



Search Engines: Finding Information

Unit 3. Information and the Internet

Revision Date: Jan 04, 2020

Duration: 1 50-minute session

Lesson Summary

Summary

This lesson investigates how the world wide web and search engines work. Concepts of browsers and servers as well as the spiders that crawl the web in search of valuable information, the data farms that store the data, and the processes used to organize current and historical data. The search process starts before you ever type a query, by crawling and indexing trillions of documents. Students will create a concept map illustrating their understanding of the operations of a search engine. A concept map is an artifact that could be created as part of the Explore Performance Task at the end of Unit 3.

Outcomes

Students will be able to:

- Describe the processes used by modern search engines to index content on the Internet
- Arrange the order of operations used in creating an index.
- Define basic search engine terms: spider, bot, crawl, data farm,
- Compare category based searching with indexed searching.
- Use an online tool to create a knowledge diagram of related information.

Overview

1. Getting Started (5 min) - Think-Pair-Share on Internet Searches
2. Activities (40 min) - Students cultivate an understanding of searching and build concept maps.
3. Wrap-Up (5 min) - Share ideas

Source

The slides for the guided exploration of search methods were adapted from slides provided by Marie desJardins at the University of Maryland, Baltimore County.

Learning Objectives

CSP Objectives

- *EU CRD-2 - Developers create and innovate using an iterative design process that is user-focused, that incorporates implementation/feedback cycles, and that leaves ample room for experimentation and risk-taking.*
 - LO CRD-2.B - Explain how a program or code segment functions.
 - LO CRD-2.C - Identify input(s) to a program.
- *EU DAT-2 - Programs can be used to process data, which allows users to discover information and create new knowledge.*
 - LO DAT-2.B - Describe what information can be extracted from metadata.
 - LO DAT-2.D - Extract information from data using a program.
- *EU CSN-1 - Computer systems and networks facilitate how data are transferred.*
 - LO CSN-1.A - Explain how computing devices work together in a network.
 - LO CSN-1.D - Describe the differences between the Internet and the World Wide Web.
- *EU IOC-2 - The use of computing innovations may involve risks to your personal safety and identity.*
 - LO IOC-2.A - Describe the risks to privacy from collecting and storing personal data on a computer system.

Math Common Core Practice:

- MP4: Model with mathematics.

Key Concepts

Students will understand how the world wide web is structured and operates.

Students will understand the many processes that are required for an effective search engine.

Students will create diagrams and concept maps, do some investigations and discuss how search engines work, and then will individually use a computational tool to create an online diagram illustrating their understanding.

Essential Questions

- How can computing extend traditional forms of human expression and experience?
- How are vastly different kinds of data, physical phenomena, and mathematical concepts represented on a computer?
- How can computation be employed to help people process data and information to gain insight and knowledge?
- How can computation be employed to facilitate exploration and discovery when working with data?
- What considerations and trade-offs arise in the computational manipulation of data?
- What opportunities do large data sets provide for solving problems and creating knowledge?
- How are algorithms implemented and executed on computers and computational devices?
- How are programs developed to help people, organizations or society solve problems?
- What is the Internet, how is it built, and how does it function?
- What aspects of the Internet's design and development have helped it scale and flourish?
- How does computing enhance human communication, interaction, and cognition?
- What are some potential beneficial and harmful effects of computing?

Teacher Resources

Student computer usage for this lesson is: **required**

- Powerpoint modified from Marie desJardins's UMBC search engine powerpoint ("About Search Engines" in Lesson Resources folder)
- Google's interactive story on how search works: the crawling and indexing video
http://www.google.com/intl/en_us/insidesearch/howsearchworks/crawling-indexing.html
(http://www.google.com/intl/en_us/insidesearch/howsearchworks/crawling-indexing.html) (*first 2 minutes only*)
- Google data centers <https://www.google.com/about/datacenters/inside/> (<https://www.google.com/about/datacenters/inside/>)
- Online poster of the steps that happen in Google before and while you search: http://static.googleusercontent.com/media/www.google.com/en/us/intl/en_us/insidesearch/howsearchworks/assets/searchInfographic.pdf
(http://static.googleusercontent.com/media/www.google.com/en/us/intl/en_us/insidesearch/howsearchworks/assets/searchInfographic.pdf)
- [Optional] Handout to guide student explorations (students can use their journals or their own papers if desired): "Handout: You and the Search Engine Diagram" in Lesson Resources folder
- [Optional] Handout for the Search Engine Treasure Hunt n Lesson Resources folder
- Online knowledge web concept map builder (see below) or Inspiration software installed on student computers.
 1. <https://bubbl.us/> (<https://bubbl.us/>) 3 mind maps are free after creating a free account
 2. Insert a drawing into a Google doc (or create a Google diagram) <https://support.google.com/docs/answer/179740?hl=en>
(<https://support.google.com/docs/answer/179740?hl=en>)
 3. http://www.softschools.com/teacher_resources/concept_map_maker/
(http://www.softschools.com/teacher_resources/concept_map_maker/) is a very simple, free tool that does not require an account but is fairly limited.

