PhET Interactive Simulations:
Free resources to support STEM education

For additional information, contact:

Rebecca Vieyra

Director of Global Initiatives

rebecca.vieyra@colorado.edu

+1 309 824 8853

Objectives

○ **Access** PhET simulations and resources.

○ **Experience** PhET simulations as a tool for teaching and learning.

○ **Make connections** with a local PhET expert in the country context

○ **Reflect** on opportunities to integrate PhET resources into the education system

Interactive Simulations

To learn science and mathematics

2001 Nobel Prize in Physics
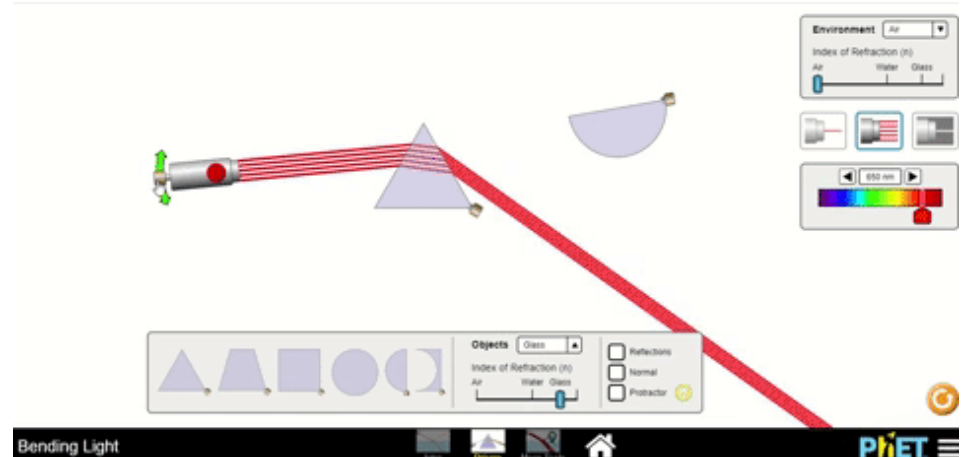
Founded by Carl Wieman in 2002
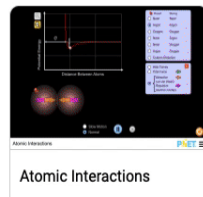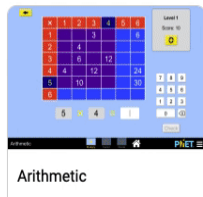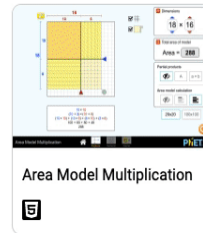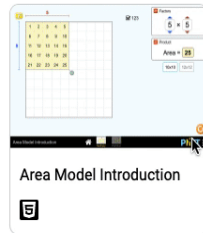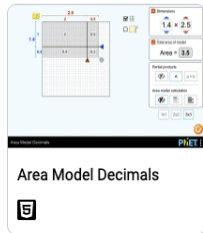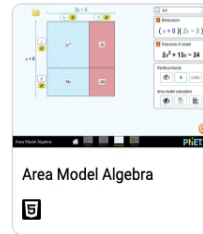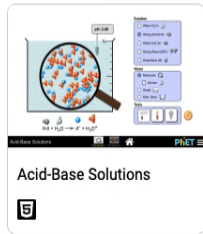**PhET** (**Ph**ysics **E**ducation **T**echnology)
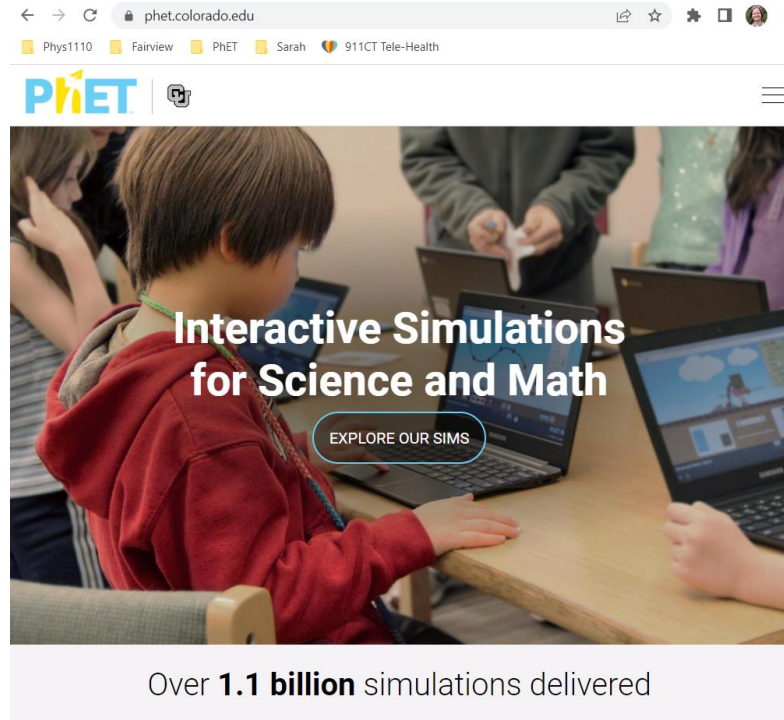
Goal: To make STEM learning more:

- **ENGAGING**: Interact & discover key ideas

- **RELEVANT**: Connect to everyday life

- **ACCESSIBLE**: Intuitive and understandable

- **EFFECTIVE**: Use STEM practices and develop understanding

- **PERSONALIZED**: Student agency

Make **learning STEM** more like **doing STEM**

Over 100 HTML5 simulations

Acid-Base Solutions

Area Builder

Area Model Algebra

Area Model Decimals

Area Model Introduction

Area Model Multiplication

Arithmetic

Atomic Interactions

Balancing Act

PhET

All Free from the Website

All Free from the Website

English

Explore the website

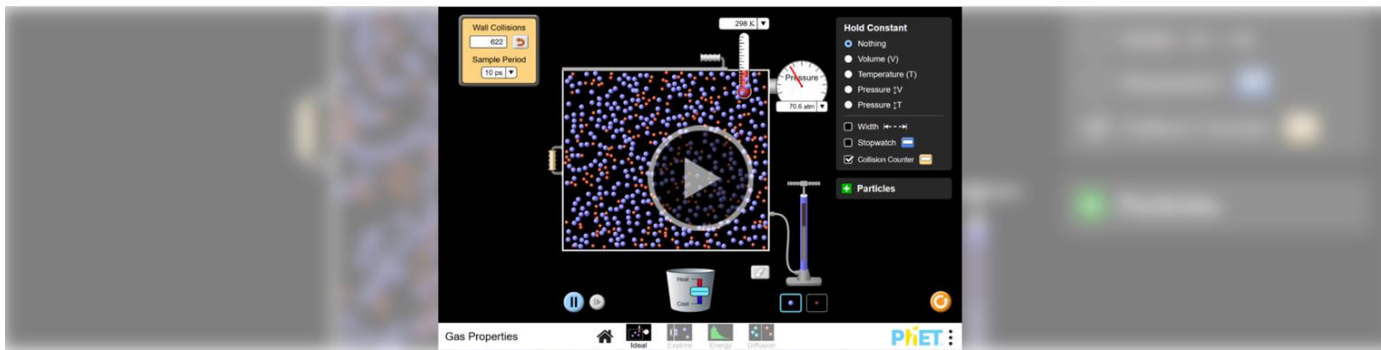What one simulation can you find that is relevant to your country's STEM education goals?

Translations are available in 120 languages from the Translations page.

