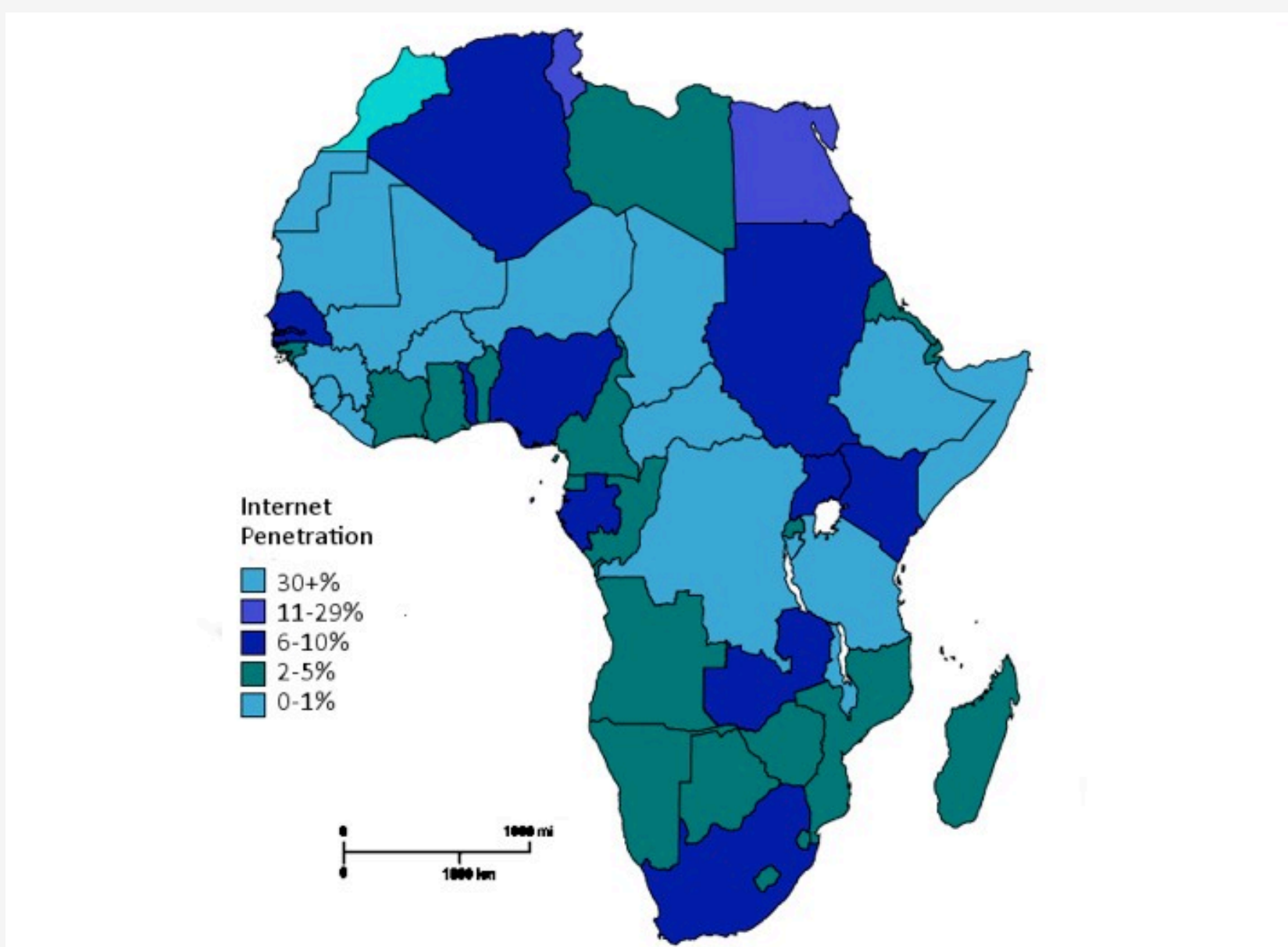


Portable Local Area Network Empowers Sharing of Medical Education Materials in Settings with Restricted Internet & Electricity

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Background

Medical schools in sub-Saharan Africa commonly struggle with expensive and inconsistent power, unreliable electricity, and limited technology support.



African countries by level of Internet penetration. Image from: <http://whiteafrican.com/2010/05/14/a-rising-tide-africas-tech-entrepreneurs/>.

These barriers make it difficult for students and instructors to access, create, and integrate digital learning materials into their education and research activities.

Objective

To explore, deploy, and evaluate models for sharing digital learning materials at institutions with no or limited bandwidth, no or limited electricity, limited on-site support for technology, at an affordable cost.

Methods

We experimented with two models for portable, easily customizable wireless area networks for accessing and sharing learning materials:

- TP-Link MR3020 (“Library Box”, <http://jasongriffey.net/librarybox/>).
- A Raspberry Pi model B.

