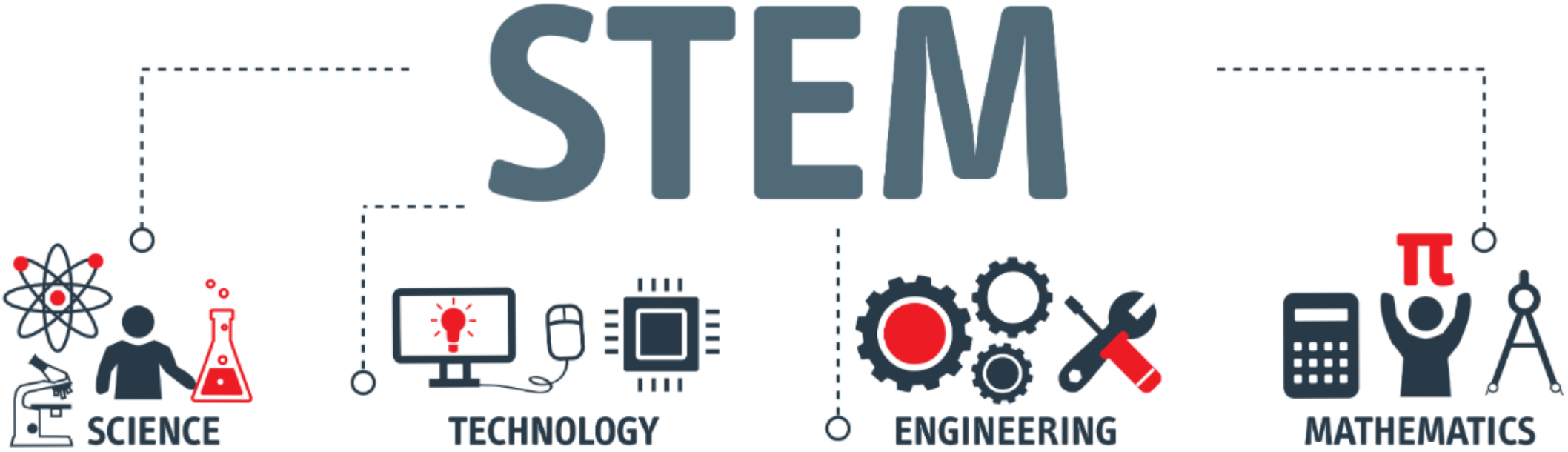
The UNESCO Section for Innovation and Capacity Building in Science and Engineering compiles online STEM education resources available for inclusive distance learning in response to COVID-19



Introduction

Teaching STEM education from home has never been more accessible than it is today. These free online resources provide coding challenges for all ages, mathematical problems and solutions, and a variety of experiments, instructions, descriptions, guides, magazines, as well as interactive opportunities with scientists via Skype.

Learn from scratch how to build and program a robot out of household materials and a smartphone. See how chemists are helping nations reach sustainable development goals. Develop scientific communication skills through teen reviews of scientists in the Quartz magazine Frontiers for Young Minds.

With an estimated 1.37 billion students home from school as a result of COVID-19 safety measures, online learning is essential. But parents do not need to take on teaching responsibilities alone.

We have been operating in Central and Southern Africa in collaboration with the field offices. The UNESCO office in Brazzaville and Harare, for example, have been equipped with 3D printers and have the necessary capacities to conduct workshops using the online resources mentioned below. Trained experts have been identified in the region.

In other areas, we will have to build the capacity beforehand by sending out all the necessary resources to the field offices. Our field offices are key to the continuation of our workshops.

Tools such as Zoom can be used to conduct webinars especially by the trained experts in the regions. Again the field offices are key as they will be the ones to identify good Internet connections.

HQ will have a backstopping role and in the case of the Microscience Kits, we have stored around 5,000 kits in South Africa and it is a matter of sending out the kits from South Africa to the countries where we will be conducting the workshops.

The objective is to increase the interest of young people, and especially girls, in scientific disciplines that stimulate their critical thinking, innovation and problem-solving skills.

