

Meet the Internet

A lesson plan from Living Online Lab

Grades: 5th-12th (Ages 10-18)

Length: 50-60 mins

OVERVIEW AND INTRODUCTION:

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Meet the Internet is part 1 of a two-part lesson designed to make the internet more comprehensible to and accessible for students. This is essential in order to gain appreciation for the defining technology of our era, and to engage in key internet issues - such as who should control the internet, social media, net neutrality, privacy, surveillance, anonymity, and many of the other burning topics that are in kids' lives and the news every day.

"The internet is the first thing that humanity has built, that humanity doesn't understand."

Eric Schmidt, Executive Chairman, Google

Pivotal Questions:

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- What is the internet?
- Why is learning about the internet important?
- Who invented the internet?
- What is the difference between the internet and the World Wide Web?
- How did the internet become the defining technology that we take for granted, and cannot imagine living without.

LEARNING OUTCOMES/OBJECTIVES:

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Students will learn about:

- The roots of the internet
- The structure of the internet
- Difference between internet and Web
- The main phases of its development: from military experiment to civilian utility, and the commercialization of the internet

Preparation and Instructional Materials:

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Note: The following is a list of great materials that you can use to prepare for the lesson. The first resource in each section, gives a broad overview of the topic, but you are encouraged to go into as much depth as needed.

Articles:

- The Invention of the Internet (The History Channel.)
<http://www.history.com/topics/inventions/invention-of-the-internet>

This article provides a good overview, suitable for middle school. Can be used to accompany the timeline below (see: infographics/images: History of the Internet)

- Roads and Crossroads of the Internet History by Gregory Gromov (last updated: 2012) A hodge-podge survey of Internet development that contains a lot of interesting information.
<http://history-of-internet.com> (Accessed July 2017)
- The evolution of the Internet. John Naughton, Journal of Cyber Policy, 2016 (much more detailed and academic. Suitable for instructor background)
<http://www.tandfonline.com/doi/abs/10.1080/23738871.2016.1157619>)
- World Wide Web Timeline. Pew Research Center (March 2014)

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<http://www.pewinternet.org/2014/03/11/world-wide-web-timeline/>
(Accessed July 2017)

- A Brief History of the Internet (The Internet Hall of Fame)
- https://drive.google.com/open?id=0BxeO_X1zNogjVmxuRzlfUVJheTg
(Accessed July 2017)
- A Quick History of Digital Communication Before the Internet:
<https://eager.io/blog/communication-pre-internet/> (Accessed July 2017)

Some good and entertaining examples of pre-Internet communication (the pony express and the telegraph, to name two) to put the radical achievements of the Internet in perspective.

Books:

- From Gutenberg to Zuckerberg. John Naughton. Quercus (2012.)
Prologue (pages xi-xvii)
- A History of the Internet and the Digital Future. Johnny Ryan. Reaktion Books (2010)
- Understand the Digital World. Brian W.Kernighan. Princeton University Press (2017) A more technical overview of the Internet.

Infographics/images:

- History of the Internet
(<http://www.onlinemba.com/blog/history-of-the-internet/>) (accessed July 2017).

Very useful instructional tool that can be used to talk students through the main milestones of Internet history. Suitable for both middle and high school.

- ARPANET in 1969:
https://drive.google.com/file/d/0BxeO_X1zNogjbFNpUDNSUzJwMVU/view?usp=sharing

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This image shows just how basic the first computer network was in 1969 - only four nodes!

Video:

- What is the Internet? (3'44 mins.)
<https://www.youtube.com/watch?v=Dxcc6ycZ73M&index=19&list=PL3uxO-TtQjleEoH86JttDrwv2ay-jDlvd-> (from Code.org). (Accessed July 2017.)

*Excellent introduction to the Internet by one of the "founding fathers."
Suitable for middle school*

- History of the Internet (3'40 mins) (<https://youtu.be/h8K49dD52WA>)

Very good and clear overview of the history of the Internet. Can be used as a brief introduction for both middle and high school.

- History of the Internet (8'10) (<https://youtu.be/7NpcczlsnLU>) "History of the internet" is an animated documentary explaining the inventions from time-sharing to filesharing, from Arpanet to Internet. Published on March 25, 2009 (accessed July 2017.)

This is a slightly more technical explanation of the development of the Internet. Appropriate for high school students.

- How the Web Became a Thing | The History of the Internet, Part 2 (10'12 mins) Accessed July 1, 2017 <https://youtu.be/1CsPHKJWiw0>

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- How the Internet Was Invented | The History of the Internet, Part 1 from The Science Show. (11'36 mins) <https://youtu.be/1UStbvRnwmQ> Accessed July 2017.

Both these videos are clear and helpful. Most suited for high school.

- A brief history of the Internet - MIT OpenCourseWare (51'15 mins) <https://youtu.be/olezCGjxV3A> (Accessed July 2017)

High-level history for teacher background only.

