Teachers' Tips

This is a guide to tools and ideas for teachers and home-schoolers to use the Imagining the Internet site to introduce concepts about the future and history of information sharing. Included are suggestions for generating assignments or special projects for your students and a list of useful web resources on technology and the internet. Read through all of the sections – high school/college, middle school, elementary school – many of the teaching ideas transcend age groups.

Ideas to implement in the Elementary School curriculum

- **KidZone for learning and fun:** Younger elementary school students will enjoy playing the games and reading the entertaining information on the KidZone area of the Imagining the Internet site. You can assign them to complete a specific learning exercise from this site, or allow students to explore the site's many elements and learn on their own:
  
  http://www.elon.edu/predictions/kidzone.aspx

- **A Look Back:** Elementary students of all ages will enjoy clicking on the "Back 150 Years" timeline to learn about how communications technologies progressed from the telegraph to the radio, telephone and television. They can read about the inventors and inventions that preceded the internet. You can assign them to write a summary of the key points of each era recorded on the timeline.
  
  http://www.elon.edu/predictions/backforward.aspx

- **A Look Ahead:** Students will also enjoy clicking on the "Forward 150 Years" timeline to read how their future may unfold. This section of the Imagining the Internet site offers a selection of the predictions that scientists and other experts are sharing now about the decades ahead. You can assign them to write a summary of the key expectations for the future and what this might mean for them and for their children.
  
  http://www.elon.edu/predictions/backforward.aspx

- **History of the Internet assignment:** Using the database and any other online sources you might assign, students put together a timeline showing the development of internet technology. This can be an individual project or it can be a discussion-based assignment, with students working in groups and then sharing with the class. In order to help them retain the
information, encourage students to present a visual form of internet history by drawing and illustrating their own timelines. Background on internet history can be found at:

http://www.elon.edu/predictions/internethistory.aspx and
http://www.elon.edu/predictions/backforward.aspx

• **Ethics of Digital Property:** Talk about copyright and fair use and show students some quotes from the database on these topics. This will lead to a good discussion about how we should recognize the ownership of creative works such as books, music, poetry and films. Now is the time these young people should begin to understand the importance of crediting others for their work. This lesson can teach them about plagiarism and the stealing of digital files that include music and movies. Quotes from the early 1990s about copyright and fair use can be found by using "copyright" as a search term on the Imagining the Internet page:

http://www.elon.edu/predictions/advanced.aspx

- Ask the students to state what they think about these predictions.
- Discuss the conflict between sharing information freely and retaining the rights to "intellectual property" – the things we create. Talk about the moral conflicts involved in downloading music and films, etc., that are actually owned by someone else.

Discuss additional issues of controversy on the internet. (privacy, surveillance, anonymity, free speech, etc.). These can easily be found by using the pull-down menus under "Subtopic" under the "Advanced Search" headline on the predictions/advanced page.

• **Visionary People assignment:** Have the students get in pairs or teams and pick one internet personality from the Imagining the Internet website. Many brief descriptive biographies of internet stakeholders and skeptics can be found at http://www.elon.edu/predictions/200briefbios.aspx.

Using the Imagining the Internet site and at least two other sources from the internet at large, students can research what their assigned person has said about the internet and come up with a profile of the person that includes some quotes about the future. The Early '90s section [http://www.elon.edu/predictions/advanced.aspx] is a searchable database including 4,000 predictions – the students can simply type their assigned internet personality's name into the search box here to get predictions. Students can assemble an oral presentation accompanied by posters, or they can be asked to use a "presentation" program such as PowerPoint or Keynote to display their findings. Some internet personality examples:

- Vernor Vinge, scientist and science-fiction author
- Gordon Bell, computing pioneer and internet prognosticator
- R.U. Sirius (AKA Ken Goffman), and editor of the magazine Mondo 2000 and a social technology critic
Howard Rheingold, writer and editor who looks at social impacts – the originator of the idea of "Smart Mobs" on the internet

Esther Dyson, leading technology consultant

Tim Berners-Lee, developer of the World Wide Web

Marc Andreessen, creator of Mosaic (later Netscape and Firefox; allowed images and text to be on same page as well as hyperlinks)

Ask each group to include the following elements in their presentation: A short biography on the person selected (place and date of birth, education, jobs held and/or the person's area of expertise regarding technology/internet); a section detailing what makes this person special and important – what makes him or her an "expert" or someone whose ideas we should listen to; and a section with a list of three or more predictions this person has made about the future of technology and society.

