The Future of Learning:
How will people learn the skills they need for academe, work, and life?

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Search Quality & User Happiness

April, 2018
“Books will soon be obsolete in the public schools.”
– Thomas A. Edison (1913)
Learning and technology...
Pick the English word for **hestur**

- **goat**
- **foot**
- **horse**
- **world**

**English Icelandic**

- **skógur**
- **forest**
- **wood**
- **woods**
- **skóga**
- **rainforest**
- **regnskógur**
My job...

I am a cyber-tribal-techno-cognitive-anthropologist.

I study how groups of people think about, understand, and use the technology of information.
My job...

I am also a software engineer & research scientist.
LIFE BEFORE GOOGLE: A SHORT STORY

I JUST THOUGHT OF SOMETHING I’D LIKE TO KNOW MORE ABOUT.

THAT’S A DAMN SHAME.

THE END

-SHOEBOXBLOG.COM
Learning to use tools

Using Google Translate in a novel setting

push

kushinikiza

DICTIONARY
verb
-sukuma
noun
In 2000, I had a problem

- Teaching Artificial Intelligence at Stanford
My students are too good!

```java
public Best chooseMove(boolean side, int prevScore, int alpha, int beta) {
    Best myBest = new Best();
    Best reply;

    if (prevScore == COMPUTER_WIN || prevScore == HUMAN_WIN || prevScore == DRAW) {
        myBest.score = prevScore;
        return myBest;
    }

    if (side == COMPUTER) {
        myBest.score = alpha;
    } else {
        myBest.score = beta;
    }

    Log.d(TAG, "Alpha: " + alpha + " Beta: " + beta + " prevScore: " + prevScore);
    Move[] moveList = myBest.move.getAllLegalMoves(board);
    for (Move m : moveList) {
        String choice;
        if (side == HUMAN) {
            choice = playerChoice;
        } else if (side == COMPUTER && playerChoice.equals("X")) {
            choice = "O";
        } else {
            choice = "X";
        }

        Log.d(TAG, "Current Move: column- " + m.getColumn() + " row- " + m.getRow());
        int p = makeMove(m, choice, side);
        reply = chooseMove(!side, p, alpha, beta);
        undoMove(m);
        if (side == COMPUTER && (reply.score > myBest.score)) {
            myBest.move = m;
            myBest.score = reply.score;
            alpha = reply.score;
        } else if (side == HUMAN && (reply.score < myBest.score)) {
            myBest.move = m;
            myBest.score = reply.score;
            beta = reply.score;
        }
    }
    //end of if else statement
```
What do we need to know about finding information & learning in the Internet Age?
1. What’s possible to find?

- What *kinds* of things can you find online?
- What search capabilities allow you to find these things?
- What do you need to know to be able to do this?
Knowing cultural conventions genre/media

- Home page
- Bookmarks page
- Product page
- Product reviews site
- Online textbook
- Web directory
- Open source project
- Draggable maps
- Online survey
- Online news
- FAQ
- DIY guide
- Vines
- MOOCs
- Photo gallery
- Calls-For-Papers
- API docs
- P2P listings
- 3D object viewer
- MMORPG
- Internet memes
- Readme.txt
- Lolcatz
- Pinboard site
- Video
- Spoof site
- Etc etc etc...
Informacy

- The literacy of information...
- Knowing what the information is...
- How to use and interact with the information
Search / Visualize Data Sets

http://www.google.com/publicdata/
Search, Visualize, and Upload datasets

http://www.google.com/publicdata/
Two questions...

1. What kind of trees are these?
   (No guessing. You should be able to figure this out definitively.)

2. When I took this picture, I could hear a bell ringing in the distance. Why was the bell ringing?
   (Hint: It wasn't from someone's house.)
Most pictures have metadata

- Download EXIF data (lat, long):
  37.3648083333333, -122.4661083333323
Streetview to reproduce image

- Go to Google Streetview and put in lat/long:
Click through to Streetview...
Rotate your point-of-view to see street sign; Zoom in.
Do the obvious search:

[ Taaffe House Los Altos Hills ]

[ Taaffe House William Packard ]

[ church OR school ] (in Maps)
Look for all likely bell sources...
Either a church (too far away) or a monastery nearby

EXIF data shows picture time:
2013:04:04 16:35:18
April 4, 2013 at 4:35PM

[ Poor Clare's Los Alto Hills bells ]
→ http://poorclares.wordpress.com/a-day-in-the-monastery/
Task behavior of average users: Study #1

- How often do people search?
- How confident are they in their search skills?
92% say they’re confident in their searching ability

