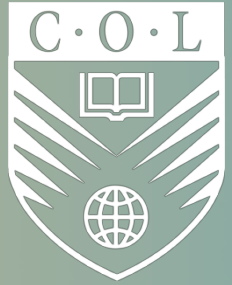


# ICT Capacity Building: Game Changers on the Horizon?

*Balaji V*  
*Director, Technology & KM*

September 2012



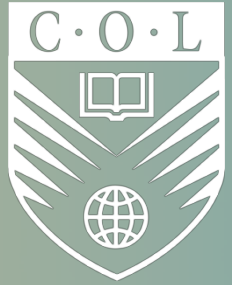


# Commonwealth of Learning COL

- Inter-governmental organization (1987)
- 54 member countries
- Focus on helping member governments improve

**Scale    Efficiency    Quality of Learning**

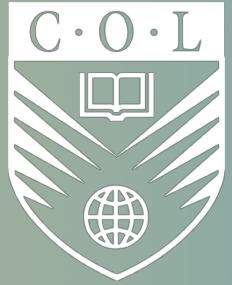
- Appropriate Tech, Open and Distance Learning



# Rapid, Mass Capacity Building in ICT

- A felt need in many developing countries
  - Especially in large developing countries
  
- Industrial Training and Conventional Higher Education CANNOT meet this need by themselves

# Because there is an Insidious Assumption...



“Open education broke open the iron triangle of access, cost and quality that had constrained education throughout history and had created the insidious assumption, still prevalent today, that in education you cannot have quality without exclusivity”

**Sir John Daniel**



# Two Key Developments

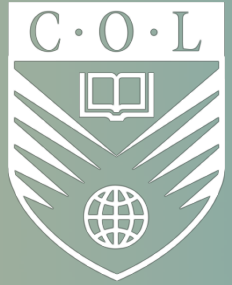
## #1 Open Educational Resources- OER



MITOPENCOURSEWARE  
MASSACHUSETTS INSTITUTE OF TECHNOLOGY



**NPTEL** National Programme on  
Technology Enhanced Learning



# Open Educational Resources

- Economic Rationale: not proven
  - Until recently, that is
- Contextualization Expensive
  - From the teacher-administrator perspective
- Level of complexity does not suit learners
  - Yes, in typical classroom
  - Not in a Flipped Classroom



# Commonwealth Universities Full Course Material

Undergraduate Level  
Openly Accessible

*1408 courses catalogued*

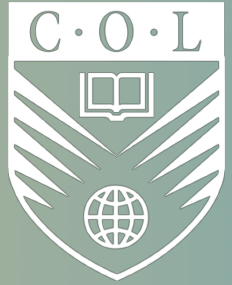


**COMMONWEALTH CONNECTS PORTAL**  
DIRECTORY OF OPEN EDUCATIONAL RESOURCES

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COMMONWEALTH OF LEARNING



# Who are the Major Publishers...

- National Open University of Nigeria
- UK Open University
- NPTEL-India
- Indira Gandhi National Open University-India
- African Virtual University
- University of Cape Town



