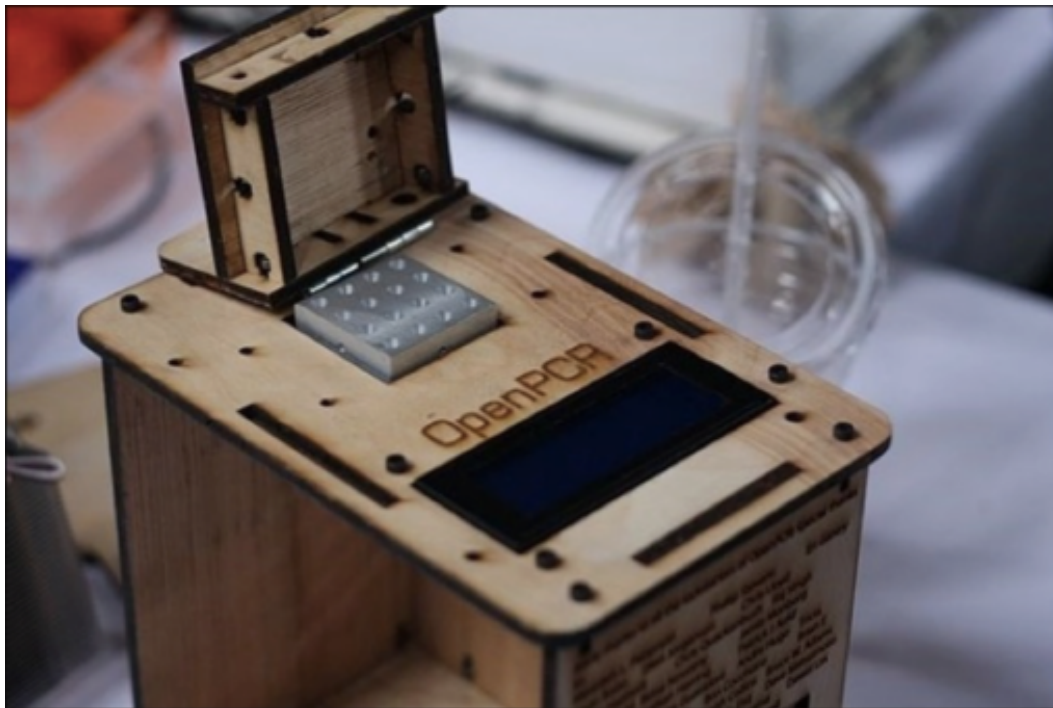


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Laboratory capacity building and the open hardware movement

2018-04-18 12:57:06

By Louise Bezuidenhout



Through my work in African laboratories I am regularly made aware of the challenging equipment shortages faced by research laboratories in many low/middle-income countries (LMICs). This extends far beyond the absence of “state-of-the-art” equipment and shiny, new models regularly produced by commercial companies. These shortages include the availability of what would normally be considered ubiquitous laboratory equipment – PCR machines, centrifuges, water purifiers and the other types of “basic” equipment that have come to characterise molecular biology laboratories.

In large part, these shortages of basic laboratory equipment are due to the way research in LMICs is funded. The project-specific grants that largely fund research in LMICs rarely make provision for the purchase of basic laboratory equipment, while research institutions are often unable to offer core funding for these necessary purchases. The absence of this basic equipment, however, has large implications. The inability to work at an optimal pace considerably slows down research and has knock-on implications for the education of undergraduate and postgraduate

students.

Current discussions about addressing these equipment shortages also offer little hope for large-scale change. Most response strategies rely on the second-hand equipment donations or securing large collaborative grants or centre of excellence funding. Such approaches, while fraught with practical challenges, are also morally flawed by perpetuating cycles of dependence between LMICs and their high-income colleagues.

It is evident that new models for resourcing laboratories need to be identified. In particular, models are required that do not perpetuate dependencies or make LMIC laboratories the dumping ground for the old equipment of the Global North. The picture above shows a OpenPCR machine made using the designs freely available online. This is an example of a rapidly growing community dedicated to finding ways to making laboratory equipment *in situ*. In so doing, the Open Hardware community is beginning to challenge the hegemony of commercial, proprietary laboratory equipment. By creating an open, online community that freely shares designs and expertise, this community is demonstrating how a wide range of laboratory equipment can be made using crowdsourced knowledge, and locally sourced hardware. Such homemade equipment tends to be far cheaper than commercial alternatives, and repairable using locally-sourced hardware.

The successes of the Open Hardware community must challenge the way we view laboratories in the Global South – both in research as well as diagnostics. It is possible that the growing Open Hardware resources could offer another means of capacity building – in particular, one that could break the cycles of resource dependency that characterise many LMIC laboratories. While there is a small, but growing, interest in Open Hardware amongst LMIC scientists, more needs to be done to support their efforts. Most importantly, Open Hardware events such as [lab equipment hackathons](#) are necessary to familiarise LMIC scientists with the possibilities inherent in the Open Hardware movement.

Nonetheless, enthusiasm must also be tempered with caution, and assuming that Open Hardware will be the panacea to solve the current resource problems is simplistic. Evidence from other fields of Open Science, particularly Free and Open Source Software, highlight the wide range of social issues that dissuade LMIC scientists from making use of free resources. In particular, we need to uncover what currently curtails the exercise of agency and control over research and diagnostic infrastructures.

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[Diagnostic stories](#) follows the emerging world of devices, instruments, protocols and machines that make up the world of global health diagnostics. Through the telling of stories about specific technological artefacts it traces the rise of diagnosis as a global health concern and offers a critical perspective on the device-focused approach of many attempts to improve diagnostic infrastructure in the Global South. The series is edited by Alice Street.

Photo credit: [Robert Goodier](#)

AMA citation

Bezuidenhout L. Laboratory capacity building and the open hardware movement. *Somatosphere*. 2018. Available at: <http://somatosphere.net/?p=14358>. Accessed April 18, 2018.

APA citation

Bezuidenhout, Louise. (2018). *Laboratory capacity building and the open hardware movement*. Retrieved April 18, 2018, from Somatosphere Web site: <http://somatosphere.net/?p=14358>

Chicago citation

Bezuidenhout, Louise. 2018. Laboratory capacity building and the open hardware movement. *Somatosphere*. <http://somatosphere.net/?p=14358> (accessed April 18, 2018).

Harvard citation

Bezuidenhout, L 2018, *Laboratory capacity building and the open hardware movement*, *Somatosphere*. Retrieved April 18, 2018, from <<http://somatosphere.net/?p=14358>>

MLA citation

Bezuidenhout, Louise. "Laboratory capacity building and the open hardware movement." 18 Apr. 2018. *Somatosphere*. Accessed 18 Apr. 2018. <<http://somatosphere.net/?p=14358>>