Teacher Resources

Translations

LANGUAGE ⬇	LANGUAGE (TRANSLATED) ⬍	TOTAL ⬍	HTML5 ⬍	JAVA ⬍	FLASH ⬍
Afrikaans	Afrikaans	18	10	7	1
Akan	Akan	2	2	0	0
Albanian	shqipe	148	101	47	0
Amharic	Amharic	144	103	39	2
Arabic	العربية	149	106	41	2
Arabic, Morocco	العربية (المغرب)	104	104	0	0
Arabic, Saudi Arabia	العربية (السعودية)	89	54	31	4
Armenian	Armenian	75	58	17	0
Aymara	Aymara	1	1	0	0

Inclusive Features

INCLUSIVE FEATURES ✕

- ☐ Inclusive Features
  - ☐ Alternative Input
  - ☐ Camera Input
  - ☐ Interactive Description
  - ☐ Interactive Description on Mobile Devices
  - ☐ Sound and Sonification
  - ☐ Voicing
  - ☐ Pan and Zoom
  - ☐ Interactive Highlights

Offline Access

Offline Access

▶ **Desktop/Laptop Computer** **Free**

▶ **Chromebook**

▶ **iPad**

$0.99 USD for the **PhET App** to support PhET maintenance, but you can download individual simulations from the website for free.

Play with a simulation for 5 min.

Groups of 3!

Energy Skate Park (Science)

Center and Variability (Math)

What do you notice? What do you wonder?

Energy Skate Park (Science)

Center and Variability (Math)

Sim-based Learning
through student-centered pedagogies

PhET Sim

Activity Design

Teacher Facilitation
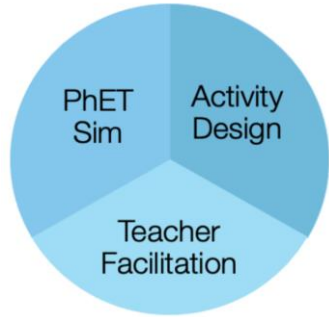
Flexible in Contexts