While 66% search less than 1 time per day

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<th>Frequency of searching</th>
<th>Very Confident</th>
<th>Somewhat Confident</th>
<th>Not Confident</th>
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<tr>
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<td>Sometimes</td>
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<tr>
<td>Rarely</td>
<td>-</td>
<td>1</td>
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</table>

<table>
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<th>Importance of most searches</th>
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<th>Somewhat Confident</th>
<th>Not Confident</th>
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<td>24</td>
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<tr>
<td>Unimportant</td>
<td>15</td>
<td>19</td>
<td>22</td>
</tr>
<tr>
<td>Mixed</td>
<td>51</td>
<td>57</td>
<td>69</td>
</tr>
</tbody>
</table>

Pew Internet & American Life Project (2005) ±3%
How Many Queries Do Users Make?

- 66% users have an average of less than a query a day

![Searches Per Week Per User](chart)
Finding text on a page

- Fundamental online reading skill
  - Control-F / CMD-F / Edit>Find>

- Lets you find a piece of text in an online document very quickly
Control-F aka CMD-F aka Edit>Find
Find how long Beth Smith took to run this race.
Study #1

Frequency (10-second buckets) n = 85

Beyond 120 secs, 25% of answers are incorrect.
Study #2: How many people know Control-F?

- Survey of 2,225 US-English internet users:
  - 90.5% do **NOT** know how to “find” on a page

- Survey of 545 US-English internet using teachers:
  - 51.1% do **NOT** know how to “find” on a page

- Analysis of over 50K Firefox users (worldwide):
  - 93% have **NEVER** used the “find” command on a page
1. Where is the Altar stone at Stonehenge believed to have come from?
2. In the Tin Tin comics, the name of a character originally named Blumenstein was changed after the original publication. What was it changed to?
3. Why did Captain Cook visit Tahiti?
4. What food was popular in the Medieval Belgian Village at the 1964 World Fair according to Wikipedia?
5. In 1984 the band named The Cure released an album entitled "The Top". The lead singer played all the instruments on this album except one. What is that instrument?
6. In the song "Day at the Races" by Jurassic 5, what are the next 3 lines following the line "Beatin’ up the block with the ghetto hop that knock and make you wanna crash the spot"?
7. Which 2 French New World colonies did the British capture during the Seven Years War?
Effect of knowing “Control-F”

Bottom line:
When you teach someone how to use Control-F

-12% TTR
Knowing the conventions of the culture: Genre/Media

- Home page
- Bookmarks page
- Product page
- Product reviews site
- Online textbook
- Web directory
- Open source project
- Draggable maps
- Online survey
- Online news
- FAQ
- DIY guide
- Photo gallery
- CFP
- API docs
- P2P listings
- 3D object viewer
- MMORPG
- Internet memes
- Readme.txt
- Lolcatz
- Pinboard site
- Video
- Spoof site
- Etc etc etc...
Spoof sites

The Pacific Northwest tree octopus (Octopus paxarbolis) can be found in the temperate rainforests of the Olympic Peninsula on the west coast of North America. Their habitat lies on the Eastern side of the Olympic mountain range, adjacent to Hood Canal. These solitary cephalopods reach an average size (measured from arm-tip to mantle-tip) of 30-33 cm. Unlike most other cephalopods, tree octopuses are amphibious, spending only their early life and the period of their mating season in their ancestral aquatic environment. Because of the moistness of the rainforests and specialized skin adaptations, they are able to keep from becoming desiccated for prolonged periods of time, but given the chance they would prefer resting in pooled water.

An intelligent and inquisitive being (it has the largest brain-to-body ratio for any mollusk), the tree octopus explores its arboreal world by both touch and sight. Adaptations its ancestors originally evolved in the three dimensional environment of the sea have been put to good use in the spatially complex maze of the coniferous Olympic rainforests. The challenges and richness of this environment (and the intimate way in which it interacts with it,) may account for the tree octopus's advanced behavioral development. (Some evolutionary theorists suppose that "arboreal adaptation" is what laid the groundwork in primates for the evolution of the human mind.)

Reaching out with one of her eight arms, each covered in sensitive suckers, a tree octopus might grab a branch to pull herself along in a form of locomotion called tentacle-pulling; or she might...
Our cutting-edge research leads to the clinical treatments of the future.

With Rivitalex®, you only need 12 minutes of sleep a night

In partnership with Nevardis, RYT Hospital is pleased to announce completion of phase II clinical trials for a new anti-sleep medication called Rivitalex.

