PiLab Grant Funding Solicitation for Applicants

The Problem

In recent years, computer science has moved to the forefront of desired skills in today's job market. Students who learn these skills prior to graduating high school are that much better prepared for college and/or a career that will allow them to earn good money, provide for themselves and their family, and be productive members of society, all while doing something they enjoy.

Plus, the computer is an invaluable tool for anyone working in or studying Science, Engineering, Technology and Math (STEM). It is the go-to tool for measuring and analyzing complex data, creating new designs and testing them virtually, developing new electro-mechanical hardware and driving it – basically everything from balancing a budget to calculating the expansion of the universe. Our vision is to help Montana's youth achieve new heights in STEM by providing an opportunity to develop (or deepen) their computer science skills and master the computing tool. We want to see computer science in every K-12 school in Montana.

Many schools in Montana want to offer courses in computing skills, ranging from general office tasks to coding, but do not have the funding or trained staff to do so. As they price out various computing labs, the prices of most desktops, tablets, and software make funding these labs especially daunting.

This can be especially true for private and rural public schools. Smaller populations, geographic location, and funding models often make it difficult for these schools to obtain the required funds to implement computer labs for their students.

A Solution

The Gianforte Family Foundation is offering an option for these schools.

In 2015, Petra Academy in Bozeman implemented a lab setup using Raspberry Pis (essentially a low-cost computer the size of a credit card), keyboards and mice, monitors, and all necessary software. With this model, students learn the basics of how a computer works. They also learn general computational thinking, and how they can use computers to solve problems, two skills that can be applied to any career or field of study.

The PiLab is much more than the typical computer lab used for learning word processing and surfing the internet. Programs are stored on an SD card (no hard drive) and you can literally poke your fingers at the circuit board. Unlike a computer, Pi is very flexible, can be run on batteries so it's portable, and can connect to sensors, servo motors, and a wide variety of electronic attachments for nearly unlimited possibilities.

Other advantages to this lab include:

- The cost for this lab, which resulted in 12 desktop computer setups, was approximately $2,500, a fraction of the cost of traditional labs.
- Raspberry Pis are ideal for teaching computer science, as the students are able to interact with all aspects of the computer. Plus, the system is already installed with Python, Java, and code editors.
- The system is Linux-based, with no need for virus protection and no costs for operating system updates.
- The computers have other computing functions for projects and classes other than computer science, such as a web browser and Libre Office, and OpenOffice-like productivity suite.
- If desired, teachers can also use the web browser program on the Raspberry Pis to run the Code Studio portion of Code.org. This would allow students as young as four to learn basics of coding.

There are two minor limitations to this setup. First, the computers are not as fast as standard desktops or laptops. This would not be a major hurdle for most applications.

Second, the systems would not be effective for teaching Photoshop or other more sophisticated programs. If this is your school's primary purpose for a computer lab, the Raspberry Pi setup would not meet your needs.

However, if it is the desire of your school to provide a lab where students can learn coding, as well as other general computing skills, this program could be a great fit for you.

If your school already has a computer lab, but would like to obtain Raspberry Pi starter kits to add a physical computing aspect to your existing CS curriculum, you can apply for a partial grant for that equipment through this same process. You can find several resources online that explain these types of projects. A couple to start with are the Raspberry Pi Blog and Adafruit (https://www.raspberrypi.org/blog/ *and* https://learn.adafruit.com/category/raspberry-pi).

What You Need to Know

Private and rural public schools in Montana can apply for funding to implement this computer lab, via an online application form. The funding amount will be based on the number of computers needed, up to 20 workstations.

Each computer can be obtained for about $230 each (including a Raspberry Pi starter pack, mouse, full QWERTY keyboard, 21.5" monitor, and basic electronics kit). The following list outlines the costs and sources for this equipment. Prices are based on the supplier and are subject to change.