Vocabulary: <https://techterms.com/category/internet> (Accessed July 2017)

PROCEDURE

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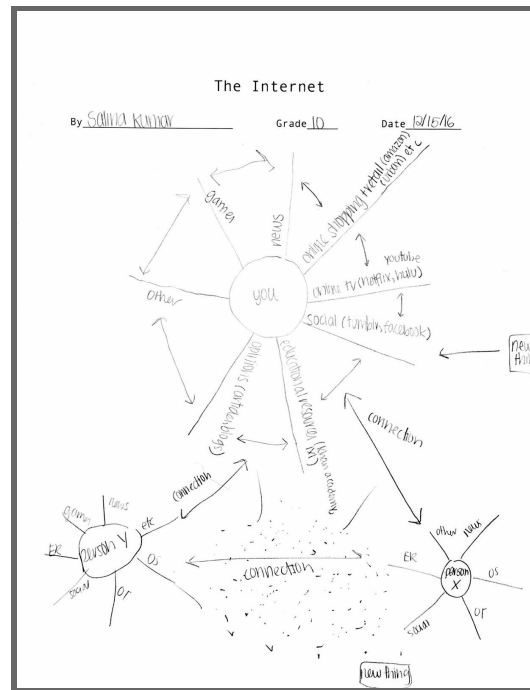
Introduction:

10 mins: What is the Internet?

- Before kicking off this sequence of lessons, it can be a very useful- and fun - exercise to ask students to draw their image of the internet. What image comes to mind immediately when you think of the internet? What does the internet look like to you? These drawings can be used as a great jumping-off point for a quick discussion about the nature of the Internet, asking students what they know about the origins of the technology they use every day.

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The Internet - by Salina (10th grade)

(Save these drawings and bring them out again at the end of the course to review and discuss)

5 mins: Setting the stage...

We are in the first minutes of the first day of the greatest information and communications revolution in human history.

The Internet is frequently called “the single most powerful agent of change in recent history.”

“The Web as I envisaged it, we have not seen yet. The future is still so much bigger than the past,” says Sir Tim Berners Lee, inventor of the World Wide Web.

Most adults are aware that the internet is changing our world. Mostly, however, they do not appreciate the magnitude of these changes; few are even very knowledgeable about how the internet works.

Youth born in the Internet Era are often called ‘Digital natives,’ but this does not

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automatically make them savvy about the internet.

They certainly cannot possibly fathom the extent of the Internet Revolution without some background and context.

Any talk about the internet almost inevitably turns to numbers to put things in perspective.

Most students find it hard to believe, for example, that a 1970s supercomputer - that took up a very large room, cost \$5 million back then, and could only be used by a few people - was less powerful than the smartphone in their pocket today that can connect them to billions of people across the globe in an instant.

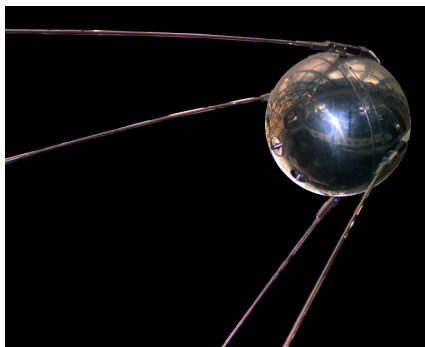
5 mins: Show video History of the Internet (3'40 mins)

(<https://youtu.be/h8K49dD52WA>)

15 - 20 mins: A walk through the timeline of the Internet

Here are some of the milestones in the History of the Internet. Instructors are invited to read through one of two of the Internet history articles and timelines included in this lesson plan, and put together their own walk-through, if desired:

1957: Sputnik



Sputnik 1 was the first artificial Earth satellite. The Soviet Union launched it into an elliptical low Earth orbit on 4 October 1957. It was a 58 cm diameter polished metal sphere, with four external radio antennas to broadcast radio pulses. (Wikipedia)

