Open Social Learning Communities

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Preetha Ram, Chris Sprague, Saurav Sahay, Hua Ai
My Background

- BTech EE IIT Delhi 1982
- MS CS Illinois 1984
- PhD AI/CogSci Yale 1989
- Professor CS Georgia Tech 1989–99
- Professor CS/HCC Georgia Tech 2003–
- Founder Enkia 1999 (acquired)
- Founder OpenStudy 2007
Cognitive Computing

Cognitive Systems

Cognitive Science
Cognitive Computing

Intelligent Systems

Human-Centered Computing
Pasteur’s Quadrant

- Pure basic research (Bohr)
- Use-inspired basic research (Pasteur)
- Pure applied research (Edison)

Relevance for the advancement of knowledge

Relevance for immediate applications
Application Areas

- Monitoring & Diagnostics
- Robotics
- Bio/Med/Healthcare
- Games
- Education

...and more
Open Social Learning
More than one-third of the world’s population is under 20. By 2006, 100 million qualified to enter a university will have no place to go.

To meet this staggering demand, a major university needs to be created each week.

— Sir John Daniel (1996)
Education: What’s the problem?

Engagement

88% of high school dropouts have passing grades.

— Gates Foundation study “Silent Epidemic” (2006)

47% of dropouts say “classes are not interesting”.

60% find video lectures “boring”.

60% read less when using e-textbooks.
The Long Tail of Education
The Long Tail of Education

Traditional
- New York University
- Harvard
- University of Oxford

MIT OCW: 9m users/yr
iTunes U: 300m downloads
Khan: 30k videos/day

Open Education
- MIT OCW
- iTunes U
- videolectures.net
- Open Yale courses
Education: Still a problem

Engagement

60% find video lectures “boring”.

Great video and talented presenters. My only complaint: I’d like to interact with others who are viewing the resources. Creating a one-way flow of information significantly misses the point of interacting online.

— George Siemens (2007)
What Engages Our Students?

95% spend 10-15 hrs/wk on Facebook

80% go to Wikipedia

55% use IM for homework
What Engages Our Students?

$I11B$ market

“I'm calling for investments in educational technology that will help create … educational software that is as compelling as the best video game.”

— Barack Obama (2011)
Imagine “Open Social Learning”

Imagine a Facebook where the point is to study together, not trade pictures and jokes.

Imagine a World of Warcraft where students earn points by helping each other learn.

Not educational games. Education experience itself is structured as a “social game”.

Cognitive Computing Lab
Open Social Learning

Traditional
- New York University
- Harvard
- University of Oxford

Self Learners
- MIT OCW
- iTunes U
- videolectures.net
- Open Yale courses

Community Colleges

Home Schoolers

Edu Content

OpenStudy

Cognitive Computing Lab
The Team
OpenStudy is…

“a social platform for learners who want to help each other study”

“you’re no longer alone—you have the world’s biggest classroom to turn to, any time, anywhere”

“a global study group”

“global element is important…users will almost always find someone online in the study groups”

“one of ten most innovative companies in education”
Community of learners

No boundaries
From 3rd graders to college students to professionals
Anytime Anywhere
Community of learners

Multi-student study sessions

“Make the world your study group”
Community of learners

Gamification

Achievements and Medals

Mathematics
17 Medals
10 Achievements

Biology
0 Medals
1 Achievement

Computer Science
2 Medals
1 Achievement

Mathematics
8 Medals
7 Achievements

MIT 6.0 Intro
Computer Science
0 Medals
2 Achievements

School: Art Center College of Design
About Me: work hard, and play harder! PA A A R T A Y!! ☆☆☆☆☆

School: Georgia Institute of Technology
About Me: C.S. major

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# 9 months of OpenStudy

## OCW
- MIT OCW
- Open Yale Courses
- OpenMichigan
- UC Irvine
- Notre Dame
- NYU
- Emory
- Georgia State U
- Korea University
- NCTU
- Tufts
- TU Delft
- Tokyo University
- Process.Arts
- African Virtual University
- Distance Education Univ. Costa Rica
- Monterey Inst. Technology
- Purdue Online Writing Center

