

# Computational Thinking:



## A Problem-Solving Tool for Every Classroom

NECC

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### Computational Thinking: Computer Science

The Pre-Collegiate Faculty Connection  
A site for K-12 computer science educators  
<http://www.microsoft.com/education/facultyconnection/BZ/Default.aspx>

The Beginner Developer Learning Center from Microsoft  
A wealth of tutorials and lessons  
<http://msdn.microsoft.com/vstudio/express/beginner/>

The Kids Corner – Programming resources for kids from Microsoft  
<http://msdn.microsoft.com/vstudio/express/beginner/kids/default.aspx>

Microsoft Visual Studio Express Editions - Free, lightweight, easy-to-use, and easy-to-learn tools for the student developer  
<http://msdn.microsoft.com/vstudio/express/downloads/>

Scratch + other projects from LifeLong Kindergarten - Easy to learn and use programming environment for children  
<http://scratch.mit.edu/>  
<http://ilk.media.mit.edu/projects.php>

Phrogram - Another programming environment for kids  
<http://phrogram.com/>

Computer Science 4 Fun - Useful in a variety of subjects  
<http://www.cs4fn.org/>

Computer Science Unplugged  
<http://www.unplugged.canterbury.ac.nz/share.html>  
[ar](#)

Online Math Applications  
<http://library.thinkquest.org/4116/Science/science.htm>

### Computational Thinking: Physical Sciences

#### Flight Simulator X

Download the updated **trial version** which includes two airports, two missions, and three different aircraft. Now available in five languages!

<http://www.microsoft.com/games/flightsimulatorx>

Information for educators:

<http://www.fsinsider.com/product/Pages/InfoEducators.aspx>

Sanford Flight Lab - Flight Simulator activities (dated, but a good starting point):

<http://www.flightsimulation.com/lab/index.html>

Concord Consortium - Free Software for analyzing and manipulating data

<http://www.concord.org/resources/browse/172/>

Gizmos <http://www.explorellearning.com/>

Earth quake simulation and study

[http://www.sciencecourseware.org/eec/Earthquake/Investigating Seismic Activity \(page 205\)](http://www.sciencecourseware.org/eec/Earthquake/Investigating%20Seismic%20Activity%20(page%20205))

<http://www.iste.org/eseries/source/orders/excerpts/netsci.pdf>

Geology Labs online

<http://www.sciencecourseware.org/GLOL/>

Rock Cycle and Carbon Cycle

<http://tangent.krellinst.org/complit-notrack/>

Science Animations, Movies & Interactive Tutorials  
<http://science.nhmccd.edu/biol/animatio.htm>

Understanding science through computing  
<http://ascr-discovery.science.doe.gov/index.shtml>

Online Math Applications: Science  
<http://library.thinkquest.org/4116/Science/science.htm>

### **Computational Thinking: Math**

A wealth of problems and puzzles, online mentoring, research, team problem-solving, collaborations, and professional development  
<http://mathforum.org/>

Math standards by grade level with modeling activities  
<http://standards.nctm.org/document/chapter4/index.htm>

National Library of Virtual Manipulatives by grade level matching to standards  
[http://nlvm.usu.edu/en/nav/topic\\_t\\_1.html](http://nlvm.usu.edu/en/nav/topic_t_1.html)

More lessons with teacher supplied plans  
[http://enlvm.usu.edu/ma/nav/bb\\_school.jsp?sid=emready&coid=all](http://enlvm.usu.edu/ma/nav/bb_school.jsp?sid=emready&coid=all)

Concord Consortium Free Software for analyzing and manipulating data  
<http://www.concord.org/resources/browse/172/>

Gizmos (30 day free trial)  
<http://www.explorelearning.com/>

Interactive math  
<http://www.cut-the-knot.org/index.shtml>

### **Computational Thinking: Social Studies**

Census data analysis with spreadsheets  
<http://standards.nctm.org/document/eexamples/chap5/5.4/index.htm>

Population dynamics  
Computational Laboratory population  
<http://tangent.krellinst.org/complit-notrack/index.jsp>

Health - Spread of disease  
Computational Laboratory population  
<http://tangent.krellinst.org/complit-notrack/index.jsp>

Voting - Gizmos - (30 day free trial)  
<http://www.explorelearning.com/>

Cornrow Braiding - The history, culture and transformational geometry with interactive software.