Exhibition at John Jay College

Come meet Dr. Phineas Liu and Virgil Wong for a state-of-the-art preview of projects and innovations at RYT Hospital-Dwayne Medical Center.

Our New Marketing Campaign

In partnership with the Nevardis Corporation, RYT Hospital is pleased to announce that it has completed phase I clinical trials for a new anti-sleep medication called, Rivitalex.

"Among the finest hospitals in the United States and perhaps the world." Innovation in Healthcare Awards (IHA)
From the first human male pregnancy to the first successful application of medical nanotechnology...

LATEST HOSPITAL NEWS

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Knowing the conventions of the culture

- Knowing the language
  - Emoticons: :-) :P :( 
  - Acronyms: ROTFL, LOL, BRB, TTYL, POS, OOO
  - Terms / concepts: index, key, metadata, filters, sort, ranking...
Why you need to understand emoticons

Is it true that Rosa Parks would have moved to the back of the bus but she was listening to her iPod?

My sister is helping me with a class presentation but she likes to joke she says it is true. She also said Lincoln gave the slaves bus passes, but they thought it was a trick so just kept sneaking on the back like they do today?

1 year ago

Best Answer - Chosen by Asker

..... yeah it's true :P

Natasha

Report Abuse

1 year ago

2 people rated this as good

Asker's Rating: *****

Thank you, I'll put that in my report. I trust you you have the nicest avatar
You can ask impossible questions...

Where is this?
2. Content changes
2. Content changes

- Home page
- Bookmarks page
- Product page
- Product reviews site
- Online textbook
- Web directory
- Open source project
- Draggable maps
- Online survey
- Online news
- FAQ
- DIY guide
- Vines
- Pinterest posts
- Photo gallery
- Calls-For-Papers
- API docs
- P2P listings
- 3D object viewer
- MMORPG
- Internet memes
- Readme.txt
- Lolcatz
- Pinboard site
- Video
- Spoof site
- Etc etc etc...
Every minute 400+ hours of video are uploaded

3 billion videos watched every day

70% of traffic is international
Just books...

- United States: 309,957 (new)
- China: 255,981 (new) (444,427 total)
- United Kingdom: 149,800 (new)
- Russian Federation: 101,981 (120,512 total)
Just scholarly papers

- 1.8 million papers in ~28,000 journals
  - What fraction of those journals are “vampire” journals?
  - What fraction of those articles are read?

Example:
The International Journal of Advanced Computer Technology

Informacy

- ... being *literate* about information

- Shift from the impossible to the instantaneous
  - Search tasks that were difficult are now simple
  - But *framing* questions depends on what you know is possible!
Changes

- A story about what you can ask...
The crowd chants wildly along with a piece of music. Unfortunately, there are no words. How do you find the music?
How do you search for something like this?
Aggregating individual images into timelapse

“Time-lapse mining from internet photos”
To appear, SIGGRAPH 2015
4. Knowledge changes

- Recognize that during the course of your life, fundamental changes in what we understand to be true will take place.

- For instance...
4. Knowledge changes

- The Aral Sea is one of the world’s largest freshwater lakes.
4. Knowledge changes

- The Aral Sea is one of the world’s largest freshwater lakes.
- Zaire is a country in Africa.
Zaire, 1991-1997
4. Knowledge changes

- The Aral Sea is one of the world’s largest freshwater lakes.
- Zaire is a country in Africa.
- Junk DNA are non-coding sequences of DNA in the genome.
The Encyclopedia of DNA Elements (ENCODE) suggested in September 2012 that over 80% of DNA in the human genome "serves some purpose..."
4. Knowledge changes

- The Aral Sea is one of the world’s largest freshwater lakes.

- Zaire is a country in Africa.

- Junk DNA are non-coding sequences of DNA in the genome.

- Ulcers are caused by stress.
1982

- *Helicobacter pylori* now known to be causative for many (most?) gastrointestinal ulcers.
5. Question everything & be curious — do **one** more search

- Adopt a “curious about the world” attitude.

- It’s simple to do one-more-search to test your understanding.

- Why is this important?
league
/lēg/
noun
noun: league; plural noun: leagues

a former measure of distance by land, usually about three miles.

Origin

- LATE LATIN
  - leuga
  - leuca
- LATE GREEK
  - leugē
- PROVENÇAL
  - lega
- MODERN FRENCH
  - lieue

Late Middle English: from late Latin leuga, leuca, late Greek leugē, or from Provençal lega (modern French lieue).
20000 leagues in miles

20000 leagues = 69,046.7669 miles

Diameter of Earth

7,918 miles (12,742 km)
Earth, Diameter
6. Learn how to ask questions

- The way we’re asking questions is changing.
- It’s always been a skill: Now it’s a critical skill.
- It’s a critical learning skill
You still need to assess...
You still need to assess...