## OER
- CDC (TRAIN)
- SmartHistory (MOMA)
- Purple Math
- Tutorial.Math.Lamar.edu
- FreeMathHelp
- HelpWithFractions
- BiologyCorner
- CellsAlive
- Physics 1728.com
- HyperPhysics
- CalculatorSoup
- Videolectures.net
- Connexions
- DavidDarling Info
- HippoCampus
- Prof. Damodaran

## Community
- 50,000 users
- 600,000 views/month
- 18 minutes/session
- 1,000 questions/day
- 70% answered in 5 min

- Study Groups
  - Math
  - Biology
  - Physics
  - Chemistry
  - Engineering
  - Comm & Media
  - Arts & Design
  - Finance
  - Computer Science
How to use OpenStudy

Students & Educators
Login or Facebook
Join group(s)

Education Resources

Select Widget Type
Pick Location
Paste Code
User Demographics

- United States: 44.95%
- UK: 26.02%
- India: 13.86%
- Canada: 1.3%
- Other: 1.3%

Age Distribution:
- Female: 19%
  - 13-17: 1.3%
  - 18-24: 8.7%
  - 25-34: 4.9%
  - 35-44: 2%
  - 45-54: 1.3%
  - 55+: 0.76%
- Male: 77%
  - 13-17: 4.2%
  - 18-24: 38%
  - 25-34: 22%
  - 35-44: 7.4%
  - 45-54: 3.2%
  - 55+: 2.5%
User Feedback

crestrideac: this is my first time on this program but its addicting trying to answer these random questions

tacobell1234: i know right?

iamignorant: This website is really a revolution

iamignorant: It has really changed the way we studied

"Addictive"

"Revolution"
User Feedback

“Awesome”

Study help

Peer support
User Feedback

“Love it”

TBates: I love the community here, people are free to ask any question in math they have and people give step by step instructions and explain the problems as opposed to just giving an answer.

“Explanations, not answers”
Open Social Learning

Open Communities of Learning Peer-to-Peer
Open Social Learning

Open Communities of Learning Peer-to-Peer

“Massively multiplayer online learning” — students everywhere, connected, learning together

It is not accidental that social networks are so well adapted to education. [The] value is in the human connections it creates while relieving the drudgery of studying alone.

— Rich DeMillo, C21U

Let students teach each other, earning social capital via a system of game-like rewards.
Other Learning Communities

How do people get healthcare information?

“First, they do an on-line search.”
Internet is the leading source of health and wellness information.

Figure 1. Sources Used to Find or Access Health- and Wellness-Related Information in the Past 12 Months

Source: KPIs Across America Searches: Health and Wellness, January 2008
Health 1.0 → Health 2.0

Figure 1. Sources Used to Find or Access Health- and Wellness-Related Information in the Past 12 Months

<table>
<thead>
<tr>
<th>Percentage of Adults Referencing...</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disease associations/Support groups</td>
<td>Wikipedia, FluWiki, WiserWiki</td>
</tr>
<tr>
<td>Pharmaceutical companies</td>
<td>Blogs</td>
</tr>
<tr>
<td>Someone else with the same condition</td>
<td>DiabetesMine, HealthMatters (Healthline), WebMD</td>
</tr>
<tr>
<td>Nurse/Nurse practitioner</td>
<td>Social networks</td>
</tr>
<tr>
<td>Pharmacist</td>
<td>OrganizedWisdom, PatientsLikeMe, DailyStrength, SecondLife, Sermo, ReliefInSite, NursesRecommendDoctors, TheHealthCareScoop, MySpace, Facebook</td>
</tr>
<tr>
<td>Television</td>
<td>Video-sharing</td>
</tr>
<tr>
<td>Newspapers/Magazines</td>
<td>ICYou, YouTube</td>
</tr>
<tr>
<td>Relatives/Friends/Co-workers</td>
<td>Online forums</td>
</tr>
<tr>
<td>Doctor</td>
<td>Yahoo! Groups, Revolution Health Groups, Google Health Groups, Groups@AOL, About Groups, iVillage</td>
</tr>
<tr>
<td>Internet</td>
<td>Podcasts</td>
</tr>
<tr>
<td></td>
<td>Johns Hopkins Medical Podcasts, NIH Podcasts, CDC Travelers Health, dLife podcasts for diabetes</td>
</tr>
</tbody>
</table>