Results

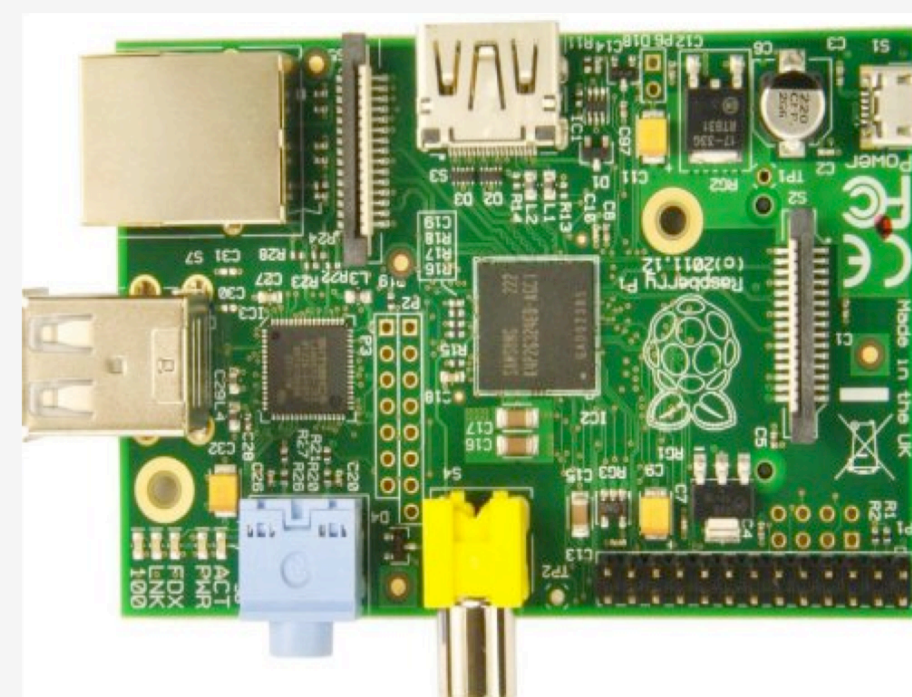
Both devices have been configured so that individuals within range can access the files on any Wi-Fi-enabled device with a web browser. Twenty devices are currently deployed in Ethiopia, Kenya, and Liberia – eleven configurations with the TP-Link and nine with Raspberry Pi.

Both devices:

- Are small and portable in size, approximately the size of a mobile phone.
- Cost \$40 - \$200, depending on accessories.
- Can be powered by any USB-compatible power source (e.g. wall outlet, rechargeable portable battery).
- Can be used as a wireless router, a web server, and a file server.
- Are easy to access and to revise content on a USB storage device (e.g. flash drive, external hard drive).



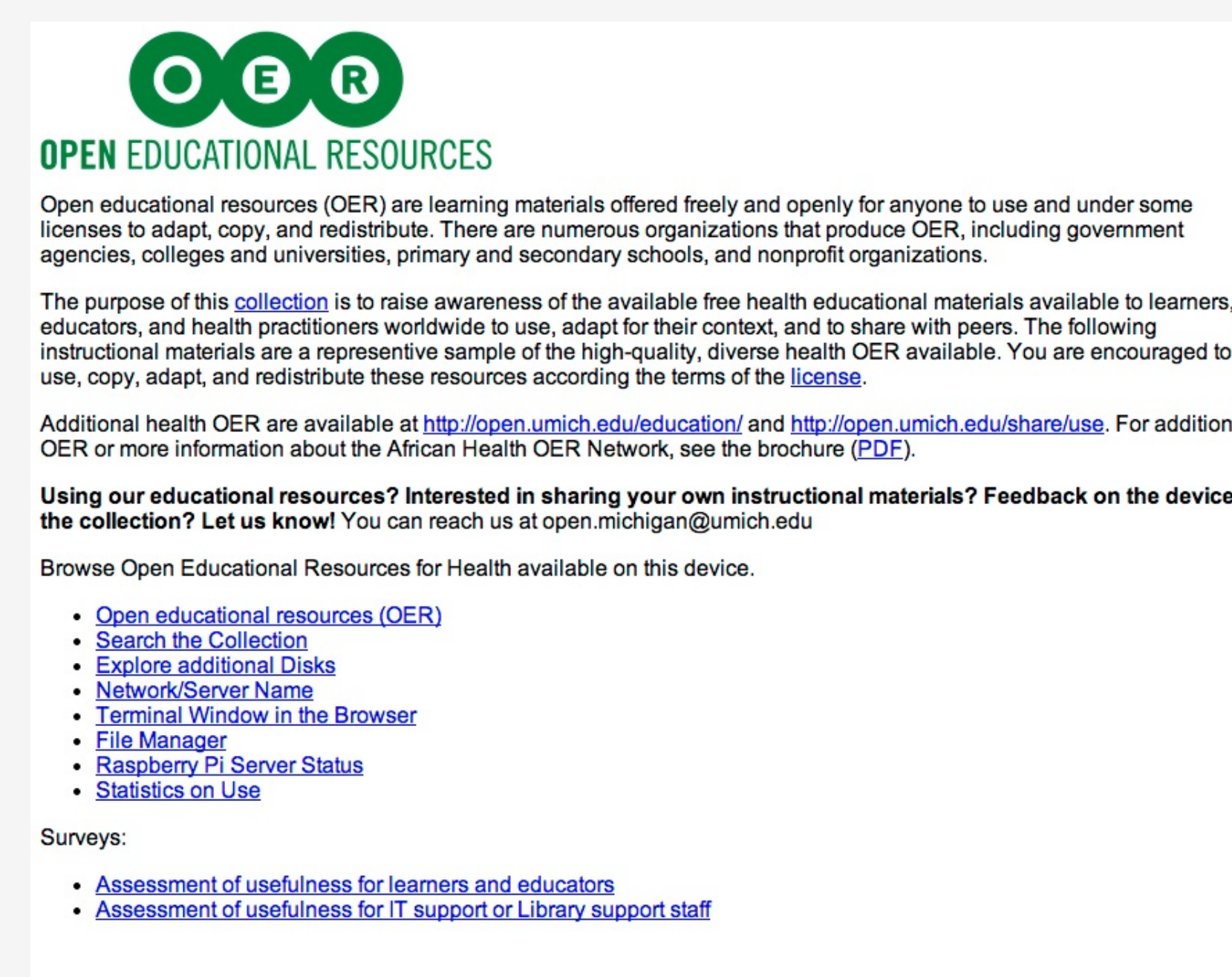
Library Box configuration with TP-Link MR3020.



