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# 15 ways to empower students with open source tools

From learning basic digital literacy or expanding on those skills with fun projects, open source gives students the freedom to explore, tinker, and learn.



24 Jul 2017 | [Don Watkins \(https://opensource.com/users/don-watkins\)](https://opensource.com/users/don-watkins) | 12

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*The academic year is firing back up soon, so you'll be seeing more education articles on Opensource.com in the coming weeks.*

Recently I read the fascinating book [Empower: What Happens When Students Own Their Own Learning](http://a.co/6gaGmQZ) (<http://a.co/6gaGmQZ>), by John Spencer and A.J. Juliani. The book led me to think more deeply about my teaching methods and how I like to learn. I think learning should be exciting, and I'm happiest when I'm actively engaged in what I'm doing. Why wouldn't students in our schools want anything different than that? And why aren't we doing more to give that experience to them?

While many schools today have a 1:1 ratio of computers/tablets to students, most of them use platforms and software that allow little (if any) modification. Students can't tinker with the software or hardware. Yet tinkering and experimenting are at the heart of learning. The authors of *Empower* say that students in environments that foster "making" take ownership of their learning more readily and tend to be deeper thinkers who are more at home with frustration. Ultimately, they wrote, "makers are better equipped for life."

## Tinkering and exploring with Raspberry Pi

As I've been working more and more with Raspberry Pi computers, it's become clear to me that they, along with open source software, are a great and affordable way to bring more tinkering and making into schools.

Since Raspberry Pi is relatively inexpensive (a Raspberry Pi setup with keyboard, mouse, and LCD display costs about a third of a typical \$400 tablet) and durable, a classroom of 25 students could be outfitted without breaking the school's budget.

In addition, the open source software available for Raspberry Pi doesn't require additional licenses or fees, as is often the case with other types of software.

What better way to encourage making, designing, creating, and evaluating than outfitting your classroom with a set of Raspberry Pi computers?

## 6 ways open source empowers learning

Digital literacy is as important today as reading, math

open source, students and teachers have the tools they need, right at their fingertips, to support literacy and a culture of making and tinkering.

Here are six specific digital literacy skills that people can learn by using open source solutions.

1. **How hardware works:** It's easy for teachers and students to take a Raspberry Pi apart and put it back together to learn how hardware works.
2. **What the operating system does:** Raspberry Pi's Debian-based Raspbian operating system enables students to explore and learn how an OS and file system work.
3. **How to program:** Raspberry Pi comes with the open source [Scratch](https://www.raspberrypi.org/blog/scratch-2-raspberry-pi/) (<https://www.raspberrypi.org/blog/scratch-2-raspberry-pi/>), [Python](https://www.python.org/) (<https://www.python.org/>), and [Java](https://go.java/index.html) (<https://go.java/index.html>) programming languages, and there are many other programming languages available, such as [Sonic Pi](https://www.raspberrypi.org/learning/sonic-pi-lessons/) (<https://www.raspberrypi.org/learning/sonic-pi-lessons/>), an open source programming environment based on Ruby.
4. **Understand licensing and ownership:** Students can engage in robust discussions about free software, along with [copyleft](https://www.gnu.org/licenses/copyleft.en.html) (<https://www.gnu.org/licenses/copyleft.en.html>), copyright, and [Creative Commons licensing](https://creativecommons.org/licenses/) (<https://creativecommons.org/licenses/>), all topics at the heart of digital literacy.
5. **Use software to support learning:** Students can learn and do their usual school assignments with a wide variety of open source software and games including [LibreOffice](https://www.libreoffice.org/) (<https://www.libreoffice.org/>), [Tux Typing](https://tux4kids.alioth.debian.org/tuxtype/) (<https://tux4kids.alioth.debian.org/tuxtype/>), [TuxMath](https://tux4kids.alioth.debian.org/tuxmath/) (<https://tux4kids.alioth.debian.org/tuxmath/>), [GIMP](https://www.gimp.org/) (<https://www.gimp.org/>), and [WordPress](https://wordpress.com/) (<https://wordpress.com/>).
6. **Create original materials:** After learning them, teachers and students can use that cadre of applications to create their own openly licensed educational materials.

## 9 fun projects for students and teachers

After your students learn the basics of Raspberry Pi and open source software, let them put their imagination and creativity to work on these classroom projects.

