Differential Diagnosis, Diagnosis, Relevant Investigations, Treatment, SOAP, Problem list, Summary), 'Patient Chart', 'My Notepad' (Make notes as you go along), and 'Cost' (View the cost incurred for this patient care.). The main content area contains two quiz questions: 1. 'What are the side effects of Amphotericin B' with a text input field, and 2. 'Amphotericin B is effective against' with radio button options: a. Bacterial infections, b. Fungal infections, c. Viral infections, d. All the above, and e. None of these. A 'Submit Quiz' button is located at the bottom of the main content area.

# VIDEO STREAMING

The screenshot shows a web browser window displaying an E-learning video player. The browser address bar shows the URL 'http://tuskback.cmcvellore.ac.in/view/content/M52C/2498/2509'. The page header includes 'E-learning Christian Medical College Vellore Curriculum Website' and navigation links: 'Home', 'Browse All Courses', 'Search', and 'Manage Content'. The main content area is titled 'E-Learning Playground | Video streaming test | samp mov'. The video player interface includes a navigation menu on the left with options: PREVIOUS, UP, NEXT, Keywords, Objectives, Notes, Linked From, My Folders, Print, History, and Info. The video player itself shows a surgical procedure with the text 'If you cannot see the plugin, download the FREE QuickTime Player here.' Below the video player, there is a metadata section: 'Created: Saturday January 24, 2009', 'Modified: Saturday January 24, 2009', and 'Contributor: Copyright Information: Copyright 2009, Christian Medical College'. The footer of the page contains links for 'About Us', 'Contact Us', 'Dodd Memorial Library', 'Intranet (campus or CyberRoom access only)', and 'CMC Website', 'CMC Edu Site', 'CMC E-mail'.

## NOTES

SYSTEMATIC BACTERIOLOGY

PREV UP NEXT

Keywords >

Objectives >

Notes

Full Notes

Folder Notes

Linked From >

My Folders >

My Flash Cards >

Print >

History

Info >

Type	Document	Authors
	Staphylococci	Shalini Anandan, M.D.
	The Streptococci	Shalini Anandan, M.D.
	Coccus	Shalini Anandan, M.D.
		Shalini Anandan, M.D.
		Shalini Anandan, M.D.
		Mary Mathews
		Shalini Anandan, M.D.
		Shalini Anandan, M.D.
		Joy Michael, M.D. FRCPath
		Joy Michael, M.D. FRCPath
	Spirochaetes 1 - Treponema pallidum	Shalini Anandan, M.D.

Notes

Save Notes

## FLASH CARDS

Microbiology | Images | Mycology | Microscopic Preparation | Spotter 2

SPOTTER 2

PREV UP NEXT

Keywords

Objectives

Notes

Linked From

Image Zoom

My Folders

My Flash Cards

Print

History

Info >

My Flash Cards

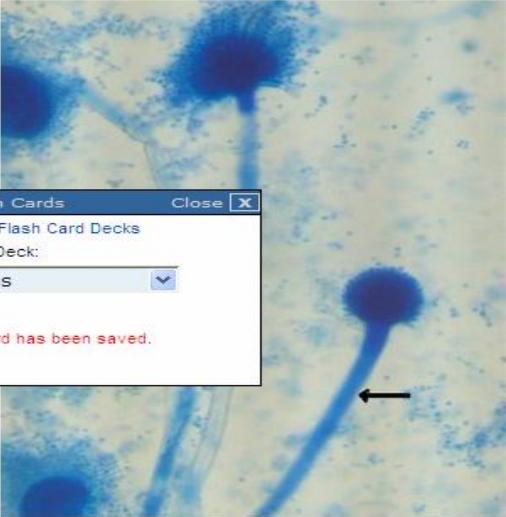
Manage Flash Card Decks

Save in Deck:

images

Save

Your card has been saved.



1) Identify the microscopic preparation.

## **Description of the governance practice**

E-learning began as a project between Tufts University Boston and Christian Medical College Vellore. Currently, there are 3 programmers and 1 associate research officer. The Programmers work with developing online feedback, creation of new undergraduate courses, creation of username & password for new users, and providing technical support. The associate research officer works with individual faculty to create online educational materials.

## **Description of the hardware and software products and technology**

*Recommended:*

Server class PC, Redundant power supplies, Multi socket, multi core CPUs, ECC RAM, RAID controller, Remote management card (iLO), 2 internal HDDs, 2 Ethernet NICs, Keyboard and mouse

*Processor:* Intel or equivalent, multi socket, quad core, 2.0 GHz

*Memory* - 8 GB

*Storage:* Dual, 7200 RPM, 100 GB, SATA HDDs, RAID-1 configuration

*Network* - Gbps Ethernet NIC

*Operating System* - CentOS 5.8 x86-64 - Linux

## **Details of coverage of the target population**

CMC is a national leader in medical education and is ranked as one of the top medical colleges in India. CMC trains 500 undergraduate medical students and 220 residents and fellows. The E-

learning portal is a resource that has been widely used by the students and faculty of the institution.

Another thrust area of the initiative has been to create a technology platform to support educational linkages with mission hospitals in rural India. The goals of the mission hospital project are to create a technology platform to: (a) support clinical training of CMC students at the primary/secondary care level through the mission hospitals and (b) provide educational support to doctors working at primary and secondary level, through guidelines for common problems, referral support for complex cases, and continued learning opportunities.

The use of technology for education is a step forward in bridging the academic distance between the medical college and primary and secondary level providers and provides an opportunity for working towards equitable health care and healthy communities.