Pre-Lab
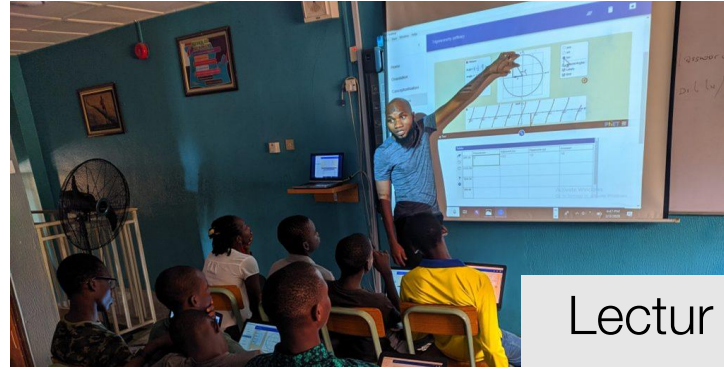
Lecture

Activity/Lab
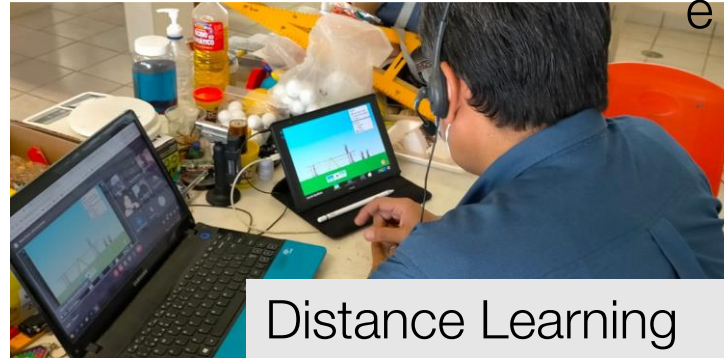
Distance Learning

PhET in Cambodia
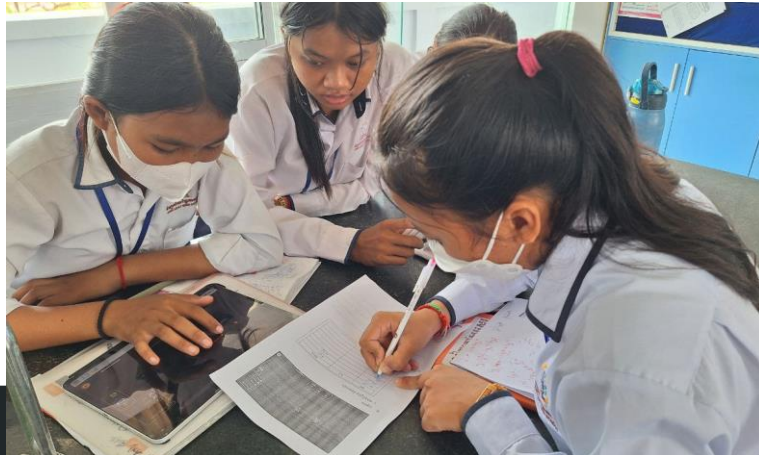
Experienced PhET user:

Phun Soklim

phunsoklim.rupp@gmail.com

15

PhET in Indonesia
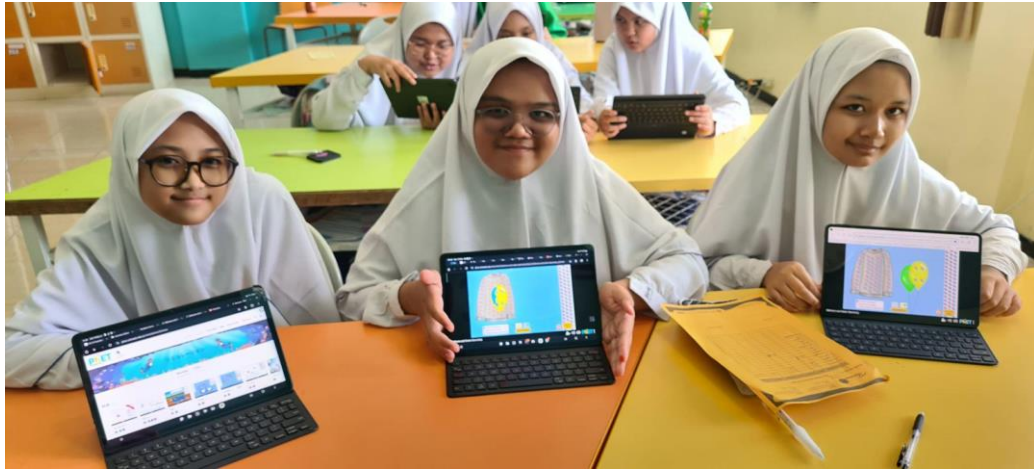
Experienced PhET user:

- **Helmi Pakas**
- helmipakas.rivai@gmail.com

PhET in the Philippines

Experienced PhET user:

- **Glenn S. Mendoza**
- glenn2040@hotmail.com

PhET in Vietnam

Experienced PhET user:

- **Dao Thi Hong Quyen**
- hongquyen90@gmail.com

Promotes Student-Centered Learning

Sim Lessons	Non-Sim Lessons
Exploring new mathematical ideas	Practicing standard procedures
Inventing strategies	Recalling facts
Sharing own ideas	Appealing to rules

Atabas, S. et al. (2020). A tale of two sets of norms: Comparing opportunities for student agency in mathematics lessons with and without interactive simulations. *The Journal of Mathematical Behavior, 58*, 100761.

Asia Engagement

22M+ online sessions by Asian users in 2022.