Cobot: Conversation Bot for Healthcare
I heard that flu shots may have side effects. Is it safe to get a vaccine when you are pregnant?

Johns: I am expecting a boy this December, and I am very worried about H1N1 flu. Since I'm pregnant, I am not sure the vaccine is safe enough for me or my baby.

Sarah: CDC is recommending for pregnant women to get the H1N1 vaccine. You need to be much more concerned about your health than the baby's health.

JennB: Here is the article. www.cdc.gov/flu/protect/
Building the Site

- Theory
- Design
- Technology
Learning Theories


Fuchs, 1997

Lave & Wenger, 1991

Peer-to-Peer learning,

Communities of Practice

Blended Learning

Social Constructivism

OpenStudy

Vygotsky, 1978
Architecture

User Experience Design

Really Real-Time Collaboration

AI Recommendation Engine

Social Media Analytics

Social Capital Engine
Technology Stack

Matching Engine
- Collaborators
- Communities
- Questions

Learning Profiles
- Interests
- Competencies
- Soft skills

Real time studying
- Live updates
- Learning tools
- Always on

IP

Lift web framework (scala)
1. Comet implementation (real-time updates)
2. Static page generation
3. Talks to backend Akka "actors"
4. OpenStudy REST API

Akka Distributed Actor Framework (scala)
- Study Group Actors (one per topic)
- User Actors (one per user)

MongoDB
- Student Learning Profile
  - Good answers (medals)
  - Achievements and badges
  - Topics of interest
  - Fans and collaborators
  - Group chat messages
  - Retention

Personalized profile

Real-time Q&A

Game-like rewards
Need: Global Real-Time Conversations
Technology: Really real-time interaction

Matching Engine
- Collaborators
- Communities
- Questions

Learning Profiles
- Interests
- Competencies
- Soft skills

Real time studying
- Live updates
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Need: Finding Open Resources
Need: Finding Content and People

Start Conversation

Conversations to Join

- Pregnancy & Swine Flu
  Getting H1N1 flu vaccine by September means skipping all but the most preliminary clinical tests of vaccine safety...
  A second wave is likely to occur, as soon as fall...

- Swine Flu Vaccine
  We cannot wait beyond mid-August to make a decision if vaccine is...
  Best estimates suggested that infection rates will...

- Female Health
  Initial doses likely will go to those most severely hit by the pandemic...
  Here is the article. [www.cdc.gov/flu/protect/](http://www.cdc.gov/flu/protect/)

- H1N1 Flu and New Boros
  There was a recent announcement from CDC about recent vaccine...
  The side effect of flu vaccine continues to...

People you may talk to

- happydragon
  diet, obesity, fitness

- larry69
  asthma, fitness

- curious33
  asthma, parenting

- julied49
  pregnancy, new born, parenting

Your Inbound Conversations (4)

- H1N1 Flu
- Diabetes
- Allergies
- Heart Attack

Related Web Resources

- News for Vaccine
  Yearly flu vaccination should begin in September or as soon as...
  [CNN](http://www.cnn.com)

- Influenza Vaccine (Flu Shot) Facts
  Side effects of the inactivated flu vaccine are not common. In 19...
  [WebMD](http://www.webmd.com)

- Anybody knows about flu vaccine?
  [Yahoo News](http://news.yahoo.com)

Healthy Woman

Women need different treatment in every way...