[http://www.ccd.rpi.edu/Eglash/csdt/african/CORNROW\\_CURVES/cornrow\\_homepage.html](http://www.ccd.rpi.edu/Eglash/csdt/african/CORNROW_CURVES/cornrow_homepage.html)

Online Math applications: Investing  
<http://library.thinkquest.org/4116/Investing/investin.htm>

Projects from LifeLong Kindergarten  
<http://ilk.media.mit.edu/projects.php>

Concord Consortium Free Software for analyzing and manipulating data  
<http://www.concord.org/resources/browse/172/>

### **Computational Thinking: Language Arts**

Media Literacy- Recognize the value of various data forms with multimedia authoring and understanding that an image's meaning changes depending on the purpose for which it is used, a new requirement of 21st Century communication.  
[http://www.edc.org/CCT/dig\\_lit/web/index.html](http://www.edc.org/CCT/dig_lit/web/index.html)

We have to get used to thinking of images, sounds and movement as raw material for construction. What a picture means, for instance, is no longer entirely defined by what is IN the picture, but rather by how it is used and in what context. Students have to learn to think about the purposes for which they want to use different media when they are authoring a multimedia text.

Junk charts – Analyzing data representations  
<http://junkcharts.typepad.com/>

Concord Consortium  
<http://www.concord.org/resources/browse/172/>

### **Computational Thinking: Fine Arts**

Online Math Applications: Music  
<http://library.thinkquest.org/4116/Music/music.htm>

Projects from LifeLong Kindergarten  
<http://ilk.media.mit.edu/projects.php>

Crickets - Create musical sculptures, interactive jewelry, and other artistic inventions -- and learn important math, science, and engineering ideas in the process. <http://www.picocricket.com/>

Patterns and Sequences  
[http://enlvm.usu.edu/ma/nav/bb\\_school.jsp?sid=emready&coid=all](http://enlvm.usu.edu/ma/nav/bb_school.jsp?sid=emready&coid=all)

Craft Tech - Craft technology is a term for the interweaving of computation with craft materials. ...

many forms including the application of specialized software to aid in the design and construction of crafts such as mechanical toys and paper sculpture and in the creation of craft objects with embedded intelligence.

<http://l3d.cs.colorado.edu/~ctg/Craft%20Tech.html>

Digital Literacy

Explorations with graphics and sounds

[http://www.edc.org/CCT/dig\\_lit/web/index.html](http://www.edc.org/CCT/dig_lit/web/index.html)

### **Computational Thinking: Life Sciences**

Gizmos (30 day free trial)

<http://www.explorelearning.com/>

Computational Library – disease and population studies

<http://tangent.krellinst.org/complit-notrack/>

Online Math Applications: Science

<http://library.thinkquest.org/4116/Science/science.htm>

Concord Consortium Free Software for analyzing and manipulating data

<http://www.concord.org/resources/browse/172/>

Virtual Courseware

<http://www.sciencecourseware.org/eecindex.php>

Science Animations, Movies & Interactive Tutorials

<http://science.nhmccd.edu/biol/animatio.htm>

### **Computational Thinking: Resources for further reading**

*Computational Thinking* by Jeanette M. Wing, CMU

<http://www.cs.cmu.edu/afs/cs/usr/wing/www/publications/Wing06.pdf>

Jeanette Wing <http://www.cs.cmu.edu/~wing/>

Beginner Developer Learning Center

Bit & Bytes and Kids Corner

<http://msdn.microsoft.com/vstudio/express/beginner/learningpath/default.aspx>

LifeLong Kindergarten Mitch Resnick, MIT

<http://llk.media.mit.edu/index.php>

Great Principles of Computing Peter J. Denning

[http://cs.gmu.edu/cne/pjd/GP/gp\\_overview.html](http://cs.gmu.edu/cne/pjd/GP/gp_overview.html)