Countries with the **highest numbers of access** to the PhET website include the following:

- Indonesia (3.9M)
- Philippines (2.9M)
- India (2.2M)
- UAE (1.9 M)
- Japan (829K)
- China (702K)
- Hong Kong (476K)

PhET simulations include **translations** in the following languages:

11,244,994

Bengali: 104	**Indonesian:** 36	**Malay:** 96	**Tamil:** 82
Chinese (simplified): 96	**Japanese:** 99	**Marathi** 61	**Telugu:** 108
Chinese (traditional): 108	**Kazakh** 80	**Mongolian:** 105	**Thai:** 75
Chinese (Hong Kong): 35	**Khmer:** 19	**Persian:** 103	**Urdu:** 39
Gujarati: 108	**Korean:** 108	**Russian:** 91	**Uzbek:** 108
Hindi: 106	**Lao:** 45	**Sinhalese:** 40	**Vietnamese:** 107
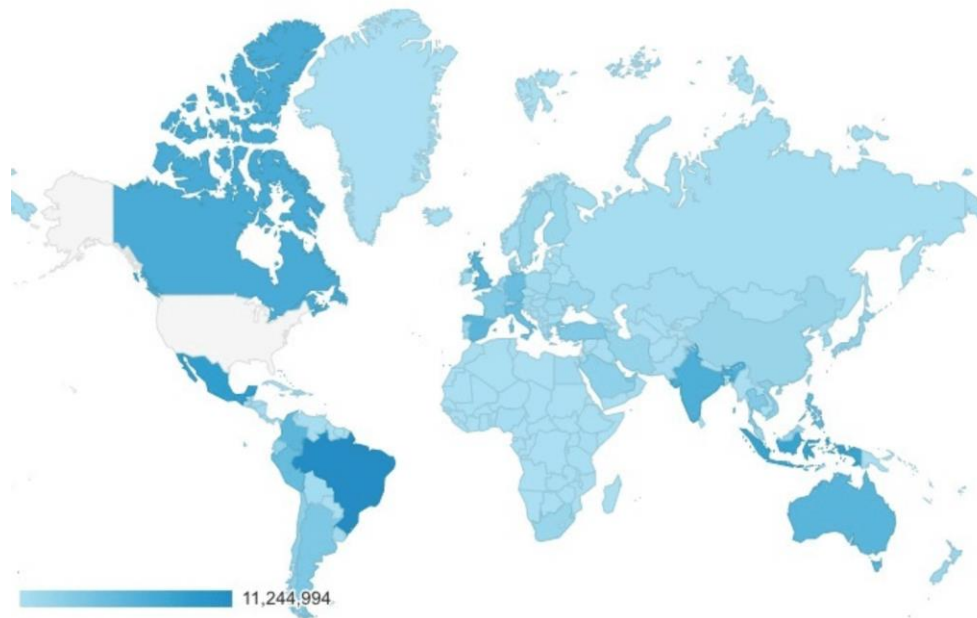
PhET Global: Professional Training for Teachers

Yidan Prize 一 丹 獎

Carl Wieman, PhET Founder
2020 Yidan Prize for Education Research

in partnership with mastercard foundation
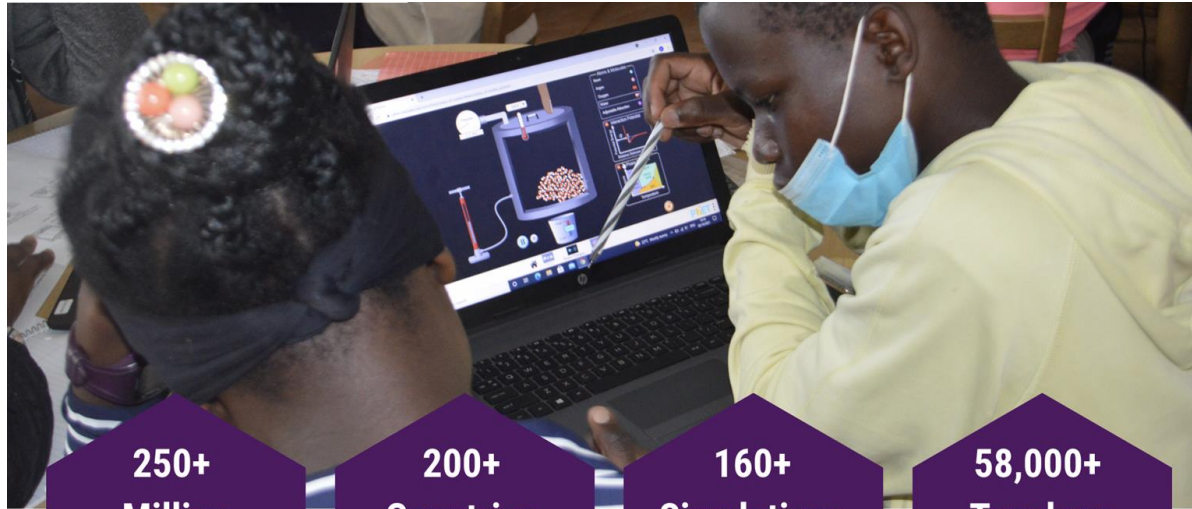
250+ Million
sim sessions per year

