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Computers: A Journey from Past to Future

WebQuest Description: Did you know that as we speak, monkeys are able to control robotic devices with their brainwaves? Have you seen the most powerful supercomputer in the world? This unit is packed with websites, videos, and interactive resources to explore the past, present, and future of computer technology. Casual browsers are encouraged to explore the catalog of video links, demonstrating breakthroughs on the cutting edge of science and technology. Cooperative groups analyze computer innovations, create an interactive timeline, and present new ideas about the future of computers, gadgets, and the internet. Includes resources to learn how computers work. Adaptable for middle school, high school, and college. This comprehensive project can be broken into several units and provides a minimum of 12-16 hours of instructional time.
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Introduction

You are working for a computer manufacturer called GenComp. (The company name is a combination of the words "genius" and "computers".) You have been placed on a panel (a group of 3 to 5 members) to research the history of computers. Teams will create a timeline explaining the history of computers, and discuss which innovations were most important and why. Teams will then reseach the the latest developments in computer technology, and discuss new ideas for computers of the future. You will present your findings to other GenComp teams, and have a full company discussion. Your research will help designers to create computers and related devices (like iPhones, Droids, or iPads) for the future.

Tasks

Throughout this assignment you should keep the following questions in mind: How did computer devices change over time? What were some of the most significant computer inventions and why? How will we use computers in the future? What might the computers or devices of the future be able to do?

As a team, your tasks will include:

1. Researching the history of computers using the internet and other resources.

2. Creating a timeline illustrating how some discoveries and innovations lead to others.

3. Thinking about and discussing the most important developments-- those with the greatest impact on how we live today.

5. Presenting your discoveries and thoughts to a group of your peers. This will include your ideas about the future of computers. Others who work at GenComp may be able to use these ideas to create new computers and gadgets.

Note that if you scroll further down, you will see a resource page. For your convenience, all the resources you need will be found at the bottom of the next page (click on "Process" on the upper left menu of this page to continue.)

Process

Process
1. Essential questions   2. Research the history of computers 3. Team discussion & reflection 4. Create interactive timeline 5. Investigate technologies of the future 6. Team presentations- future innovations   7. Learn about how computers work in the process.
1. Questions: In creating your timeline, you want to consider the following questions. How did computing technology develop from 500 B.C. to the new millenium? What were some of the most significant technological innovations and why? Do not feel threatened by any of the computer terminology in this process. You can look up any term by clicking on Webopedia, Wikipedia, or How Stuff Works . There are several resources on "How Computers Work" at the bottom of this page. All colored and underlined words and phrases are links to websites. Have fun on your quest!
2. Research: To learn about the history of computers, explore the websites below. You will find information dating all the way back to ancient civilizations. To prepare for your timeline, focus on the 1940's through the present time (2010). Download and print Research & Reflection worksheets (4 pages). See resources page at the bottom of this web page. Click on Resource #1. Your company boss may already provide this for you. Choose several computer

inventions or developments that seem most important to you or your team. Use your Research and Reflection worksheet to take notes. Be sure to include the year, the creator(s), and the significance of each invention, if you can. The creator of an invention could be one person, a group of people, or an entire company. Be sure to cite your sources.

Click on the following links to access websites for step 2 (Research):

Triumph of the Nerds: History of Computers (PBS)-- PBS.org

Computer History Museum Timeline-- Computerhistory.org

ThinkQuest: From Stone to Silicone (B.C. to 1998)-- Thinkquest.org

Computer Hope: Timeline-- Computerhope.com

History of the Internet (video)-- Teacher Tube (by Mehli Gilbil)

Suggestions and Ideas for Teamwork

These are just suggestions and options for how to cooperate and collaborate as a team. For the Research and Reflection task, you might have each member read and think about one website or resource, and provide information to the team. Each member can take his/her own notes on the Research and Reflection sheet, or each member can take an assigned task. For example, some team members can gather and read information, while others listen, summarize, and take notes; or, each member can focus on the history of one or two decades. For example, one member could collect information on the 1940's and 50's, while another member focuses on the 1960's and 70s, and so on. There are many ways to organize a team. The important thing is that everyone contributes.

3. Reflect: You are preparing to create your timeline. Discuss the questions on the Reflection Sheet with your group (page 3 of Resource#1). Using page 4 of resource#1, take notes, based on your discussion. Discuss and choose at least two of the most significant innovations for each decade. For example, be prepared to list at least two advances in computer technology in the 1940's, at least two in the 50's, the 60's, and so on. You may notice that some decades had more rapid developments (more inventions) than others. It's a good idea to list several innovations for those decades. Discuss how one innovation lead to another. For example, how did computers change after the development of the integrated circuit? This exploration will help you to create a more interesting timeline.