Lesson Plan

Getting Started (5 min)

Students should journal on the following question:

"How many searches do you think are done each day using the Google search engine?"

Pair and share, then show this amazing live counter of internet searches: <http://www.internetlivestats.com/google-search-statistics/>
(<http://www.internetlivestats.com/google-search-statistics/>)

Guided Activities (40 min)

Activity 1 (25 min) - Understanding Search

Use the slide presentation "About Search Engines" (in Lesson Resources folder) to direct students through this lesson.

1. Students create a diagram of their best understanding of what happens when you type a query into a search engine. (Either provide the "Handout: You and the Search Engine Diagram" handout from the Lesson Resources folder or have students write on their own paper.)

2. Demonstrate how a search engine works with the video (*first 2 minutes only*) http://www.google.com/intl/en_us/insidesearch/howsearchworks/crawling-indexing.html (http://www.google.com/intl/en_us/insidesearch/howsearchworks/crawling-indexing.html) and diagram. Students can put a star next to each step in the process they thought of, then add to their diagrams to make them more complete.
3. Direct students to go to GoogleFight.com. (<http://GoogleFight.com>) [for saving time just have the teacher demonstrate] Discuss what happens. Ask:
 - o Are all searches completed in the same amount of time?
 - o Why or why not?
 - o How does Google get the numbers to show on the results?
 - o Are the numbers really an indication of the popularity of one thing vs another?
4. Jigsaw into third's and assign each third one of the following tasks. Have students answer their assigned question based on the reading.

Read paragraphs 1 and 2 of Understanding Browser Tracking (<https://edu.gcfglobal.org/en/internetsafety/understanding-browser-tracking/1/>) by Goodwill Community Foundation, Inc. What have you used online recently that is keeping a record – tacking – your usage?

Read paragraphs 1 and 2 of Locational Privacy (<https://epic.org/privacy/location/#issues>) – Issues by Electronic Privacy Information Center. What devices or systems are tracking your or your family's location?

Read paragraphs 1 and 2 of HOW COMPANIES USE PERSONAL DATA AGAINST PEOPLE (https://crackedlabs.org/dl/CrackedLabs_Christl_DataAgainstPeople.pdf) section 2.4 Key developments in recent years. How do companies individually identify us?

Share responses to each question with the class.

Activity 2 (15 min) - Searching the Internet vs. Searching the Web

Describe at least three differences between the internet and the world wide web and identify which is searched by search engines like Google or Bing.

Wrap Up (5 min)

Homework - Optional Concept Map Creation

Have students create a concept map of ideas relating to search engines, doing additional research to round out their understanding. (See Teacher Resources for online tools that can be used to create concept maps.)

Share ideas from the students' concept maps. Point out that the concept map (if done online) is an artifact that was created using a computer to present information visually.

Optional Extension: (for fast moving classes who need more to do)

Google tracks everything that everyone queries. (Is this an invasion of your privacy?) The results are fascinating.

Look at www.google.com/trends (<http://www.google.com/trends>). You can look at trends by region and limit them to a date and/or place. For example search for “Obama, McCain” limiting your search to 2008, and the United States. What conclusions do you draw?

Pick another topic of interest to explore in Google trends to reveal society's interests.

Options for Differentiated Instruction

Students can create diagrams and concept maps on paper by hand if that is helpful.

Be sure to assign roles to pairs when working together. Don't allow one partner to be passive while the other is active.

Evidence of Learning

Formative Assessment

Students create a concept map of what they learned with additional research on the topic.

Summative Assessment

Students will develop a visual diagram of the processes involved in indexing the Internet by a search engine.



(<http://www.umbc.edu/>)



(<http://www.umd.edu/>)



(<http://www.nsf.gov/>)

Authored by: CS Matters in Maryland

Website: csmatters.org (<http://csmatters.org>)

Email: csmattersinmaryland@gmail.com (<mailto:csmattersinmaryland@gmail.com>)

This work is licensed under a
Creative Commons Attribution-ShareAlike 3.0 United States License (<http://creativecommons.org/licenses/by-sa/3.0/us/>)
by University of Maryland, Baltimore County (<http://umbc.edu>) and University of Maryland, College Park (<http://umd.edu>).