Sample questions can also be generated by teachers to make each assignment more specific, or to use as general discussion questions for students who will be completing the project in groups. Examples:

For those assigned to Berners-Lee: What is the WWW? What is HTML?
For those assigned to Andreessen: What was Mosaic and why is it important?

- **Prescient Predictions assignment**: Tell students to read some of the predictions made in the "Early '90s" [http://www.elon.edu/predictions/advanced.aspx](http://www.elon.edu/predictions/advanced.aspx) and the "Share Your Vision" [http://www.elon.edu/predictions/SubmitYourVision.aspx](http://www.elon.edu/predictions/SubmitYourVision.aspx) sections of the Imagining the Internet site. You can search through these areas in advance and pre-select some favorite predictions and make them available as a handout or projected presentation or you can assign older students to search around the sites or younger students to look at the following page:

Here are a few additional interesting predictions you could use; there are MANY more to choose from in the "Early '90s" and the "Share Your Vision" sections of the Imagining the Internet site:

- I'm looking forward to the day when my daughter finds a rolled-up 1,000-pixel-by-1,000-pixel color screen in her cereal packet, with a magnetic back so it sticks to the fridge. – *Tim Berners-Lee, inventor of the World Wide Web*

- People are skeptical about nuclear power and genetic engineering and a lot of other areas, but they blindly accept the Internet. We techies should be more honest about what computers can do and what they cannot do, or else we are setting ourselves up for a big pie in the face. – *Clifford Stoll, astrophysicist*

- By 2090, the computer will be twice as smart and twice as insightful as any human being … By 2100, the gap will grow to the point at which
homo sapiens, relatively speaking, might make a good pet. Then again, the computers of 2088 might not give us a second thought. – Greg Blonder, writer

- I can imagine proposals that every automobile, including yours and mine, be outfitted with a recorder but also with a transmitter that identifies the car and its location – a future license plate … (it) could record your speed and location, which would allow for the perfect enforcement of speeding laws. I would vote against that. – Bill Gates, CEO of Microsoft

- In the future, computers will … fit onto your face, plug into your ear. And after that – they'll simply melt. They'll become fabric … Fabric and air and electrons and light. Magic handkerchiefs with instant global access. You'll wear them around your neck. You'll make tents from them if you want. They will be everywhere, throwaway. Like denim. Like paper. Like a child's kite. This is coming a lot faster than anyone realizes. – William Gibson, author

- I had (and still have) a dream that the Web could be less of a television channel and more of an interactive sea of shared knowledge. I imagine it immersing us as a warm, friendly environment made of the things we and our friends have seen, heard, believe or have figured out. – Tim Berners-Lee, inventor of the World Wide Web

- I'm a future hacker; I'm trying to get root access to the future. I want to raid its system of thought. Grrr. Machines disappoint me. I just can't love any of these wares, hard or soft. I'm nostalgic for the future. We need ultrahigh res! Give us bandwidth or kill us! … I think tech will solve all our problems, personal and scientific. Girls need modems. – St. Jude (real name, Judy Milhon, a co-editor of the magazine Mondo 2000

- No matter what circumstances we face or predilections we harbor, the business of living is love. Getting love and keeping love. Manufacturing love. Making love. Making love stay. And no worldwide web of cool chips and hot wires is going to change that. So just shut up about your Brave New World, bub. – Philip Mart, writer

Next, ask the students to come up with their personal predictions about the distant future of communications technologies like the internet and cell phones. This is a great writing prompt for practice sessions in preparation for the gateway writing tests required in most schools.

As a reward for good work, you could promise to help the students enter their best predictions in the Share Your Vision section
(http://www.elon.edu/predictions/SubmitYourVision.aspx) of the Imagining the Internet site, which is open to all public postings of interesting ideas about the future of communications. Their comments will be kept as a lasting document, added to hundreds from other people of all ages from around the world. This database will be retained for people in years to come to study to see what people of our generation were thinking about changes brought by technology.