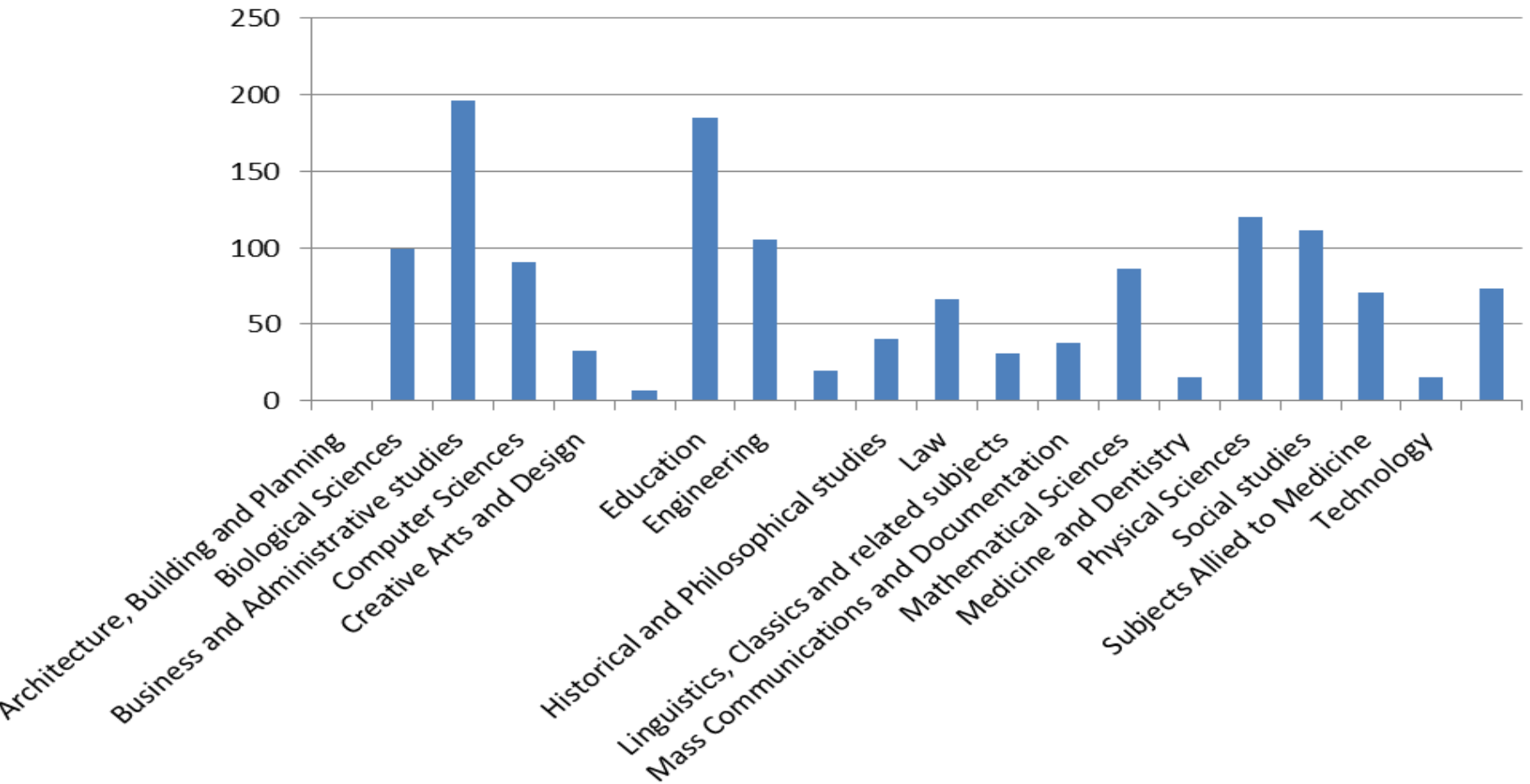
# Publishers with more than 60 courses each