- **Raspberry Pi 3 Unit ($90)**
  - Raspberry Pi 3 Starter Pack (includes board, case, SD card, power supply, etc.) Source: adafruit.com, product #3058

- **Keyboard/Mouse Sets ($23)**

- Computer Add-on Pack (includes keyboard and optical mouse) (10x)
  Source: adafruit.com, product #2129

- **Monitors ($110)**
  - ASUS LED 21.5" 5MS VS228H-P R (10x)
    Source: newegg.com, product #N82E16824236176

- **Potential additional equipment**
  - Power strips (any hardware store)
  - Tables (e.g. folding tables from Costco)

Below is a photo of a 12-station PiLab.

Eligible schools must meet the following requirements:

- Provide a qualified volunteer or employed teacher who will set up and maintain the lab. This person must have adequate knowledge and experience with Raspberry Pis and Linux, or must complete the provided PiLab training described in the next section. The PiLab training we provide is free, and will enable anyone taking it to competently set up and maintain the lab.
- Have a qualified teacher teach at least one computer science class per school year. For the purposes of this grant, qualified teachers are those who have successfully completed (or are planning to complete) the Joy and Beauty of Computing teacher training. This training is a one-week intensive course offered during the summer via the Montana University System.

Important to note: Teachers who successfully complete this training and implement it in their classroom can potentially apply for their students to receive dual-enrollment credit!

- Be a private K-12 school with 501c3 status or a rural public K-12 school, in Montana.

The funding will provide for up to 20 computers, and any required power strips, tables, or other accessory costs that may arise. Each school awarded funding will be required to provide the following once the lab is installed:

- Copies of invoices and receipts for the lab equipment
- Metrics each year for the first two years, measuring the number of classes offered with the lab (both CS classes and any others) and the number of students enrolled in each class. This information will be provided in online follow up forms, and instructions for accessing these forms will be emailed to the applicant four weeks before the forms are due.
- Photos of the lab with the teacher and students, and permission to use the photo in a press release to the local paper.

Each school will be required to sustain and maintain the labs following the initial setup, including paying for internet and IT support (if necessary), other maintenance costs, and replacement of parts as needed.

What We Will Provide

Along with any awarded funding, we will provide online training for any interested member of the school's staff. This training will cover setting up and maintaining this lab. It is in the form of video tutorials that can be found at montanapilabs.org.

This training will provide instruction on the following:

- How to navigate Linux
- How to set up Raspberry Pis and student accounts
- General operations of PiLab
- How to install additional packages
- How to use Raspberry Pis to build computer-controlled circuits and devices

FAQs

What are my next steps?

If you are connected with a private or rural public school in Montana, and you want to request funding so you can implement this model into your curriculum, begin compiling the eligibility requirements mentioned above. It may be helpful for you to print off the application questions to use as a checklist as you assemble your information. Once you have everything together, complete an online application and submit it.

You can access the application by logging in to your account via our website, gianfortefoundation.org. If you have applied to us for funding before, you should already have a username and password (if you don't remember it, please contact us). If you've never sought

funding from us before, create a new account. Once logged in, click on Apply and enter the access code "raspberry" in the upper right corner to access the application for this program.

Once an application is submitted, it will be reviewed. If awarded, funding will be sent for you to purchase your equipment based on the needed costs you provided in the application.

What if I want this system for my school, but don't know what any of those techie words mean?
First, don't worry – much of that will become clear as you move through this process and take the training. In the meantime, here is a quick glossary of terms:

PiLab – A computer lab made up of Raspberry Pis, keyboards, monitors, and mice
Linux – A free operating system that runs on Raspberry Pis
Python – A general-purpose programming language designed to be easy to read and simple to implement
Java – Another programming language, commonly used for developing content for the internet
Open source – Freely available
LibreOffice – An open source office suite with applications for spreadsheets, word processing, presentations, and more

We also encourage you to visit www.raspberrypi.org to get acquainted with the resources they have to offer. You may find the education edition of their magazine especially helpful – you can view it at https://www.raspberrypi.org/education/.

I don't know anyone who could set up and maintain the lab.
If you watch our online video training, you will be able to set up and maintain this lab yourself.

Our school does not have high-speed internet.
While an internet connection would be helpful in teaching the "Computational Thinking" course, at this point it is not a requirement for this lab setup.

I still have questions.
Please feel free to email Catherine Koenen, Executive Director of the Gianforte Family Foundation, if you need clarification on anything in this proposal. catherine@gianfortefoundation.org