**Ideas to implement in the Middle School curriculum**

- **Hot-Issues assignment:** Assign students to select a topic and search for and compile the best quotes about it in the section of the Imagining the Internet site titled "The Early '90s Predictions Database." The topic categories include such things as copyright, anonymity, censorship, crime, privacy, information overload, e-commerce, virtual reality and many others, and they can be found in the pull-down menus at: http://www.elon.edu/predictions/advanced.aspx
  
  o Have students quote 10 to 15 of the best past predictions on the selected topic and note why they chose them and what they think about them. Have them focus on any moral/ethical implications and the future.
  
  o Every technological breakthrough has its pros and cons. You can teach this by dividing your class in half and leading a spirited debate on the good and bad sides of the internet. Ask one team to make a list of all of the good aspects of the internet and ask the other to come up with a list of negatives. Examples: we can shop from the comfort of home; share our writing, photos and videos with anyone anywhere in the world for free; play in fantasy sports leagues and compete in multi-player games with people from every nation; VERSUS the fact that people can easily steal and make unlimited digital copies of a person's copyrighted music, writing and other creations; terrorists and criminals can use the internet to plan attacks and commit crimes; people are sharing dangerous information (bomb-making instructions and how to commit suicide) and pornography, etc.

- **Copyright/Fair Use assignment:** Ask students to write about the importance of copyright in today's digital, file-swapping society. Encourage use of the Imagining the Internet Predictions Database to find what internet stakeholders and skeptics have said in arguing this issue. Many interesting statements on this topic can be found by using "copyright" as a search term on the Imagining the Internet page: http://www.elon.edu/predictions/advanced.aspx
  
  o This is also a good chance to discuss other ethical issues (privacy, surveillance, anonymity, free speech, etc.). A list of these controversial topics can easily be found by using the pull-down
One good way to explore interesting social and political issues is in an essay assignment. Students can study a particular controversial topic and then write a 300-word essay in support of one side or another.

- **PSAT Practice:** Writing skills are a key component of both the PSAT and SAT tests. Another way in which students can use materials on the Imagining the Internet site to buoy their writing skills is to have them write a well-supported short essay on the future; you can suggest that those students who offer the best ideas, best writing and best foresight will have their work submitted to the "Share Your Vision" section of the Imagining the Internet site. It's easy for you or your students to send your prediction submissions in just a few minutes by using the online form found at:

  [http://www.elon.edu/predictions/SubmitYourVision.aspx](http://www.elon.edu/predictions/SubmitYourVision.aspx)

  Try to limit submissions to only those that are original and well-written. Help students carefully edit their work before pushing the button to submit each prediction.

  You could also have students write an essay in response to a list of select predictions. Two good predictions lists are "20 Edgy-Incisive 90's Predictions" and "20 Brief, Biting 90's Predictions," found at:

  [http://www.elon.edu/predictions/20edgyincisivepredictions.aspx](http://www.elon.edu/predictions/20edgyincisivepredictions.aspx)

- **A Look Back assignment:** Middle school students should understand the history of modern communications technologies, and they should be able to use search engines to find information. First, they should be assigned to use the "Back 150 Years" timeline section of the Imagining the Internet site to read a briefing about key inventors and inventions and select one technology to study. Next, students should be asked to find at least three to five sites on the internet to use as the additional basis for their work and then assemble a brief research report, poster talk and/or PowerPoint or Keynote presentation about that selected technology and its influence on social, economic and political structures of human society. They should be required to include a section with citations that document all of the sites they used as resources.

