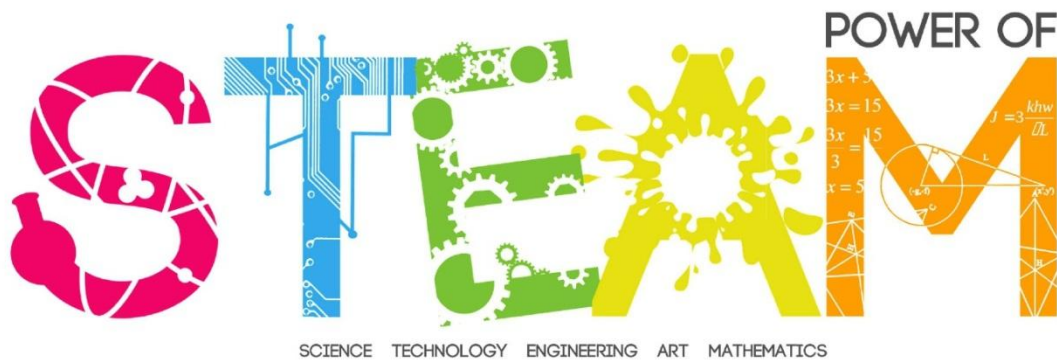


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STEAM/STEM

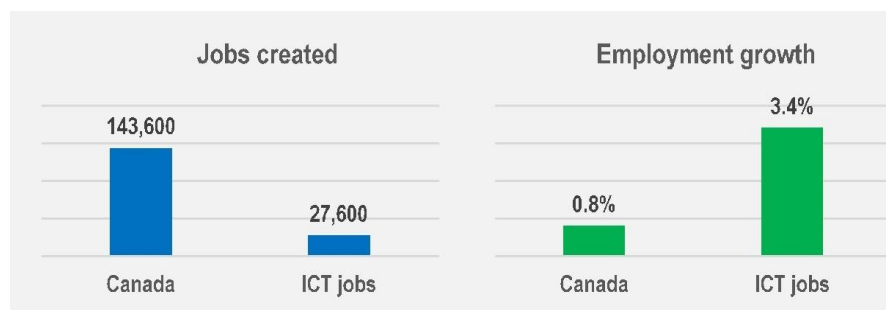
S: Science T: Technology E: Engineering A: Arts M: Math



ART + SCIENCE = PROGRESS

1 The Reason

We all need coffee. Math, science, engineering and art are incorporated into so much of our daily lives that we almost don't notice it anymore. We need people who can communicate, calculate and be literate in the STEAM fields. These fields are also desperate for qualified individuals to fill their normally permanent/long-term high paying jobs. An estimated 200,000 tech jobs will be made between 2016 and 2020—we already have LOTS jobs unfilled in this field.



“If Canada does not address the talent and skills gap, it could cost the economy **billions** of dollars in lost productivity, tax revenues, and gross domestic product... The problem isn't limited to Canada. The U.S. Department of Labor forecasts the country will create some 1.4 million IT jobs by 2020, but schools will barely be able to fill a third of them.” (ICTC)



“As librarians we need to embrace inquiry-based learning and get intimately acquainted with crafting “problem solving” units. STEM is not about learning the facts; it is about applying science and math to real-world issues, problems, and more.” (Paige Jaeger)

Even [Scouts Canada](#) has even been incorporating STEM projects into their programs. There are also a variety of organizations working to help with this problem—Girls Who Code for example, are working to get girls into this industry as [they are a minority](#) currently

A documentary called “CODE: Debugging the Gender Gap” was done recently and you can see the trailer for it [here](#). “There will be 1.4 million jobs by 2020 in the computing related field--Less than 29% of them will be filled by Americans and less than 3% of those Americans will be women.”

“The jobs are here and we don’t have the people to fill them.”

What about [Ada Lovelace](#)?! She was a gifted mathematician and is credited with writing the first algorithm intended to be used for a machine—because of this, she is commonly referred to as the first computer programmer even though she died at the young age of 36 (1852). We have [18 titles in the TRAC](#) catalogue related to her, one of them being the graphic novel “[The Thrilling Adventures of Lovelace and Babbage: The \(Mostly\) True Story of the First Computer](#)” by Sydney Padua.

2 Where to Start

Do your research and set aside some time to learn before, during and after your programs about your successes or fails.








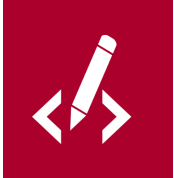

Look for grants. There is such a desperate need for these jobs that a lot of organizations and governments are throwing money at people willing to fix this problem. In particular, [big tech companies](#) are investing in STEM/STEAM programs so they have future employees. Look online and use [GrantConnect](#).