4. Create: Choose one of the two options below. Option 1 is a hard copy timeline. Option 2 is an interactive digital timeline.

Option 1: Download and print the Timeline Presentation sheet (resource #2 at the bottom of this page). This may already be provided by the "company boss". Notice how some significant events are already placed on the timeline. This is to help you think about how some inventions lead to others. Be sure to mention the date, the inventors (or computer companies), and the significance of each innovation. Cite your source for each example. See the following example*:

Year: 1940

Invention or innovation: The complex number calculator

Creator(s): John Stibitz and researchers at Bell Labs

Significance: This was one of the first "small" electronic devices to calcualte complex numbers using the binary number system.

Source: http://www.computerhope.com/history

You will need a ruler or straight-edge to complete your timeline neatly. You may choose to use construction paper or tagboard instead of the timeline worksheet provided.

*Note: see Teacher Page for possible modifications to this assignment.

Option 2: Create an interactive timeline online at Timerime.com. This option is perhaps more exciting and interactive. However, it will take time to learn how to create your interactive timeline. Click here for a tutorial. (You may have to view an advertisement before the tutorial.) Click here for a sample timeline created by Mr. Bollinger (the creator of this webquest). Mr. Bollinger's timeline is intentionally spare and incomplete. It's up to you to make a complete timeline! You can choose to create your timeline individually or as a team. Provide the same kind of information you see in the example for option 1 (above).

5. Conclusions & New Innovations: Download the Conclusions worksheets (2 pages-- see Resource #3 at the bottom of this page). Think about why the inventions you included in your timeline were important. Choose one important invention from your timeline. Explain in detail how you think that invention changed the world. For example, if you believe the iPod had the most significant impact on people's lives, you should be able to explain why. This can be done as a group or independently.

Next, explore the videos and links below to review some of the latest and future technologies. A few of the examples on are not real (yet). Can you tell which? How are the latest computers and gadgets different from those that you currently use? Do you notice any trends in the latest computer designs and interfaces? What do you think computers of the future will look like? How will they be used? What role will the internet play? Be prepared to discuss your findings with other teams (and classmates) in the computer business. Note that there are additional options below for you to learn some basics about how computers work. See "Conclusion" page (upper left menu bar) before you begin your presentation.

YouTube Resources:

Latest Computer Interfaces
Touchscreen Magic-- Arthckr's Channel
Computer Tabletop-- Chunsfreefiles.webs.com
Educational Tool of the Future-- tbisho's Channel
Holographic Computer?-- ConnerTheSlayer's Channel
Voice-Controlled Robotic Surgery-- Karen Lustgarten (KLustgarten Channel)

Brain-Computer Interfaces
Monkey Controls Robot with Brain-- BoXVid
Brain-Controlled Toy --KiwiboxDotCom
Brainwaves Control Robots--Honda.com-News
Brain-Computer Interface--Formlessness' Channel

Supercomputers
NASA Supercomputers and Climate Simulations--Science Magazine Channel
Most Powerful Supercomputer in the World (2010)--AMDShanghiaExpress
Supercomputing Models of the Brain--Henry Markram/TED.com
World's Cheapest Supercomputer--NHK World News
Virtual Surgery--WOSU

Gadgets

Links to The Gadget Show Videos--Gadget Show
The Computer Pen-- kay0kay
The Future: computers, robots, networks
Honda Robotics-- Honda.com- News
Robots for the Elderly --Diagnaluk
Living in 2050 -- Whiteeagletrance
What is Moores Law? --60SecondScience
Future of the Net-- LearnTheNet.com
Did You Know? -- ITV Video Tutorials Channel
Wireless Sensor Networks CNBC/CrossbowJapan
Google's View of Future Internet--TheOpenRoom/OGilvy.com

Website Resouces/Articles:

National Gallery for America's Young Inventors--National Museum of Education (nmoe.org)
Kids Innovation Study-- Life-connected.com
Science News for Kids (Computers)--   Sciencenewsforkids.org
CNET News- Top Tech Headlines-- News.cnet.com
Computers: Past-Present-Future-- ThinkQuest.org
15 Cool Computers of the Future-- Ubanist Magazine
How Will Computers Evolve over the Next 100 Years? - howstuffworks.com
Are Modern Cars Computers on Wheels? --New York Times
Students Robotics Competition 2010 (video)-- RITUniverstyNews
7. How Computers Work (optional):
You will gain a deeper understanding of computer innovations (including those on your timeline) if you understand a little more about how computers work. These resources will help you to generate a more informed and meaningful discussion with your GenComp peers about the history and future of computers.