1	<b>African Virtual University</b>	<b>70</b>
2	<b>Athabasca University</b>	<b>10</b>
3	<b>AU Press</b>	<b>5</b>
4	<b>Capilano University</b>	<b>20</b>
5	<b>GetSmarter</b>	<b>1</b>
6	<b>HSRC Press</b>	<b>2</b>
7	<b>Indira Gandhi National Open University</b>	<b>113</b>
8	<b>Intercultural and Diversity Studies of Southern Africa (iNCUDISA)</b>	<b>1</b>
9	<b>Kwame Nkrumah University Of Science &amp; Technology</b>	<b>13</b>
10	<b>National Open University of Nigeria</b>	<b>501</b>
11	<b>National Programme on Technology Enhanced Learning</b>	<b>122</b>
12	<b>Otago Polytechnic</b>	<b>37</b>
13	<b>Quantum computing</b>	<b>1</b>
14	<b>Teaching Education in Sub Saharan Africa</b>	<b>31</b>
15	<b>The Open University</b>	<b>358</b>
16	<b>The University of British Columbia</b>	<b>1</b>
17	<b>United Nations University</b>	<b>2</b>
18	<b>University College Falmouth</b>	<b>2</b>
19	<b>University of Cape Town</b>	<b>64</b>
20	<b>University of Nottingham</b>	<b>26</b>
21	<b>University of Oxford</b>	<b>11</b>
22	<b>University of Southern Queensland</b>	<b>10</b>
23	<b>Virtual University for Small States of the Commonwealth; Commonwealth of Learning</b>	<b>7</b>

Total

**1408**

# Computing gets covered in a big way...



# Meta Data for Each OER



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**Title:** Data Structures And Algorithms

**Authors:** [Garg, Naveen](#)  
[Indian Institute of Technology \(IIT\) Delhi](#)

**Keywords:** [Data structures \(Computer science\)](#)  
[Pattern recognition systems](#)

**EduTags:** [Undergraduate](#)  
[Video Lecture](#)

**Issue Date:** 2008

**Publisher:** National Programme on Technology Enhanced Learning

**Abstract:** 1 - Introduction to Data Structures and Algorithms (53:31) 2 - Stacks (01:04:09) 7 - Tree Walks / Traversals (51:10) 8 - Ordered Dictionaries (56:17) 9 - Deletion of Red Black Trees (01:04:33) 15 - Insertion in Red Black Trees (48:34) 16 - Disk I/O - Data Compression (45:46) 20 - Priority Queues (49:46) 21 - Binary Heaps (41:57) 26 - Two Applications of Breadth First Search (53:24) 27 - Depth First Search (57:48) 28 - Applications of Breadth First Search (53:24) 29 - Depth First Search (57:48) 30 - Applications of Breadth First Search (53:24) 31 - Minimum Spanning Trees (5:58) 32 - Shortest Paths (58:58) 33 - Correctness of Dijkstra's Algorithm (55:59) 34 - Shortest Paths (58:58)

**URI:** <http://64.114.230.153:8080/jspui/handle/123456789/585>

**Original Source:** <http://nptel.iitm.ac.in/video.php?subjectId=106102064>

**Appears in Collections:** [Computer architectures & operating systems](#)

# Typical OER- NPTEL, India

NPTEL

E-LEARNING COURSES FROM THE IITs & IISC



NPTEL >> Courses >> Computer Science and Engineering >> Data Structures And Algorithms (Video) >> 1 - Introduction to Data Structures and Algorithms

Video Watch on YouTube Download

**A Better Algorithm**  
**Algorithm** `prefixAverages2(X)`:  
*Input:* An  $n$ -element array  $X$  of numbers.  
*Output:* An  $n$ -element array  $A$  of numbers such that  $A[i]$  is the average of elements  $X[0], \dots, X[i]$ .

```
s ← 0
for i ← 0 to n do
  s ← s + X[i]
  A[i] ← s/(i+1)
return array A
```

**Analysis:** Running time is  $O(n)$

Browse Video by Topic

- Beyond Experimental Studies
- + Pseudo Code
  - Analysis Algorithms
  - Pseudo Code
  - Analysis of Algorithms
  - Insertion Sort
- + Best Worst Average Case
  - Asymptotic Analysis
- + Example
  - Example Asymptotic Analysis
  - Better Algorithm**
  - Asymptotic Notation terminology
- + Asymptotic Notation