Reach out to libraries that have done these programs. Talk to your local schools! Work with the curriculum.

Find your audience. If you don't have a large population of comic book users or teens, don't start off building a program for them. If you have a lot of children, start there.

Vet your resources. Play around with your apps, browse websites for ideas, watch YouTube videos and tutorials.

3 Coding Software

<p>ATOM</p> 	<p>aptana</p> 	<p>jEdit</p> 
<p>Notepad++</p> 	<p>Programmers Notepad</p> 	<p>PSPad</p> 
<p>SCREAM</p> 	<p>Code Writer</p> 	<p>Crimson Editor</p> 

4 Coding & STEAM Resources

4.1 Websites

123D	http://www.123dapp.com/design
AdaFruit	https://blog.adafruit.com/category/educators/
Algadoo	http://www.algodoo.com/
Allan County Library Flickr	https://www.flickr.com/photos/acplinfo/
App Inventor	http://appinventor.mit.edu/explore/
Audacity	http://www.audacityteam.org/
Battle Bots (TV show)	http://www.battlebots.com/
Blender	https://www.blender.org/
Book Creator	http://bookcreator.com/
Choice of Games	https://www.choiceofgames.com/
CK-12	http://www.ck12.org/
Code Spark Academy with The Foos	http://thefoos.com/
Code.org	https://code.org/
Codecademy	https://www.codecademy.com/
Code School	https://www.codeschool.com/
Cosmos	http://channel.nationalgeographic.com/cosmos-a-spacetime-odyssey/
Coursera	https://www.coursera.org/
Curiosity	https://curiosity.com/
Duck Brand	http://duckbrand.com/craft-decor
EdHeads	http://edheads.org/
edX	https://www.edx.org/
Fab Foundation	http://fabfoundation.org/
Free Code Camp	https://www.freecodecamp.com/
Game Salad	http://gamesalad.com/
Gamekit Challenge Pack	http://beta.gamek.it/challenge-pack/the-basics/
Gamestar Mechanic	https://gamestarmechanic.com/

Hackerspace	http://hackerspaces.org/
How to Smile	https://www.howtosmile.org/
HowToons	http://www.howtoons.com/
HTML5 Rocks	https://www.html5rocks.com/en/
Illuminations	http://illuminations.nctm.org/
INFOhio Maker Movement	http://libguides.infohio.org/makerspaces
Informal Science	http://www.informalscience.org/
Instructables	http://www.instructables.com/
Kahoot	https://getkahoot.com
Kennedy Centre: ArtsEdge	https://artsedge.kennedy-center.org/educators.aspx
Khan Academy	https://www.khanacademy.org/
KidMakers	http://www.kidmakers.org/
KidThinkDesign	http://www.kidsthinkdesign.org/
Learn HTML	https://www.sololearn.com/Course/HTML/
Learn Java	https://www.sololearn.com/Course/Java/
Learn Python	https://www.sololearn.com/Course/Python/
LEGO	https://education.lego.com/en-us
LEGO Engineering	http://www.legoengineering.com/
Library as Incubator	http://www.libraryasincubatorproject.org/
Library MakerSpace Pinterest	https://www.pinterest.com/cari_young/library-makerspaces/
Made with Code	https://www.madewithcode.com/
Madison Public Library Makers Blog	http://librarymakers.blogspot.ca/
Make It @ Your Library	http://makeitatyourlibrary.org/
Maker Education	http://makered.org/wp-content/uploads/2014/09/GSUSA-Get-Making-with-Get-Moving.pdf
MakerBot	https://www.makerbot.com/
Makey Makey	http://makeymakey.com/
Makezine	http://makezine.com/
MIT Open Courseware	https://ocw.mit.edu/index.htm

Molecular Workbench	http://mw.concord.org/modeler/
Mythbusters	http://www.discovery.com/tv-shows/mythbusters/
NASA	https://www.nasa.gov/
National Geographic Education	http://nationalgeographic.org/education
PBS's Design Squad Global	http://pbskids.org/designsquad
PBS's NOVA Labs	http://www.pbs.org/wgbh/nova/labs/
PhET Circuit Construction Kit	https://phet.colorado.edu/en/simulation/circuit-construction-kit-dc
Pixel Press Floors	http://www.projectpixelpress.com/floors/
Science Buddies	http://www.sciencebuddies.org/
ScienceNetLinks	http://sciencenetlinks.com/
SciStarter	http://scistarter.com/
SCRATCH	https://scratch.mit.edu
Sculptris	http://pixologic.com/sculptris/
Soft Circuit Workshops	http://alumni.media.mit.edu/~emme/guide.pdf
STEM to STEAM	http://stemtosteam.org/
Stencyl	http://www.stencyl.com/
Sylvia's Super-Awesome Maker Show	http://sylviashow.com/
The Code Player	http://thecodeplayer.com/
The James Dyson Foundation	http://www.jamesdysonfoundation.com/
The Odin Project	http://www.theodinproject.com/
The Tinkering Studio	http://tinkering.exploratorium.edu/
Thingiverse	http://www.thingiverse.com/
TreeHouse	https://teamtreehouse.com/
Tynker	https://www.tynker.com/
Udacity	https://www.udacity.com/
Udemy	https://www.udemy.com/
Unity	https://unity3d.com/unity
Utah State University Robotics	http://utah4h.org/projects/stem/robotics/
W3Schools	http://www.w3schools.com/