200+ Countries
usage footprint

160+ Simulations
open access,
121 languages

58,000+ Teachers
reached through
PhET Global programs

PhET

PhET Teacher Workshop

Self-Paced or **Facilitated**

15-60 hours

Co-Certified

https://phet.colorado.edu/en/teaching-resources/virtual-workshop/

Currently available in English, but can be translated with support.

Virtual Workshops

Work through these workshops to learn about PhET's suggested pedagogical strategies, and optionally sign up to earn a certificate as part of our next facilitation cycle.

Math teachers with devices for every student may take the condensed Teaching Math with PhET workshop.

Introduction to PhET
Learn how to access and share PhET simulations with your students and explore the features that make PhET sims a powerful tool for science and mathematics teachers.
🕐 2 hours

Whole-Class Strategies
Learn strategies for how to use PhET in circumstances where you are presenting a simulation in front of the whole class using a projector, interactive whiteboard, or sharing your screen online.
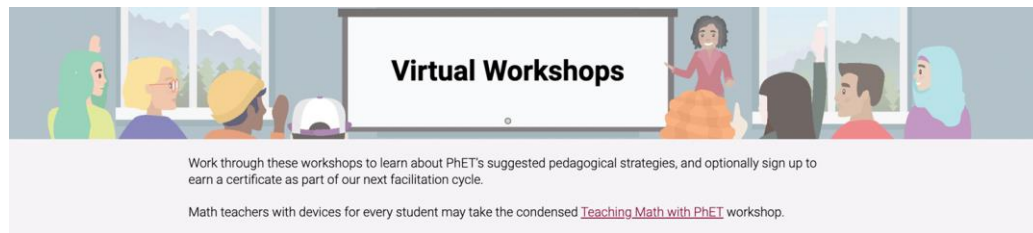🕐 3 hours

Math Activity Design
Learn strategies to create sim-based inquiry activity sheets for math classes where students have direct access to simulations on a singular or shared device.
🕐 5 hours

Science Activity Design
Learn strategies to create sim-based inquiry activity sheets for science classes where students have direct access to simulations on a singular or shared device.
🕐 5 hours

Facilitating PhET Simulation Use
Learn how to effectively design a learning sequence that makes use of PhET's simulations for mathematics and science
🕐 6 hours

Partnership Opportunities

Asia / Country-level PhET Ambassador

1. **Use our Creative Commons OERs**
2. **Intro to PhET Simulations** (webinar)
3. **Virtual Workshop** (self-paced or facilitated)
4. **Asia / Country-level PhET Ambassador**
   - Dedicated professional development for school systems, teacher education programs, etc.
5. **Asia / Country-level PhET Fellowship**
   - Extensive 18-month leadership program to develop a country-level network of 15-20 teacher experts who provide professional development across the country.

Learn more: phet-global@colorado.edu

Reflection

1. What STEM education needs in your country could be supported by PhET's resources?
2. What else would you like to know about PhET and its use in your country?

Thank you!

phet-global@colorado.edu