Powered by NPTEL

Lectures in this course:36

**1 - Introduction to Data Structures and Algorithms (53:31)**

- 2 - Stacks (01:04:09)
- 3 - Queues and Linked Lists (01:00:35)
- 4 - Dictionaries (53:43)
- 5 - Hashing (01:01:22)
- 6 - Trees (43:14)
- 7 - Tree Walks / Traversals (51:10)
- 8 - Ordered Dictionaries (56:17)
- 9 - Deletion (58:32)
- 10 - Quick Sort (58:44)
- 11 - AVL Trees (53:41)
- 12 - AVL Trees (01:00:19)
- 13 - Trees (49:11)
- 14 - Red Black Trees (01:04:33)
- 15 - Insertion in Red Black Trees (48:34)
- 16 - Disk Based Data Structures (42:36)
- 17 - Case Study: Searching for Patterns (01:02:01)
- 18 - Tries (01:01:35)

# Learners Use OER's: MCA in an Open U

facebook  Venkataraman Balaji

**IGNOU MCA STUDENTS' FORUM** Timeline Now Like

Write a comment...  
Press Enter to post.

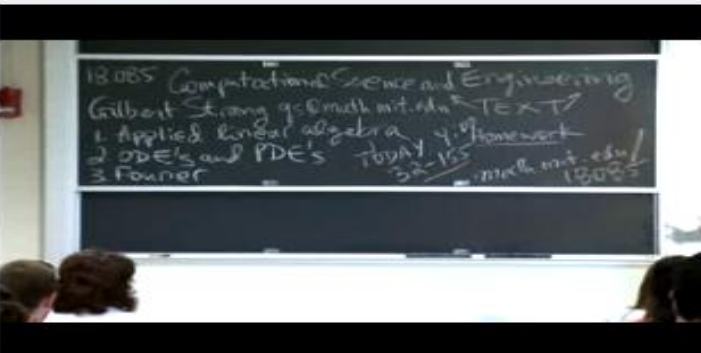
**IGNOU MCA STUDENTS' FORUM** shared a link. September 7

Today, i.e. on 08.09.2012 the following MCA subjects will be discussed on Gyandarshan-II channel as part of a tele-counselling programme. Please log into our forum (<http://www.santanu.in/forums>) at the following time to join the tele-coun...[See More](#)

**IGNOU MCA STUDENTS' FORUM (IMSF) |**  
[www.ignou.ac.in](http://www.ignou.ac.in)  
[www.santanu.in](http://www.santanu.in)

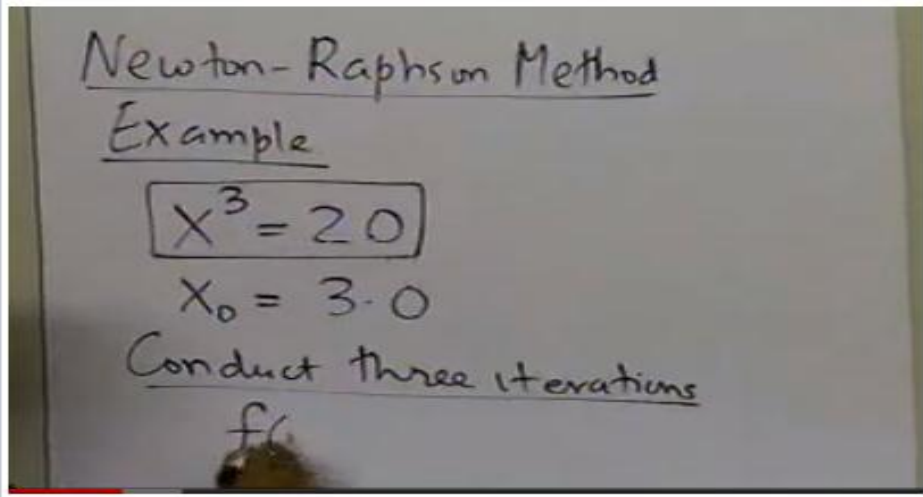
Like · Comment · Share  
3 people like this.