  [http://www.elon.edu/predictions/backforward.aspx](http://www.elon.edu/predictions/backforward.aspx)

- **A Look Ahead assignment:** Teachers can employ the "Forward 150 Years" timeline and its branching pages to help students understand how the future may unfold. This section of the Imagining the Internet site offers a selection of the predictions that scientists and other experts are sharing now about what is to come in the decades ahead. You can assign
students to write a descriptive outline of the key expectations for the future and accompany it with an essay in which they speculate about what these developments might mean for them and for their children in the years ahead. What will a typical day be like in the year 2030? What will our homes, businesses and tools be like? Students can compile their work in a research report, poster talk and/or PowerPoint or Keynote presentation.

http://www.elon.edu/predictions/backforward.aspx

• **Researching the Past:** Assign your students to select an internet visionary and find and study a number of that person's predictions about our future and write a thoughtful response with his or her personal opinion about how each of the predictions are unfolding and will turn out in the future. Using the "Early '90s" section (http://www.elon.edu/predictions/advanced.aspx) of the Imagining the Internet site and additional web resources, each student can write a three-page paper, put together a poster presentation or use PowerPoint, Keynote or other presentation software to create a piece of work that includes a number of predictions, their reaction to them and the visionary's brief biography. This can also be accomplished as a group project. Many brief descriptive biographies for students to begin with can be found at http://www.elon.edu/predictions/200briefbios.aspx.

Some examples, each with one sample quote included:

- **Vernor Vinge, scientist, teacher and science-fiction author:** "If we ever succeed in making machines as smart as humans, then it's only a small leap to imagine that we would soon thereafter make – or cause to be made – machines that are even smarter than any human. And that's it. That's the end of the human era."

- **R.U. Sirius (AKA Ken Goffman), an editor of the magazine Mondo 2000 and social technology critic:** "Who's going to control all this technology? The corporations, of course. And will that mean your brain implant is going to come complete with a corporate logo, and 20 percent of the time you're going to be hearing commercials?"

- **Gordon Bell, computing pioneer and internet prognosticator:** "Since we are all spending hours browsing, there will be info-way addiction. And that's followed by info-way regulations … And then, 4D so we can do virtual reality."

- **Dorothy Denning, expert on issues of computer-security threats:** "If encryption comes into widespread use on the information superhighway, this could seriously jeopardize law enforcement and the public safety. Encryption is also a threat to foreign intelligence operations, and thus can affect national security."

- **George Gilder, futurist and technology consultant; author of many books, including "Telecosm" and "Life After
Television": "Neighborhood children could gather in micro-schools run by parents, churches, or other local institutions. The competition of home schooling would either destroy the public school system or force it to become competitive with rival systems."

- **Esther Dyson**, leading technology consultant: "Chief among the new rules is that 'content is free'... The way to become a leading content provider may be to start by giving your content away. This 'generosity' isn't a moral decision: It's a business strategy."

- **Nicholas Negroponte** of MIT, longtime Wired magazine columnist: "When you come home, before you take off your coat, your shoes can talk to the carpet in preparation for delivery of the day's personalized news to your glasses."

- **William Mitchell** of MIT, author of the prescient book "City of Bits" (available free online and a great discussion tool): "Buildings will become computer interfaces and computer interfaces will become buildings ... We are all cyborgs now. Architects and urban designers of the digital era must begin by reauthorizing the body in space."

- **Tim Berners-Lee**, developer of the World Wide Web: "I had (and still have) a dream that the Web could be less of a television channel and more of an interactive sea of shared knowledge. I imagine it immersing us as a warm, friendly environment made of the things we and our friends have seen, heard, believe or have figured out."

- **John Perry Barlow**, expert on people's rights in the info age and lyricist for the Grateful Dead: "When cryptography is outlawed, bayl bhgynif jvyy unir cevinpl!"

- **Bruce Sterling**, Wired magazine columnist and author: "Computers are a challenge and a threat, and they're changing our society in ways that we can't control and don't understand. They're not to be trusted."

- **Clifford Stoll**, an astrophysicist, computer user and skeptic who warns that there are negatives to the technology revolution: "The heavily promoted information infrastructure addresses few social needs or business concerns. At the same time, it directly threatens precious parts of our society, including schools, libraries and social institutions. No birds sing."