WordPress	https://wordpress.com
YouTube: Craftzine	https://www.youtube.com/user/craftzine/featured
YouTube: Make	https://www.youtube.com/user/makemagazine
YouTube: MakerBot	https://www.youtube.com/user/makerbot
YouTube: Maker Faire	https://www.youtube.com/user/MakerFaireVideo
YouTube: Rose Reid	https://www.youtube.com/user/BighornLibrary

4.2 Apps

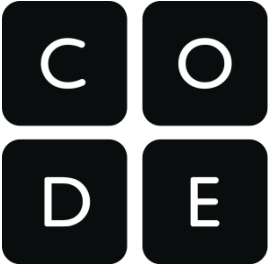



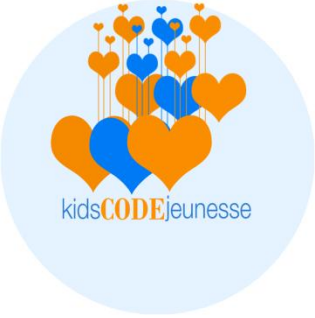
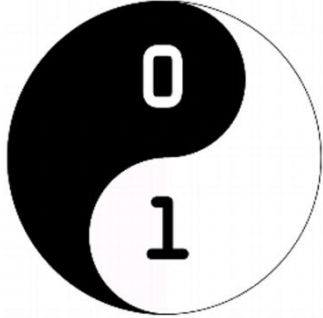


123D	FREE – App for Android & Apple
Algodoo	\$6.99 – App for Apple
Anatomy 4D	FREE – App for Android & Apple
App Inventor 2	FREE – Versions available for Android & Apple
Bedtime Math	FREE – App for Android & Apple
Book Creator	FREE – App for Android & Apple
BrainPOP	FREE – App for Android & Apple
Cardboard Design Lab	FREE – App for Android
Chemistry Lab	FREE – App for Android
Choice of Games	Starting FREE – Apps for Android & Apple
Code-a-pillar	FREE – App for Android & Apple
Code Spark Academy with The Foos	FREE – App for Android & Apple
Complete Biology	FREE – App for Android
Complete Chemistry	FREE – App for Android
Complete Mathematics	FREE – App for Android
Complete Physics	FREE – App for Android
Coursera	FREE – App for Android & Apple
Crazy Gear	FREE – App for Android
Curiosity	FREE – App for Android & Apple
Earth Now	FREE – App for Android & Apple
edX	FREE – App for Android & Apple
Encode	FREE – App for Android
Instructables	FREE – App for Android & Apple
Kahoot	FREE – App for Android & Apple
Khan Academy	FREE – App for Android & Apple
Learn HTML	FREE – App for Android & Apple
Learn Java	FREE – App for Android & Apple
Learn Python	FREE – App for Android & Apple
LightBot	FREE – App for Android & Apple
MakerBot	FREE – App for Android & Apple
NASA	FREE – App for Android & Apple

Pocket Physics	FREE – App for Android
Pixel Press Floors	FREE – App for Apple
Robot Factory	FREE – Versions available for Android & Apple
ScratchJR	FREE – App for Android & Apple
Simple Mechines	FREE – App for Android
Sky Map	FREE – Versions available for Android & Apple
Star Chart	FREE – App for Android & Apple
STEAM Quest	FREE – App for Android
Swift Playgrounds	FREE – App for Apple
Thingiverse	FREE – App for Android
TreeHouse	FREE – App for Android & Apple
Tynker	FREE – App for Android & Apple
Udacity	FREE – App for Android & Apple
Udemy	FREE – App for Android & Apple
W3Schools	FREE – App for Android
WordPress	FREE – App for Android & Apple

4.3 Events

Global Cardboard Challenge	http://imagination.is/our-projects/cardboard-challenge/
Hour of Code	https://hourofcode.com/ca
Instructables Contest	http://www.instructables.com/community/Makerspace-Contest/
International Games Day	http://igd.ala.org/
Little Bits Challenges	http://littlebits.cc/
Maker Faires	http://makerfaire.com/
Rube Goldberg Contest	https://www.rubegoldberg.com/

5 Coding Organizations

<p>Code.org</p>	<p>Girls Who Code</p>	<p>Girl Develop It</p>
		
<p>Ladies Learning Code</p>	<p>kids CODE jeunesse</p>	<p>CoderDojo</p>
		
<p>Lighthouse Labs</p>	<p>Code Club World</p>	
		

6 Libraries Coding

Look at what some libraries are already doing. Maybe reach out to them or see what sort of reaction they get?