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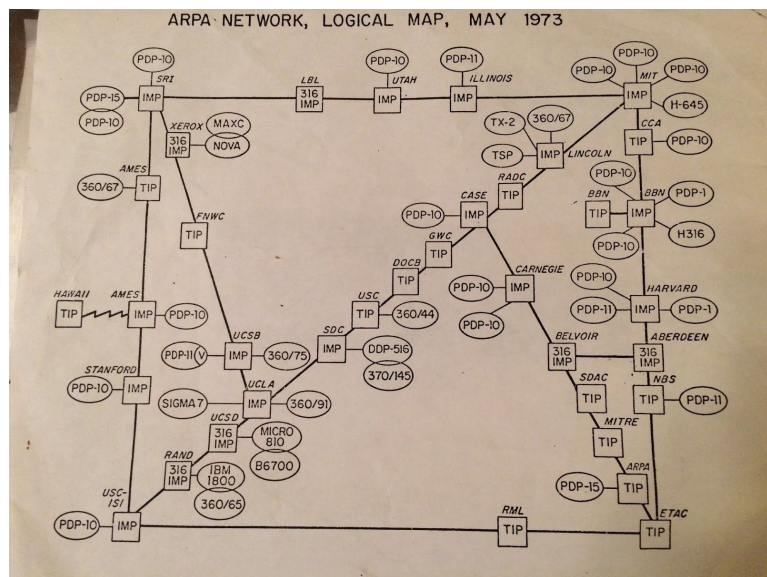
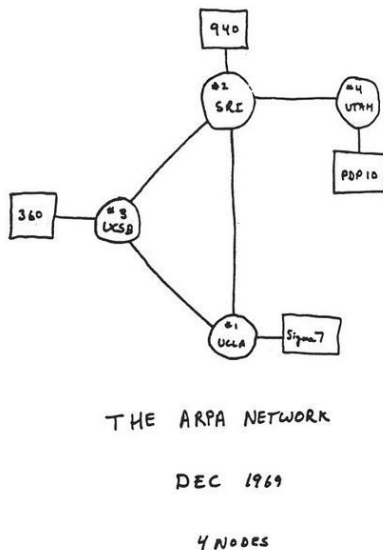
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In the middle of the Cold War, the Soviet Union's successful launch of the Sputnik satellite in October 1957, shocked the US defence establishment and led to the setting up of the Advanced Research Projects Agency (ARPA) within the Department of Defense. ARPA (later called DARPA) funded the purchase, operation, and maintenance of at least a dozen expensive mainframe computers for the various university departments and institutes which held research contracts from the agency.

ARPANet: 1969-72

The problem was that these machines were incompatible with one another, and therefore could not function as shared resources for the community of ARPA-funded researchers across the US. From this came the idea, and the funding, for a network that would enable these valuable resources to be shared. ARPANET (Advanced Research Projects Agency Network) was the result.



ARPANet in 1969 and 1973

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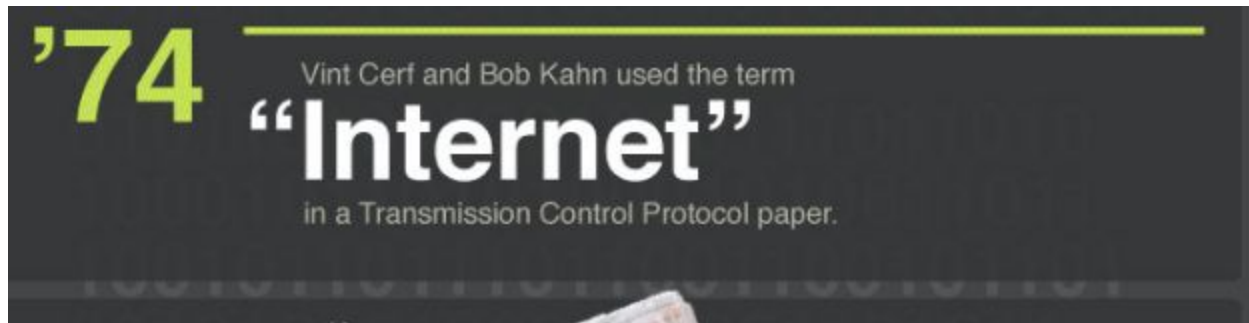
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Scientists and military experts were especially concerned about what might happen in the event of a Soviet attack on the nation's telephone system. Just one missile, they feared, could destroy the whole network of lines and wires that made efficient long-distance communication possible. In 1962, a scientist from M.I.T. and ARPA named J.C.R. Licklider proposed a solution to this problem: a "galactic network" of computers that could talk to one another. Such a network would enable government leaders to communicate even if the Soviets destroyed the telephone system. In 1965, another M.I.T. scientist developed a way of sending information from one computer to another that he called "packet switching." Packet switching breaks data down into blocks, or packets, before sending it to its destination. That way, each packet can take its own route from place to place. Without packet switching, the government's computer network—now known as the ARPAnet—would have been just as vulnerable to enemy attacks as the phone system.

ARPANet was intended to be a facility for resource-sharing, but it transpired that it was not much used for this original purpose. Instead, its users employed it mostly for communicating with one another, sharing files and software, and for sending and receiving email (the first email was introduced in March 1972 by Ray Tomlinson). In that sense, the community of users came up with a new conception of what "networking" meant – not so much the sharing of *machines* as the linking of *people*.