### **Comparison of the pre-deployment scenario and the post deployment scenario - how the solution helped**

Accessibility to relevant, concise learning material was a felt need of the students. E-learning provided this solution and enhanced student learning by allowing students to access learning materials at their own convenience and to pace their learning curve. The component of feedback which has been mandatorily implemented after each learning module has helped clinical and para-clinical departments improve on their teaching strategies, thus adding a continuous quality improvement component to the process. The use of discussion forums has created a more inclusive learning experience, encouraging students to learn from each other, and fostering better interaction between students and teachers. E-learning has also indirectly resulted in better

classroom teaching: students can come prepared for lectures, classroom time can be optimally utilized to address specific learning objectives, and students can devote more attention to listening to their instructors rather than taking down copious notes. The benefits of E-learning were highlighted by Joe Varghese et al who carried out a study to assess the impact of E-resources on learning in biochemistry among first year medical students at CMC, the results of which were published in the journal *BMC Medical Education*, and can be accessed at <http://www.biomedcentral.com/1472-6920/12/21#B7>

### **Cost effectiveness of the project**

Running costs are minimal as it does not cost any money to upload lectures or videos as learning resources for students. Students can in turn access the learning material at any time, from any location, via internet for free. This makes it a very cost effective and easily accessible learning tool.

### **Integration with other e-governance projects**

Currently we have not integrated with any e-governance projects

### **Details of cybersecurity measures in the project**

There are no security threats since the E-Learning Service runs on the Linux Environment. We use Secure Socket Layer certificate to protect user information.

### **Key learning from the project**

Information technology can be harnessed to improve the accessibility and acceptability of learning materials, aid in dissemination of knowledge to health professionals serving in areas of need and provide a platform for interaction between students and teachers, at a fraction of the cost incurred by more conventional methods of instruction.

### **Future road map of the project**

The E-learning program is in the process of developing more lectures to ensure that all aspects of the undergraduate medical curriculum are covered and available online. More videos on patient examination and diagnosis need to be created in order to improve the students' practical skills and make learning relevant to clinical care.

### **The E-learning development/administrative team**

Dr. Alfred Job Daniel, Principal of the Christian Medical College is the administrative Head of E-learning. Under him is the Vice-Principal in-charge of undergraduate students who oversees the day to day running of the E-learning project. The project was initiated by Vice-Principal Dr. Anand Zachariah and followed through by the next Vice-Principal Dr. Anna Pulimood. The staff involved in the programming, maintenance and development of the E-learning website are programmers Syamala, Vasanth, Santhiya and associate research officer Roshni. The CV of Dr. Alfred Job Daniel is enclosed.

**CURRICULUM VITAE**

**OF**

**ALFRED JOB DANIEL**

**Name** Alfred Job Daniel

**Religion** Christian

**Qualifications** **M B B S**  
**D Orth**  
**D N B Orth**  
**MS Orth**

**Address for Communications** **Principal**  
Christian Medical College  
Vellore – 632 002

**Professor & Head**  
Dept. of Orthopaedics  
Christian Medical College Hospital  
Vellore – 632 004

## **FURTHER TRAINING:**

### **In The U.K.**

Registrar, Dept. of Orthopaedics, The Royal United Hospital, Bath, BA1 3NG	Sept.98- Sept.2000
Registrar, Dept. of Orthopaedics, The General Hospital, Hereford, HR1 2PA	Oct.97- Sept.98

## **AWARDS:**

- Eminent National Board Examination Teachers Award Feb 2012
- Best Teacher Award received from The Tamilnadu Dr. M.G.R.  
Medical University, Chennai Jul 2012

## **WORK EXPERIENCE:**

<b>Professor and Head of Orthopaedics</b> Christian Medical College & Hospital, Vellore, India	Aug 2010- Till date
<b>Senior Consultant Orthopaedic Surgeon</b> , Ministry of Health, Sultan Qaboos Hospital, Salalah, Oman.	Aug 2008- Aug 2010
<b>Professor &amp; Head of Orthopaedics</b> , Christian Medical College & Hospital, Vellore, India	Jul 2007- Aug 2008
<b>Professor of Orthopaedics &amp; Consultant Surgeon</b> , Christian Medical College & Hospital, Vellore, India	Jan 2001- till date
<b>Consultant Surgeon in Orthopaedics</b> , C M C Hospital, Vellore, India	Mar 1991 - Dec.2000
<b>Registrar, Dept. of Orthopaedics, The Royal United Hospital,</b> Bath, BA1 3NG., <b>U.K.</b>	Sept.98- Sept.2000
<b>Registrar, Dept. of Orthopaedics, The General Hospital,</b> Hereford, HR1 2PA., <b>U.K.</b>	Oct.97- Sept.98



**ADDITIONAL RESPONSIBILITIES:**

<b>PRINCIPAL</b>		from Sept 2011
<b>VICE PRINCIPAL</b>	( Post Graduates ) of our College	2002-2006
<b>REGISTRAR</b>	( Admissions and Academics) of our College	2007
<b>EXAMINER</b>	1. Dr. MGR Medical University, for Master's degree in Orthopaedics	2002,2003, 2010,2011 2012,2013
	2. Dr. MGR Medical University, for Diploma in Orthopaedics	2003, 2006, 2012
	3. Dr. MGR Medical University, for Bachelor's Degree in Occu. Therapy	2001
	4. Rajiv Gandhi Medical University, Karnataka for M B B S	2003, 2008
	5. Dr.NTR Medical University, Andhrapradesh for Master's Degree in Orthopaedics	2004

# **Christian Medical College**

Ida Scudder Road,  
Vellore, Tamil Nadu - 632004  
India

Telephone : 0416-2282010  
Email: [director@cmcvellore.ac.in](mailto:director@cmcvellore.ac.in)