**Ideas to implement in the High School/College curriculum**
• **Database Exercise:** To practice using databases effectively, have students access the "Early '90s" internet predictions database (http://www.elon.edu/predictions/advanced.aspx) on the Imagining the Internet site and use the advanced-search function. First, ask students to experiment in finding things and familiarize themselves with this area of the site by entering different dates, media and names. Next, send them on a "scavenger hunt" to find particular items included in the database by using specific search terms and the pull-down menu. Some examples:

  o How many predictions in the Early '90s database include the word "dog"? List a favorite. How many predictions include the word "god"? List a favorite.

  o In which year did John Perry Barlow say: "The economy of the future will be based on relationship rather than possession. It will be continuous rather than sequential. And finally, in the years to come, most human exchange will be virtual rather than physical, consisting not of stuff but the stuff of which dreams are made."

  o How many predictions from the New York Times are included in the Early '90s database? List a favorite.

  o Find the subtopic "newspapers" and search to see how many predictions deal with their future. What are most people saying will happen with this form of media?

• **Predictions Survey assignment:** One section of the Imagining the Internet site – The Predictions Survey (http://www.elon.edu/predictions/survey_04.aspx) – includes information gathered by the Pew Internet & American Life Project in post-2003 surveys to ascertain what leading technology people, researchers and futurists think will happen in the next 10 to 20 years. The information in this "Predictions Survey" section of the site can be used in many ways.

  o Assign separate groups of students to each look at just one of the many pages dedicated to explaining the answer to each of the survey questions and report to the class and then lead a class discussion of the issue. For instance a group assigned to present the information included on the page with the response to a 2004 survey question on the future of social networks (http://www.elon.edu/predictions/q8.aspx) should read the lead explanation on this web page and then go through and find 10 favorite quotes that most accurately reflect the statistical results of the survey on this question. The group of students should compile and present a report to share with the class on this question, explaining the statistical result, supporting the report with the direct quotations and leading a class discussion about how students in the entire class feel about the issue.
Cut and paste the annual survey questions into a document and have your students take the survey and answer the questions themselves before looking at the site. Next have the students look at the site and compare their answers with those given by the internet experts. How are they similar and different? After reading what the experts have to say, would students want to alter their original opinions?

Typical survey questions include:

- In the next decade, among the following – media, education, government/politics, the workplace, education, medicine, entertainment, families, communities, religion, military, international relations - which institutions and human endeavors will change the most because of the internet? Tell us how you see the future unfolding.

- Do you agree or disagree with the following statement and why: At least one devastating attack will occur in the next 10 years on the networked information infrastructure or the country's power grid.

- Do you agree or disagree with the following statement and why: In 2014, it will still be the case that the vast majority of internet users will easily be able to copy and distribute digital products freely through anonymous peer-to-peer networks.

- Do you agree or disagree with the following statement and why: As computing devices become embedded in everything from clothes to appliances to cars to phones, these networked devices will allow greater surveillance by governments and businesses. By 2014, there will be increasing numbers of arrests based on this kind of surveillance by democratic governments as well as by authoritarian regimes.

- Do you agree or disagree with the following statement and why: By 2014, as telework and homeschooling expand, the boundaries between work and leisure will diminish significantly. This will sharply alter everyday family dynamics.

**SAT preparation:** To help students prepare for the writing portion of the SAT as well as to encourage thinking about the future, assign your students to study portions of the Imagining the Internet site that present information about future issues (for instance, the Early '90s section - http://www.elon.edu/predictions/advanced.aspx - of the site has a list of topic categories that lead to predictions about such controversial topics as copyright, anonymity, censorship, crime, privacy, information overload, e-commerce, virtual reality and many others, and they can be found in the pull-down menus.) Next assign students to answer essay questions in a timed format similar to that of the SAT. Some issues to consider include:
o What are the positive and negative moral and ethical implications of Internet use as it becomes faster, more enveloping and ubiquitous?

o How can we come up with a fair and equitable plan for the future of copyright and fair use that can be implemented worldwide?

o What are the dangers ahead when the world becomes so dependent on technology that computers are making most of our major decisions without our input?

How does the internet create new controversy over the conflict between law enforcement and our right to privacy and free speech; are the Patriot Act or other similar government controls necessary?

Additional Useful Resources for Educators

See the Sites

These sites offer additional information on communications and technology.

- [http://www.kids.gov/k_computer.htm](http://www.kids.gov/k_computer.htm) This site has a list of links to many well-developed sites for children, including Cyberethics for Kids, Kidz Privacy, an NSA page on cryptography, Girls Go Tech and many others. You can also find links to lists of science and math sites and other recommended resources.