view Join

Cognitive Computing Lab

Georgia Tech College of Computing
Technology: Collaborative Info Search

Social Graph

User Model

Semantic Network

Socio-semantic Network
Technology: Analysis Pipeline

- Analyze
- Model
- Retrieve

- Conversations
- Documents
- Users
Technology: Semantic Analysis

Semantic Analyzer

- Concept Extractor
- Utterance Classifier
- Query Generator

Analyse → Model → Retrieve

Conversations
Documents
Users

Cognitive Computing Lab
Georgia Tech College of Computing
Technology: Utterance Classification

- Question
- Advice
- Disclosure
- Acknowledgement
- Interpretation
- Reflection
- Edification
- Confirmation
Technology: User Modeling

User Modeling

STM Update → Crossover → LTM Update

Analyze → Model → Retrieve

Conversations
Documents
Users
Technology: Socio-Semantic Search

Retrieve Engine

Case based Retriever  Web Retriever  Social Retriever

Analyze  Model  Retrieve

Conversations  Documents  Users

Cognitive Computing Lab
Case Specification:

\[ C_i = (Q_i, [(r_1, h_{r1}), (r_2, h_{r2}) ... (r_n, h_{rn})], [(c_1, h_{c1}), (c_2, h_{c2}) ... (c_n, h_{cn})]) \]

Similarity \( (Q_t, C_i) = \frac{Q_t \cap \text{Specification}(C_i)}{Q_t \cup \text{Specification}(C_i)} \)

Relevance \( (r_j, c_i) = \frac{h_{rj}}{\sum_{h_{rk} \in C_i} h_{rk}} \)

\[ \text{Weighted Relevance} \ (R_j, Q_t, C_1 ... C_n) = \sum_i \frac{\text{Relevance}(r_j, c_i) \times \text{Sim}(Q_t, C_i)}{\sum_i \text{Exists}(r_j, c_i) \times \text{Sim}(Q_t, C_i)} \]

Capturing User Interactions

- Search/Browse/Rate
- Natural Language Conversations

Problem: Recommending Documents, Conversations and Users actively

Technology: Recommendation Engine
Need: User Reputation (Social Capital)
Technology: Social Media Analytics

- **Automatic Measures from System Logs**
  - User login frequency
  - Duration of Login
  - Number of user contributions
  - Number of medals/fans

- **Student Self-assessment measures**
  - Motivational Strategy of Learning Questionnaire (MSLQ)
  - National Survey of Student Engagement (NSSE)
  - Student Assessment of Learning Gains (SALG)
Technology: Semantic User Profiling

Ask / Answer

Team
Individual

User A
User B

Python
Course-related
Algorithm
String
Variable

Programming
Java
C

Variable
Algorithm
Stack
Python
String
Programming

User A
User B

Team
Individual

Ask / Answer
Technology: Social Capital Analytics

+ Bridging and Bonding Social Capital
  + Bridging: weak ties
  + Bonding: strong ties

+ Social Connection Map
Architecture

User Experience Design

- Really Real-Time Collaboration
- AI Recommendation Engine
- Social Media Analytics
- Social Capital Engine
Is It Working?

- OpenStudy launched Sep 2010
- 50,000 registered users from 151 countries
- 125,000 unique visitors a month
- Selected for Gates/Hewlett Foundation challenge grant
- Adopted by MIT, Yale, NYU, many others
- Part of MIT 10-year “billion minds” plan for OCW
- #1 brand in social study
Education: Disruption Is Just Starting

Homework Help / Test Prep
- Koofers
- Cramster
- Coursehero
- Grockit
- Sparknotes
- eNotes

Open Universities
- University of the People
- Learnhub
- P2P University

Learning Management Systems
- Blackboard
- 9th Period
- Sakai (open source)
- Moodle
- eduCommons
- Nixty

Mobile Learning
- Inigral
- Open Culture
Vision: MMO Learning

A world-wide “guild” of people interacting, helping, collaborating, learning together.

“Addicted” to studying… and “loving” it.
Contact

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ashwinram@me.com
@ashwinram

“You’ve got mail.”

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