**Computer Science Timelines**

In this lesson, students will collaborate with their peers to construct a timeline of major events related to the development of computers and the study of computer science. Students will then analyze their timelines, discussing dates that stood out, trends in technology development, and anything that surprised them. This lesson also provides an opportunity for independent written reflection, which can be used as a form of assessment.

**Standards:**

**Computer Science Teachers Association K-12 Computer Science Standards**

* **Grades K-2**
  + **1A-IC-16** – Compare how people live and work before and after the implementation or adoption of new computing technology.
* **Grades 3-5**
  + **1B-IC-18** – Discuss computing technologies that have changed the world, and express how those technologies influence, and are influenced by, cultural practices.

**College, Career, and Civic Living (C3) Social Studies State Standards**

* **Grades K-2**
  + **D2.His.1.K-2.** – Create a chronological sequence of multiple events.
  + **D2.His.2.K-2.** – Compare life in the past to life today.
  + **D2.His.4.K-2.** – Compare perspectives of people in the past to those of people in the present.
  + **D2.His.14.K-2.** – Generate possible reasons for an event or development in the past.
  + **D4.2.K.2.** – Construct explanations using correct sequence and relevant information.
* **Grades 3-5**
  + **D2.His.1.3-5.** – Create and use a chronological sequence of related events to compare developments that happened at the same time.
  + **D2.His.2.3-5.** – Compare life in specific historical time periods to life today.
  + **D2.His.14.3-5.** – Explain probable causes and effects of events and developments.
  + **D4.2.3-5.** – Construct explanations using reasoning, correct sequence, examples, and details with relevant information and data.

**Common Core State Literacy Standards**

* **2nd Grade**
  + **CCSS.ELA-Literacy.RI.2.3** – Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.
  + **CCSS.ELA-Literacy.W.2.7** – Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations)
  + **CCSS.ELA-Literacy.W.2.8** – Recall information from experiences or gather information from provided sources to answer a question.
* **3rd Grade** 
  + **CCSS.ELA-Literacy.RI.3.3** – Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.
  + **CCSS.ELA-Literacy.3.4** – With guidance and support from adults, produce writing in which the development and organization are appropriate to task and purpose.
  + **CCSS.ELA-Literacy.W.10** – Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
* **4th Grade**
  + **CCSS.ELA-Literacy.RI.4.3** – Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.
  + **CCSS.ELA-Literacy.W.4.4** – Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience.
  + **CCSS.ELA-Literacy.W.4.10** – Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
* **5th Grade**
  + **CCSS.ELA-Literacy.RI.5.3** – Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical texts based on specific information in the text.
  + **CCSS.ELA-Literacy.W.5.4** – Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience.
  + **CCSS.ELA-Literacy.5.10** – Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

**Objectives:**

* Students will be able to describe changes in computing technology over time.
* Students will be able to discuss how technology influences and is influenced by culture.
* Students will be able to reflect in writing about the role of technology and computers in their own lives.

**Lesson Duration:** at least 65-95 minutes in total

* Consider splitting this lesson into two sessions. Complete the Hook, Direct Instruction, and the first portion of the Application Activity (plan the timeline) on Day 1. Complete the remainder of the Application Activity (completing the timeline and presentations), Independent Application, and Closure on Day 2.

**Materials:**

* Computer Science Timelines (1 per group, precut and stored in an envelope or plastic baggie)
  + Version A – 30 timeline entries
  + Version B – 45 timeline entries
  + Version C – 60 timeline entries
* Chart paper (1 per group)
* Markers
* Pencils
* Glue
* Directions and Discussion Guide (1 per group)
* Independent Reflection Questions (1 per student)

**Requisite Prior Knowledge:**

* Before engaging in this lesson, it would be beneficial for students to have read the Building Blocks of Computer Science series.
* Students should have experience reading and/or creating timelines. Understanding the major features of timelines and how they organize information visually will help students create and analyze their own timeline during this lesson.