Raspberry Pi board. Image is by SparkFunElectronics (Flickr). Shared under a CC BY license. Available at: http://farm9.staticflickr.com/8210/8248199710_4efa1fa774_o.jpg.

Conclusions

Both devices may be used for a low-cost, low-maintenance methods to share digital content locally in the absence of an Internet connection and electricity. A rechargeable USB battery can serve as a low-cost uninterruptible power supply. The Raspberry Pi offers more customization options than the TP-Link, such a full operating system that enables other services (e.g. search, analytics, stylesheets). In addition, software updates for the Raspberry Pi can be sent on a replacement SD card, which can be easily transported to partner institutions by visiting colleagues.



OPEN EDUCATIONAL RESOURCES

Open educational resources (OER) are learning materials offered freely and openly for anyone to use and under some license to adapt, copy, and redistribute. There are numerous organizations that produce OER, including government agencies, colleges and universities, primary and secondary schools, and nonprofit organizations.

The purpose of this collection is to raise awareness of the available free health educational materials available to learners, educators, and health practitioners worldwide to use, adapt for their context, and to share with peers. The following instructional materials are a representative sample of the high-quality, diverse health OER available. You are encouraged to use, copy, adapt, and redistribute these resources according to the terms of the license.

Additional health OER are available at <http://open.umich.edu/education/> and <http://open.umich.edu/sham/uae/>. For additional OER or more information about the African Health OER Network, see the brochure (PDF).

Using our educational resources? Interested in sharing your own instructional materials? Feedback on the device or the collection? Let us know! You can reach us at open@michigan.umich.edu.

Browse Open Educational Resources for Health available on this device.

- Open educational resources (OER)
- Search the Collection
- Explore additional Disks
- Network/Server Name
- Terminal Window in the Browser
- File Manager
- Raspberry Pi Server Status
- Statistics on Usage

Surveys:

- Assessment of usefulness for learners and educators
- Assessment of usefulness for IT support or library support staff

Screenshot of welcome screen with list of services for our custom Raspberry Pi configuration.



librarybox.lan:8001/OpenEducationalResourcesForHealth/Research%20Methods/

Directory listing for /OpenEducationalResourcesForHealth/Research Methods/

- Article - Information literacy is not just for students - Learn NC - CC BY NC SA.pdf
- Article-Conducting Focus Groups-University of Saskatchewan-CC BY NC SA.pdf
- Article-Open access journals and publishing options in health sciences-Liz Lever-CC BY.doc
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Screenshot of file browser interface with Library Box configuration.

Plans for Further Research

Embedding Feedback Loops within the User Interface

In order to better understand if, how, and for what purposes the devices are being used, we added a short six-question survey to each configuration. It consists of two Likert scales and four free-form text questions. There is one set of questions for learners and educators and another for technology and library support staff. (The questions are available at the link below.)

Impact on Teaching and Learning

- What impact, if any, has deploying Raspberry Pi and TP-Link MR3020 in these settings had on students and faculty sharing educational materials?
- If there are significant increases in sharing educational materials, what does this mean for academic and professional development in the short and long term in the countries affected?
- In which contexts are people gaining the most and the least from which device? Why?

Technological Design

- What is the range of the wireless signal of each device in different environments (e.g. cement vs. brick walls)?
- How many concurrent users can each device support? Does that vary by type of activity (e.g. streaming video, text-based PDFs)?
- How does the power consumption vary by type of data storage (SD card vs. USB drive)?