All the instructions and pedagogic resources required to organize the workshops are available online:

World Digital Library

Fields	Project Description	Links
The Global Microscience Experiments Project:	The UNESCO Global Microscience Experiments project provides students with real laboratory kits and instruction booklets on how to conduct scientific experiments in physics, chemistry, and biology. The pedagogical importance of this practical science education tool for capacity building in scientific thinking is high. In response to the requests of Member States, the project has been updated to include sessions on Artificial Intelligence in collaboration with Google PI, Robotics, and 3D Printing.	http://www.unesco.org/new/en/natural-sciences/special-themes/science-education/basic-sciences/microscience/unesco-teaching-and-learning-materials/
Chemistry	**Mediachimie** This website offers online secondary school and lower undergraduate training/teaching resources in chemistry. It covers a range of fields — including: environment, health, agriculture, and energy — and discusses the link between chemistry and the sustainable development goals.	https://www.mediachimie.org/

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AI and Robotics	The Section of Innovation and Capacity building has integrated AI and Robotics to its STEM Programme. The objective is to introduce young students to AI through coding, programming and robotics. Two users are targeted: teachers as trainers and young students as end-beneficiaries.	Tutorials related to 3D robotic blueprints are available at these websites: https://www.e3bot.com/ https://www.thingiverse.com/thing:3568774/files (3D blueprints) **MIT SCRATCH** is a community where school children learn to program their own interactive stories, games and animations. The contents are available in more than 30 languages: https://scratch.mit.edu/ **MIT APP Inventor** is an intuitive, visual programming environment that allows everyone, even children, to build fully functional apps for smartphones and tablets: https://appinventor.mit.edu/ **Tinkercad** is attractive environment that allows young people to 3D design and code. There are free 3D printing blueprints files available: https://www.tinkercad.com/

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Technology	**Arduino** is an open-source electronic prototyping platform. It offers a range of software and hardware tools and documentation enabling almost anybody to be creative with technology. It shows STEM students to learn how to code.	www.arduino.cc
Biology	**Scitable** Scitable inspires undergraduates and high-school AP biology students with resources on genetics and cell biology from Nature Publishing Group, home of Nature. It contains some ebooks in biology. **The UNESCO World Library of Science (WLoS)** The UNESCO World Library of Science (WLoS) is a free online resource for science learning. It contains hundreds of peer-reviewed articles that use text, pictures, illustrations, and videos to make scientific concepts easy-to-understand. The WLoS is also a community hub for learning. Users can join classes, start groups and connect with other learners.	https://www.nature.com/scitable/ (Not updated since 2014 but still contains interesting resources.) https://www.nature.com/wls/ (Not updated since 2014 but still contains interesting resources.)

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Natural Sciences	**Annual Reviews, Inc.** Annual Reviews, Inc., is a nonprofit organization that publishes 51 review journals in specific disciplines in natural science and social science, and Knowable Magazine, a freely available website that cultivates public understanding of science.	https://www.annualreviews.org/ Annual Reviews also provides Knowable Magazine: https://www.knowablemagazine.org/
Science, Mathematics and Engineering	**Khan Academy** Khan Academy offers practice exercises, instructional videos, and a personalized learning dashboard that empower learners to study at their own pace in and outside of the classroom. The platform offers tools that empower teachers and parents to coach the students. Their resources are available in more than 30 languages.	https://www.khanacademy.org/

Fields	Project Description	Links
Education Technology	THE Journal is dedicated to informing and educating Students and tech-savvy educators to improve and advance the learning process through the use of technology. It provides exclusive, online content in education technology.	https://thejournal.com/Home.aspx
General learning	**Quartz offers:** - Science podcasts for kids; - Skype a scientist: allowing kids to Skype a scientist and have a general chit-chat about science; - Code.org: online lectures/tools (in multiple languages) that teach kids how to program; - Frontiers for Young Minds is an open-access scientific journal written by scientists and reviewed by a board of kids and teens.	https://qz.com/1819166/how-to-teach-your-kids-at-home/ https://code.org https://kids.frontiersin.org

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Mathematics **Physics** **Biology** **Chemistry**	**TMG Gabon 5000** This website contains online courses of different secondary-school grades, developed through the Project Train My Generation in Gabon (Gabon5000). The courses include mathematics, physics, biology, physics, chemistry, and more.	http://gabon5000.avcn.fr/ (In French)
Physics **Mathematics** **Chemistry** **Environmental Sciences**	While applying the Global UNESCO Avicenna Virtual Campus model, UNESCO is producing pre-recorded lessons and internet-based online/offline essential competency-based learning materials, specifically targeting out-of-school children from the NW and SW Regions of Cameroon.	https://unesco-yao.avcn.fr/ (in 6 languages)