**Donesh Bajaj** I watched <http://www.youtube.com/watch?v=CgfkEUOFAj0> . great one



**IGNOU MCA STUDENTS' FORUM** shared a link. September 6

MCSE-004: Newton-Raphson Method



Java 5. I go through installing Java SE 1.5, then downloading Tomcat 6. I then...

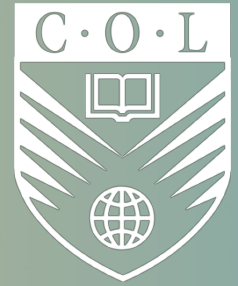
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5 people like this.

**Vicky D Tricky** Good one :)  
September 8 at 7:01pm · Like

**Harshad Vaghela** good work  
September 8 at 8:43pm · Like

Write a comment...  
Press Enter to post.

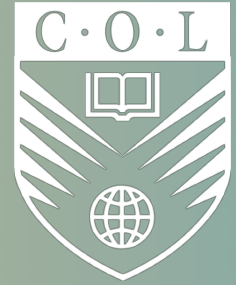
# OER's in ODL in developing countries



- No Incentives for faculty to create or use
  - Limited capacity, awareness
  - Research by OER Asia (2012)
- Much wider use among Learners in ICT areas
- Good proportion of OER devoted to ICT topics

## Key Development #2

# Rapid Emergence of MOOC's



**Udacity**

*MOOC.CA*

- Massive Open Online Courses (MOOC)
- Registrants number in one exceeded 150 000
- Low completion rates: 8-15 % generally
  - Still as many as would go through in 40 years if offered only in a classroom







# MOOC's and OER

- Several MOOC's offer OER's



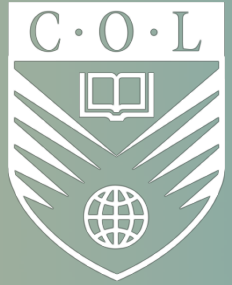
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<http://creativecommons.org/licenses/by/3.0/>.

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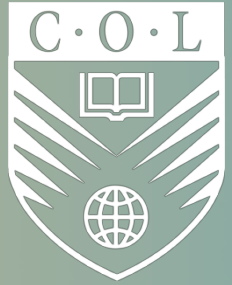
- OER's are used in many....



# MOOCs and ODL



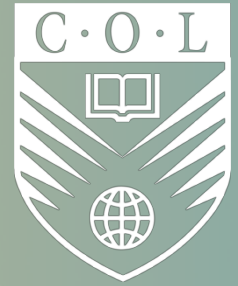
- Distinct:
  - Online Learning and ODL/Distance Education
  - Unsteady, slow convergence...
- Not any more
- Key tech constraints in Online Ed resolved in MOOC:
  - Mass registration
  - Mass tracking of progress
- New advantages to MOOC in mass education



# MOOC's are Disruptive...

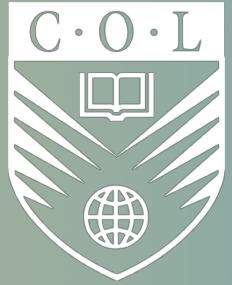
- Blends of Online and Contact-Centered Learning
  - Udacity, EdX: proctored testing
- Novel e-Portfolio
  - Udacity creates non-alterable portfolio of a learner
  - Can share it across institutional (thus, national) boundaries
- If standards evolved, new academic credit banking is feasible

# MOOC+ e-Portfolio with OER: truly disruptive



- Contours of a new paradigm in mass training and education in ICT
- More affordable, more accessible
- Highly modular
  - More suitable for on-the-job, pre-employment training
  - More amenable for continuing education
- Delink certification and completion of whole courses

# MOOC+OER in Developing Countries



- Grand new opportunities for ICT Capacity Building
  - Mass Scale
  - No Exclusivity
  - Quality Assured
  - Modular
  - Affordable
  - Relevant to Employers and Entrepreneurs
- Analogy: Car Phones of 1970's and mass-marketed cell phones of today