**Assessments:**

* Team timelines with main idea or theme
* Independent reflection questions

**Vocabulary:**

* Chronological order – arranged in the order in which the events happened
* Sequence – to arrange in order
* Timeline – a chronological presentation of key events related to a historical period or subject area, often in an illustrated chart or table

**Differentiation Considerations:**

* Because this lesson involves group work, consider using strategic grouping by ability. Use the differentiated versions of the Computer Science Timelines accordingly. Assign the version with the most entries to students who need the most challenge, the version with the least entries to students who need support, and the version with the middle number of entries to the remainder of students. Ability grouping will make this easier.
* In order to support students’ independence and time-on-task as they work with their peers, consider assigning team jobs to each student. Make it clear to students that these jobs are on top of their daily responsibility of participation. All students should listen, discuss, and question in addition to completing their job. Use what you know about your students to determine whether you want them to choose their roles within their teams or if you want to assign them ahead of time.
  + Reader – reads the directions, timeline entries, etc. aloud to the team
  + Recorder – neatly writes what the team decides on chart paper
  + Discussion Leader – guides the team through the discussion guide; includes everyone in the group in the discussion
  + Material Master – responsible for gathering, taking care of, and returning materials throughout the lesson
* For students who struggle with writing, consider allowing them to use a speech-to-text program or scribing their answers for them as to put the focus on the content, not the written communication skills.

**Lesson and Instruction:**

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| **Lesson Components and Time Guidelines** | **Teacher Actions** |
| **Introduction/Hook**  Approximately 5 minutes | Begin the lesson by explaining that today students will have the opportunity to work with their peers to construct a timeline of major computer science developments.  Ask students to complete a think-pair-share with their neighbor about what entries they may find in their work today. They should consider major dates related to computers, technology, and the study of computer science. If students struggle here, ask them to think about broad categories, such as how phones have changed over time.  If time allows, have volunteers share their responses with the class before transitioning to the Direct Instruction portion of this lesson. |
| **Direct Instruction and Modeling**  Approximately 7-10 minutes | Review the major features of timelines:   * Highlight the most important events * Show events in a sequence (in order) * Connects to a main idea or theme * Well labeled, neat, and easy to understand   Explain to students that they will collaborate with their peers to read through and organize their assigned events into a timeline. Stress the idea that timelines not only show chronological order, but also highlight some main idea or theme. Students will use a Discussion Guide to determine trends in their timeline.  After organizing and discussing all the items, students can gather the remaining materials they need to create their timeline (i.e., glue, markers, chart paper). If your students would benefit from it, consider requiring them to check in with you prior to retrieving their supplies. This will help ensure students do not rush through their thought process and help save on the need for extra copies!  Explain to students that the timelines they create will not only include all the entries in chronological order, but will also highlight a main idea or theme connected to the contents of the timeline. Students can determine how to communicate this on their timeline. Encourage them to be creative with their presentation. They can use pictures, color-coding, keys and symbols, labels, paragraphs, or other ways to share their main idea or theme.  Note: If choosing to use the differentiation strategy of team jobs (see the second bullet point), review the roles and expectations here. |
| **Application Activity**  Approximately 15-20 minutes | Provide students a copy of the Directions and Discussion Guide and transition to work time where students will collaborate to consider how computers and other technology have changed over time as well as their effects on culture. As teams work, circulate the classroom to provide support as needed.  After teams have completed their timelines, consider having them present their work to the class. These presentations can be quick and informal in nature to provide an opportunity for students to practice their speaking skills in a low-risk setting. |
| **Independent Application and Demonstration of Learning**  Approximately 30-45 minutes | Transition to the independent setting where students will use writing to reflect on their understanding of technological changes over time as well as how computing technology influences, and is influenced by, culture.  Consider using this written reflection as an informal assessment opportunity to determine students’ grasp of the impacts of computing. |
| **Closure**  Approximately 5-7 minutes | To close the lesson, draw students’ attention to the main ideas and themes highlighted by each team. Provide each student a sticky note and have them write about what learning will stick with them from this lesson. When they are done, they should walk and stick their sticky-note to their timeline, before returning to their seats.  Finally, explain that computing technologies change to benefit people, decrease risks, and meet societal needs. All these changes have their own effects, both positive and negative. It is important to be able to think critically about how technology develops and how it affects culture. |

**Next Steps and Reflection:**

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| What went well? |  |
| What changes might be beneficial? |  |
| Reteaching needs |  |
| Extension needs |  |