



## Innovative approach to learning and teaching of sciences in Africa

Despite concerted efforts to adopt the United Nations' 17 sustainable development goals (SDGs),<sup>1</sup> Africa still lags the rest of the world. In fact, 90% of Africans currently live in extreme poverty,<sup>2</sup> which affects access to quality education, good health, and other SDGs.

Although the literacy rate has steadily increased to 66% over the last four decades,<sup>3</sup> access to quality education, particularly in Sub-Saharan Africa, remains low. Furthermore, institutions for higher education continue to endure inadequate access to teaching and learning resources, such as laboratory equipment, internet, human resources, and physical infrastructure. This access barrier inevitably compromises the quality of teaching and learning of science, technology, and mathematics (STEM) disciplines, which demand additional teaching and learning tools for effective learning.

In 2013, Veronica Augustyn (NC State University, U.S.) and John-Paul Eneku (Makerere University, Uganda) initiated a collaborative effort with six partner universities to enhance the quality of STEM learning in African universities.<sup>4</sup> Called the SciBridge project (scibrIDGE.org), this student-led organization develops low-cost experiment kits focusing on energy technologies.

SciBridge volunteers in the U.S. form groups specific to each experiment kit and proceed with three stages of kit development. First, students learn the basic scientific principles and background associated with the technology of interest. This information is then used to design a prototype kit that enables students to observe the relationship between material properties and device performance. Once a successful prototype is established, students prepare an experiment manual complete with fundamental scientific principles, experiment procedures, and questions for the participants. Finally, kits containing the necessary supplies, experiment manual, and video tutorial of the experiment are

packaged with enough materials to support a full classroom.

Faculty members at African universities coordinate SciBridge activities that are integrated into undergraduate curricula. Students gain hands-on experience with the materials through the instructor-led experiments, strengthening their understanding and building a solid foundation for future studies. Access to equipment provided in the SciBridge kits also enables research capabilities beyond the classroom as students perform research at the bachelor's and master's level in energy-related areas such as solar electrical performance of different leaves and low-cost technology to harness solar energy. To reach more students and classrooms, SciBridge has added four partner universities and has partnered with other organizations offering similar initiatives, such as JUAMI,<sup>5</sup> SciFro,<sup>6</sup> and WS2,<sup>7</sup> by contributing experiment kits, learning materials, and kit development support.

The approach that SciBridge uses for kit design and exchange broadly impacts students in both Africa and the U.S. More learning resources in the classrooms at African universities create environments that are conducive to strengthening the learner-instructor rapport. In the U.S., the students that are developing kits learn the scientific principles while gaining leadership skills and research experience as they go through the scientific process. Bridging students from the U.S. and Africa broadens individual perspectives and encourages new possibilities for research collaborations and careers in STEM.

### References

<sup>1</sup>UN General Assembly, *Transforming our world: the 2030 Agenda for Sustainable Development*, 21 October 2015, A/RES/70/1, available at: <https://www.refworld.org/docid/57b6e3e44.html> [accessed 25 August 2021]

<sup>2</sup>The Sustainable Development Goals Center for Africa and Sustainable Development



**Figure 1. Schematic illustrating the SciBridge development and implementation process.**

Credit: Michael Spencer

Solutions Network (2020): Africa SDG Index and Dashboards Report 2020. Kigali and New York: SDG Center for Africa and Sustainable Development Solutions Network.

<sup>3</sup>World Bank (2021): Literacy rate, adult total (% of people ages 15 and above) Sub-Saharan Africa. Retrieved on July 23, 2021. Available from <https://data.worldbank.org/indicator/SE.ADT.LITR.ZS?locations=ZG>

<sup>4</sup>V. Augustyn & J. P. Eneku, "Building the SciBridge between Africa and the United States," *Science & Diplomacy*, Vol. 4, No. 4 (2015).

<sup>5</sup><https://www.juami.org>

<sup>6</sup><http://www.scifro.org>

<sup>7</sup><https://ws2global.org/about-us>

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