1. Use Scratch to teach younger students [the basic](https://opensource.com/life/15/6/6-tips-teaching) (<https://opensource.com/life/15/6/6-tips-teaching>

- great [how-to \(http://kata.coderdojo.com/wiki/Beginner\\_Scratch\)](http://kata.coderdojo.com/wiki/Beginner_Scratch) from CoderDojo and even create animated stories with Scratch.
2. Older students can learn to program with Python using this great [beginner Python exercise \(http://kata.coderdojo.com/wiki/Beginner\\_Python\)](http://kata.coderdojo.com/wiki/Beginner_Python) at CoderDojo or [create Turtle graphics \(https://opensource.com/life/15/8/python-turtle-graphics\)](https://opensource.com/life/15/8/python-turtle-graphics) with Python. For more on Python programming, check out my review of [Teach Your Kids to Code \(https://opensource.com/education/15/9/review-bryson-payne-teach-your-kids-code\)](https://opensource.com/education/15/9/review-bryson-payne-teach-your-kids-code).
  3. Students can edit and create new images with GIMP, a powerful image editor that's fun to learn and use. [Search Creative Commons \(https://search.creativecommons.org/\)](https://search.creativecommons.org/) for images that can be downloaded, modified, and reused with proper attribution.
  4. Similarly, students can experiment with music and sound using [Audacity \(http://www.audacityteam.org/\)](http://www.audacityteam.org/) audio-mixing software. [Search Creative Commons \(https://search.creativecommons.org/\)](https://search.creativecommons.org/) for sound files that can be downloaded, modified, remixed, and reused with proper attribution.
  5. Create an [eBook server \(https://opensource.com/article/17/6/raspberrypi-ebook-server\)](https://opensource.com/article/17/6/raspberrypi-ebook-server) for the classroom or school with the open source Calibre software and a Raspberry Pi. Students and teachers can add to the library with resources from [Project Gutenberg \(https://www.gutenberg.org/\)](https://www.gutenberg.org/), [Saylor Academy \(https://www.saylor.org/books/\)](https://www.saylor.org/books/), and the [Open Textbook Library \(https://open.umn.edu/opentextbooks/\)](https://open.umn.edu/opentextbooks/).
  6. Have students [build a WordPress server \(https://www.raspberrypi.org/learning/lamp-web-server-with-wordpress/\)](https://www.raspberrypi.org/learning/lamp-web-server-with-wordpress/) to share their work within the safe confines of the school's network. Not only will they learn how to write and publish blog posts, but they'll also learn the nuances of installing and managing a blog.
  7. Create a lesson around copyright and [Creative Commons \(https://creativecommons.org/\)](https://creativecommons.org/) licensing. Talk to students about the value of sharing their work, encouraging classmates to reuse and attribute their work properly, and building upon others' work to create new things without plagiarizing.
  8. Mix it all up with a classroom poetry slam. Use LibreOffice Writer to create short poems that can be saved as documents. Then share them on your classroom WordPress blog or Calibre eBook server. You could even let students use Audacity to dub their narration over a soundtrack.
  9. Building on that project, combine coding and poetry writing by using Python to create an interactive poem writer. Here is a Python code example

```
# PoemWriter
print("This program will help you write a four line poem.")
name = input("What is your name?")
print("Hello "+name)
print("\n")
print("You will be prompted for each new line of poetry")
line1 = input("What is the first line of your poem?")
line2 = input("What is the second line of your poem?")
line3 = input("What is the third line of your poem?")
line4 = input("What is the fourth line of your poem?")
print("\n")
print("What is the title of your poem?")
title = input("What is your title?")
print("\n")
print("Here is your poem! "+name)
print("\n")
print("\n")
print(title)
print("\n")
print(line1)
print(line2)
print(line3)
print(line4)
```

There is no limit to what you and your students can learn with open source solutions. If you want to empower today's learners, then Raspberry Pi and open source software should be in your lesson plans. The beauty of open source is that it offers a platform that gets to the heart of learning through exploring, creating, and iterating in a variety of environments.

Topics:

**Education** (<https://opensource.com/tags/education>)

**Raspberry Pi** (<https://opensource.com/tags/raspberry-pi>)



## About the author

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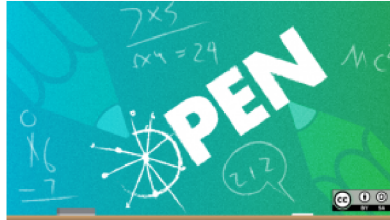
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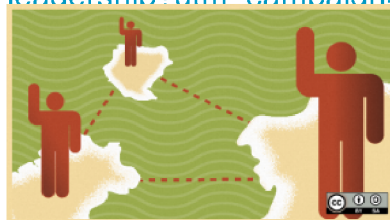
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[Jeff Macharyas](https://opensource.com/users/jeffmacharyas) (<https://opensource.com/users/jeffmacharyas>) on 24 Jul 2017

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I will be conducting a class for HS juniors and seniors this fall at St. Lawrence University, in Canton, NY, which I call "Graphic Design Using Open Source Tools." It's my first attempt at teaching and there are some good tips in your article I can apply. I'm not getting into hardware but your concepts are great and I like that WordPress idea; I'll try to work that in. I'm developing the curriculum now and created a WordPress.com site to post assignments and news and h



[Don Watkins \(https://opensource.com/users/don-watkins\)](https://opensource.com/users/don-watkins) on 24 Jul 2017

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Great! Glad that this helps you Jeff. I'd love to hear about your success with the program.

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