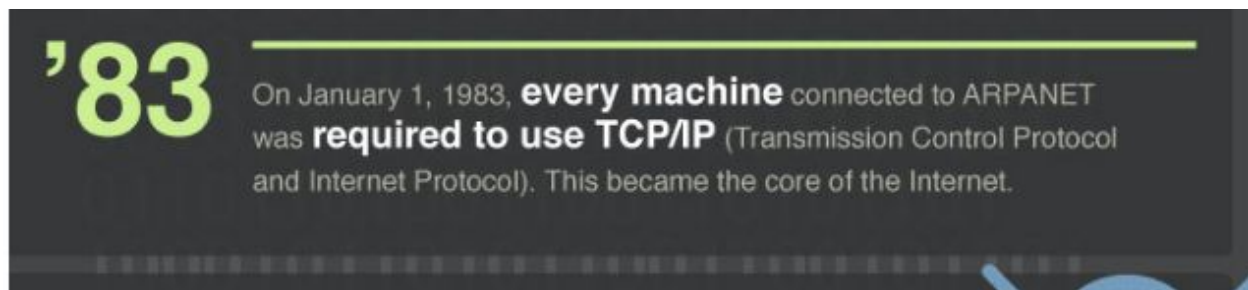
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By the end of the 1970s, a computer scientist named Vinton Cerf had begun to solve this problem by developing a way for all of the computers on all of the world's mini-networks to communicate with one another. He called his invention "Transmission Control Protocol," or TCP. (Later, he added an additional protocol, known as "Internet Protocol." The acronym we use to refer to these today is TCP/IP.) One writer describes Cerf's protocol as "the 'handshake' that introduces distant and different computers to each other in a virtual space."

1983: TCP/IP



1991: The World Wide Web

Cerf's protocol transformed the Internet into a worldwide network. Throughout the 1980s, researchers and scientists used it to send files and data from one computer to another. However, in 1991 the Internet changed again. That year, a computer programmer in Switzerland named Tim

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Berners-Lee introduced the World Wide Web: an internet that was not simply a way to send files from one place to another but was itself a “web” of information that anyone on the internet could retrieve. Berners-Lee created the Internet that we know today.

1993: The browser revolution

In the spring of 1993, Marc Andreessen and Eric Bina, then working at the National Center for Supercomputer Applications (NCSA) at the University of Illinois at Urbana-Champaign, released *Mosaic*, a browser they had written for the Web. Although *Mosaic* was not the first graphical browser, it was the first one to display graphics inline (i.e. as an integral component of a page, rather than in a separate window).

1995: The Internet “gold rush”

On 9 August 1995, Netscape (a company established by Andreessen and Bina) went public (IPO). The stock was priced at \$28 a share. In the first day of trading, the price peaked at \$75 before eventually closing at just over \$58, a price that valued the year-old company at \$2.9 billion.

Netscape's extraordinary IPO triggered intense speculative interest in the Internet and paved the way for the first Internet boom, which was later christened the ‘dot-com bubble’. The mania was fuelled by speculative interest in the stock market valuation of a multitude of Web-based companies (‘dot-coms’) which appeared following Netscape's extraordinary debut.

2000: The Bubble Bursts

The boom followed the traditional pattern of speculative manias through the centuries and, eventually, in March 2000, the bubble burst. In just over a month, the total market capitalisation of companies on the NASDAQ exchange fell from \$6.71 trillion to \$5.78 trillion.

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2000-2003: Web 2.0

The emergence of the interactive web, and ‘user-generated content’ or ‘peer production’ – that is, material created and published freely by people who do it for no apparent economic motive.

2004 - Present: Mobile connectivity, surveillance, cybercrime, corporate power, changing patterns of use and their implications

The most recent phase in the evolution of the Internet has been characterised by significant changes in the ways that people access and use the network and by the ways in which the infrastructure of the network has evolved to cope with these changes. The key developments are: the rise of mobile connectivity; the rapid expansion of so-called social media; pervasive surveillance by both state and commercial entities; increase of the power and influence wielded by a small number of large technology companies and consolidation of their grip on the network; increases in cybercrime; changes in patterns of media consumption; and the emergence of new companies like Uber, Airbnb, and Coursera which use the network as a platform on which to run businesses that are potentially very disruptive to incumbents.

The material in this timeline has been adapted without citation from the articles listed above, and is intended for instructional direction only.

5 Mins: Wrap-up:

The internet is unique in so many ways: It was not designed from the outset to be what it is today, and it is still in its infancy

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Future direction of the web?

The main discussion of this topic will take place in the final module: The Web We Want: Cyberutopianism vs. digital dystopia.

Task Assessment

- <http://www.learnthenet.com/test-yourself/>

A selection of short online tests from Learn the Net

Extension Activity:

Imagine life without the internet! This can, for example, be assigned as an essay, or as an in-class presentation.

- Life Before the Internet
(<https://medium.com/the-haven/life-before-the-internet-54cc03fd2451>)

This humorous article is intended for the instructor's amusement only, but could actually provide some ideas to inspire students.