- [http://imaginemars.jpl.nasa.gov/index1.html](http://imaginemars.jpl.nasa.gov/index1.html) - Imagine Mars is a participatory project for teachers to conduct with students. Provides lesson plans, Mars facts and other resources to lead student project teams.


- [http://www.computerhistory.org](http://www.computerhistory.org) - The website of the Computer History Museum in California. It offers online exhibits of the history of computing as well as facts about the development of the Internet.

- [http://cnst.rice.edu/](http://cnst.rice.edu/) - Rice University's website on nanotechnology, an important but little-known concept that will soon be infiltrating our lives. It offers a fun kids' site that teaches children about nanotechnology.

- [http://www.brainpop.com](http://www.brainpop.com) - This site is available for both educators and students through a paid subscription. It's especially helpful for teachers, as it offers videos and teaching ideas on nearly every subject.

- [http://www.thegateway.org](http://www.thegateway.org) - The Gateway to Educational Materials (GEM) allows teachers to use the web to research education ideas. There are thousands of
examples of lesson plans, activities, media and more.

• [http://school.discovery.com/schrockguide](http://school.discovery.com/schrockguide) - This site, linked to the Discovery Channel's school website, includes numerous resources from Kathy Schrock, a Massachusetts educator whose area of expertise lies in the integration of technology in schools.

• [http://www.lib.virginia.edu/education/resources/k-12.htm](http://www.lib.virginia.edu/education/resources/k-12.htm) - From the University of Virginia Education Library comes a comprehensive list of resources on topics such as states' standards of learning, technology in the classroom, and more.

• [http://www.learnnc.org](http://www.learnnc.org) - This site is built for North Carolina teachers, but it is useful for anyone anywhere. It provides teaching ideas and resources for all grade levels. It lets the user search for educational websites in a variety of subjects via the "Best of the Web" section.

**Useful Books**

The following books offer additional information and insights and are well worth the investment to include them in a classroom or school library collection. They offer teachers and students wonderful resources from which to gain more depth on coursework.

"Imagining the Internet: Personalities, Predictions, Perspective" (2005, Rowman & Littlefield) is a companion to this database. It looks at the future and past of pervasive networks of all kinds incorporating the stories of Six Degrees of Kevin Bacon, the Luddites, Socrates' opposition to the "technology" of writing, the Romantics, the Utopians, technorealists, and a projected battle between Cosmists and Terrans over a future in which artificats may dominate the galaxy. It shares concepts of such thinkers as Ithiel de Sola Pool, George Orwell, Marshall McLuhan, Vannevar Bush, Duncan Watts, Fritjof Capra, and Isaac Asimov while parsing the thoughts of Bill Gates, Nicholas Negroponte, John Perry Barlow, Bruce Sterling, Clifford Stoll, Al Gore, and dozens of other networked communications stakeholders and skeptics.

"City of Bits" (1994) by **William J. Mitchell**. Written by the dean of the School of Architecture and Planning at the Massachusetts Institute of Technology. The traditional printing of this book was followed in the spring and summer of 1995 with a companion online issue - what was labeled as "the first full-text interactive book on the World Wide Web." It is one of the finest looks at what may be that was generated in this era. It is available for free online at: [http://mitpress2.mit.edu/e-books/City_of_Bits/](http://mitpress2.mit.edu/e-books/City_of_Bits/)
"Being Digital" (1995) by Nicholas Negroponte. One of the high-visibility ambassadors of the Internet in the 1990s, Negroponte wrote and spoke in glowing terms of "being digital," seeing a glowing future for the world. The co-founder of MIT's Media Lab offered here an introduction to the possibilities of digital communication for the uninitiated. He had helped bankroll the start-up of Wired magazine in 1993, and his monthly column for that publication - considered the Rolling Stone of the technology age - forms the basis for this book, considered to be a classic predictive book about the potential of networking. Portions of the book are available for free at the site http://archives.obs-us.com/obs/english/books/nn/bdcont.htm. You can also freely access many writings by Negroponte on the Wired magazine archive site.

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