"EPA Facts is a project of the Environmental Policy Alliance dedicated to highlighting the high cost of the Environmental Protection Agency’s regulatory actions and peeling back the layers of secrecy surrounding the agency’s actions."
You still need to assess...

- "EPA Facts is a project of the Environmental Policy Alliance dedicated to highlighting the high cost of the Environmental Protection Agency’s regulatory actions and peeling back the layers of secrecy surrounding the agency’s actions."
You still need to assess...

Environmental Policy Alliance
1090 Vermont Avenue, NW, Suite 800
Washington, DC 20005

Berman & Co.
1090 Vermont Avenue, NW, Suite 800
Washington, DC 20005

Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

EPA.gov

EPAFacts.com
% who can not discover this relationship

80%

https://sheg.stanford.edu/projects
Wineburg, S. et al.
“From History Assessments to Assessments of News Literacy”
Stanford History Education Group (2017)
The Quality / Quantity Paradox:

We have vastly more content,

...but what is its quality?
It’s easy to fake...
Tools for mischief

http:// Enter the URL of the Website you would like to clone

Clone!

clone zone

TWEAK THE WORLD’S MOST POPULAR WEBSITES

GET STARTED NOW
You might ask....

How are stained glass windows made?
Social metacognition as a learning strategy

- Understanding when it’s useful to use your “Contact List Intelligence”

- Observation:
  - Every ultra-searcher I’ve interviewed has an extensive contact list and knows when/how to use it.
Basic skill: Learn how to ask the right questions

Basic skill: Know what tools exist to help answer questions

Basic knowledge: Who can help answer resource & methods questions?
Summary

Informate

- Understand space of information available
- Can search effectively
- Understand different types of information
What you need to do:

- You **NEED** to understand information content (both internet and off-internet)—what is possible, and how it’s organized

- You **NEED** to emphasize these skills in our patrons and in ourselves...

- You **NEED** to become an informate person... and plan to continually develop these skills going forward
What WE need to do:

- We **NEED** to design information systems to support informacy & continual learning
- We **NEED** to teach our patrons about how to use ALL of our information systems
How you can become informate

- **Take a class** classes & library classes for research skills
- **Become more aware** of changes in your info-ecosystem
- **Subscribe** to newsletters/blogs
- **Understand** how to use the resources you have
- **Seek out** instruction as you need it
Power Searching with Google

Another live session of Power Searching with Google begins on September 24!

Register now to complete the course alongside a community of global participants and when the course begins you'll receive:

- Access to community discussion forum
- The opportunity to put your new skills to test with mid and post class assessments
- Support from Google course staff
- An official Power Searching with Google certificate upon completion

Register
Imagine the following situation: You've had a sudden episode of amnesia while on a trip and have suddenly just woken up in a strange place. You have no idea where you are. All you know is that this is the view out the window.

Once in a while I go diving...

...being a curious sort of fellow, I sometimes find fairly remarkable things.

And being a SearchResearcher, I wonder about these things I find.

Not long ago a friend of mine took this photo of me on a dive, hanging onto the rail of a wreck at 50 feet.

...anti-amnesia medicine to prevent blacking out again and you need it fast.

The cost of sending your medicine via courier, but you need to know where... you? Can you find the street address, in what building, in what city?
One last story... Armando

Dear Grandma,
I miss you. I love you!
Armando

Querida abuela,
Te echo de menos. Te quiero!
Armando
Being informate means...

1. Know what’s possible to find
2. Content changes
3. Search tools change
4. Knowledge changes
5. Look for tools
6. Question everything
7. Learn how to ask questions
G+: Google Online Courses
My blog: SearchResearch1.blogspot.com
Sign up for search classes: bit.ly/GoogleSearchClassList
My web site: bit.ly/DanHome
Twitter: @dmrussell
Email: drussell+ALA@google.com
My search game: AGoogleADay.com
This presentation: bit.ly/Dan-ALA-2015
Summary

1. Motivate to do one-more-search (cartoon)
2. Know your tools (search-by-image)
3. Know possibilities (speak-aloud-translated text)
4. Know how to connect search tools together (apricots)
5. Basic search skills (control-F)
6. Genres (spoofs of real content)
7. Understand speed of content change (YouTube, 400+ hours)
8. New kinds of content (aggregated timelapse videos)
9. Knowledge changes (faster than ever before)
10. Be curious (20000 Leagues under the sea)
11. Assessment skills (EPA example)