Video: "Computer Walk-through" (Computer History Channel)
Interactive Unit: Intel's Introduction to Computers (Intel.com)

Resource #4 Binary Numbers- (below) provides a PowerPoint introduction to binary numbers, and how they apply to computers. Interactive activities are included.

Resource #5 Computer Components- is a PowerPoint introducing the main components of a computer, and how they work together.

Evaluation

Category and Score	You can do better.	Yeah, alright.	Nice work!	Fantastic!	Score
Questioning and Research (Resource 1)	Minimal notes taken. Little detail	Innovations are listed with dates.	Innovations are mentioned with all expectations. Some innovations evaluated for significance.	Connections are made about innovations. Dates, Creator(s),and relationship to other inovations explained.	1-5

Category and Score	You can do better.	Yeah, alright.	Nice work!	Fantastic!	Score
Reflection and application (Creation of Timeline)	Relevant innovations and dates listed. Little collaboration.	Relevant innovations, dates,and creators listed. Some collaborative reflection	Relevant innovations are explored. All expections met and sources cited. Proactive group interaction.	All previous expectations met. Demonstrates understanding of Relationships between historical innovations.Timeline is interactive. Very collaborative group dynamic.	1-5
Future of computers: (Creation of thoughtful Conclusions)	Facts from research listed.	Facts from reseach listed and conclusions reached with little evidence of informed speculation.	Research informs conclusions with evidence of meaningful group discussion.	Uses credible resources beyond those listed and credible research informs creative and realistic specualuation about the future of technology.	1-5
Debriefing, Presentation, and collaboration	Presents facts and conclusions that are not directly related to research. Little evidence of collaboration.	Presents facts and conclusions based on research.Some evidence of collaboration.	Dynamic presentation with thoughtful, informed discourse.Proactive collaboration	Dynamic presentation, with thoughtful, informed discourse and evidence of further reseach and new questions. Demonstrates creative, parctical and original innovation. Dynamic group interaction and collaboration.	1-5
				Total Score	4 to 20

Conclusion

Congratulations. Your quest is almost complete. It's time to have a discussion with other teams about your timeline and to present your thoughts about computers of the future. You can choose the format of your presentation: PowerPoint, digital or hard-copy timeline, computer presentations, or handouts. Refer to your Conclusions worksheet throughout your discussion. GenComp's Product Design and Development Department will need your ideas to create new innovations. Once you have completed these tasks, you will have a better understanding of the process of computer innovation! You may procede to visit (or revisit) the "Evaluation" page (upper left menu) to rate yourself. The company boss may do the same. Congratulations, and good luck in your future technological endeavors!

Teacher Page

Objectives:
Participants will learn about computer and technological innovations from B.C. to present.
Participants will increase and utilize technology skills imbedded in this project (See relevent ISTE standards below).
Participants will analyze information to make connections about the relationships between historical events.
Participants will gather, discuss, analyze, and synthesize information to create a meaningful product (interactive timeline) in the context of inquiry-based activities.
Participants will gather, analyze, and synthesize information to make informed marketing predictions about the future of technology.
Participants will apply information to new situations in the form of a debriefing activity (presentation, panel discussion, peer review)
ITSE Standards (NETS) addressed:
Standard 1b) proficiency in use of technology
Standards 2b) responsible use of technology, and c) demonstate positive attitude toward technology in support of lifelong learning, collaboration...and productivity
Standard 3a) use of technology to enhance learning, increase productivity, and promote creativity.
Standard 3b) collaboration in constructing technology-enhanced models, publications and producing other creative works.
Standard 4b) use of a variety of media and formats to communicate information and ideas effectively...
Standard 5a) use of technology to locate, evaluate, and collect information from a variety of sources. (research)
Standard 5c) evaluate and select new information resources and technological innovations...
Standard 6a) use of technology resources for solving problems and making informed decisions
Standard 6b) use of technology in the development of strategies for solving problems in the real world.
*Modifications for Timeline assignment: Dates, facts and figures are only relevant insofar as they help to demonstrate the process or evolution of the computer. The most important factor is that students see the relationships between events in history. This timeline can be adjusted accordingly, depending on student needs and teacher judgement. To accomodate student needs, depending on learning objectives, I might allow omissions for such facts as the names of the inventor(s) or the formal citing of sources. I would only do so in order to spend more time and emphasis on how some innovations lead to others. The benefits of listing the names of the innovators is that their "stories" can be further reseached, discovered, and shared.
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All downloadable worksheets by Sean Bollinger
Interactive timeline tutorial by 5MinLife Videopedia (www.5min.com)
All other sources cited in text.

Standards

Credits

Other