6.1 Halifax Public Library



An article was written by CBC News about the [free coding course offered at the central branch in Halifax](#) on Aug 27th, 2016. 115 people attended while 80 people were waitlisted. It was described in their program as:

HTML, CSS, & JavaScript Workshop with Lighthouse Labs

Want a taste of the world of a Web Developer? Led by members of the Lighthouse Labs team, you'll be introduced to the fundamentals of web development, and have the chance to try your hand at building your very own website using HTML, CSS and JavaScript. The workshop will consist of an hour of lecture time, a break for lunch, and then two and a half hours of hands on keyboard, coding and exploring the different aspects of programming. There will be mentors on site to help you every step of the way!

6.2 Calgary Public Library



CPL offers a variety of programs about computers and coding at different age and skill levels. You can sort through the programs [here](#) or look through the entire catalogue of programs [here](#).

6.3 Toronto Public Library



TPL offers a couple different programs and options for different levels and aspects of coding and programming. Check out their information [here](#).

6.4 Edmonton Public Library



EPL is doing a couple different things. They've reached outside of the basic coding and offered other help with things like open data. You can look [here](#) and [here](#). Nancy Sheng wrote a blog post about the benefits of introducing this information at a young age [here](#). They also looked at the gender gap in the coding industry [here](#). They also organized a list of resources for coders [here](#). See their current plans to expand their resources [here](#). See the coding workshop for kids [here](#).

6.5 Vancouver Public Library



VPL has a variety of events and programs offered focusing on coding that you can see [here](#) and other technology courses [here](#).

7 Extra Resources

All of these are available using our EBSCO databases or stated otherwise (but are still freely available online).

1. Anderton, Holly. *STEM, Teens, and Public Libraries: It's Easier than You Think!* (3 pages)
2. Anzivino, Luigi and Karen Wilkinson. *Libraries and Tinkering Spaces* (4 pages)
3. Barack, Lauren. *STEM to Grow in Libraries*. (2 pages)
4. Council of Canadian Academies. *Some Assembly Requires: STEM Skills and Canada's Economic Productivity: The Expert Panel on STEM Skills for the Future* (2015). Retrieved from <http://www.scienceadvice.ca/uploads/ENG/AssessmentsPublicationsNewsReleases/STEM/STEMFullReportEn.pdf>
5. Dehaas, Josh. *Students are fleeing STEM degrees*. MacLean's. Retrieved from <http://www.macleans.ca/work/jobs/students-are-fleeing-stem-degrees/>
6. Jaeger, Paige. *STEM, eSTEM, and the Cybrarian: What Every Librarian Should Know*. (3 pages)
7. Kerr, Janel M. *Developing a STEM Event in Your Community* (3 pages)
8. Kerr, Janel M. *Developing STEM outreach activities in Rural Communities* (4 pages)
9. Lamb, Annette. *Makerspaces and the School Library, Part 1: Where Creativity Blooms* (4 pages)
10. Lamb, Annette. *Makerspaces and the School Library, Part 2: Collaborations and Connections* (5 pages)
11. Lewington, Jennifer. *Why tech giants are investing in STEM programs for students*. The Globe and Mail. Retrieved from <http://www.theglobeandmail.com/news/national/education/why-tech-giants-are-investing-in-stem-programs-for-students/article21329798/>
12. OnlineUniversities.com. *50 Best iPad Apps for STEM Education*. Retrieved from <http://www.onlineuniversities.com/blog/2012/05/50-best-ipad-apps-for-stem-education/>
13. Roberson, Tezeno. *"STEM"-ulating Young Minds: Creating Science-Based Programming @ Your Library* (8 pages)
14. Seymour, Gina. *The Compassionate Makerspace: Grief and Healing in a High School Library Makerspace* (4 pages)
15. Tencer, Daniel. *Tech Jobs Will Boom in Canada, But country Lacks People to Fill Them: Study*. The Huffington Post Business. Retrieved from http://www.huffingtonpost.ca/2016/03/12/it-jobs-skills-shortage-canada_n_9440872.html