

## STANFORD PROFESSOR MANU PRAKASH BRINGS “FRUGAL SCIENCE” TO DZENJE CDSS IN MULANJE.



*A group photo of Professor Manu Prakash with the members of the Dzenje CDSS Sci4O club, their patron Hastings Skinner, and head teacher Mr. Harrison Parapandu in front of the school building.*

In a historic visit that put Mulanje on the map of global scientific innovation, Professor Manu Prakash—a renowned bioengineer from Stanford University and co-inventor of the revolutionary Foldscope—recently visited Dzenje Community Day Secondary School (CDSS). The visit, organized in partnership with the Malawi Liverpool Wellcome Programme (MLW), brought cutting-edge science to the hearts of learners in one of Malawi’s most picturesque districts.

### **The Man behind the Lens: Who is Professor Manu Prakash?**

He is an Associate Professor of Bioengineering at Stanford University. He coined the term “curiosity-driven science” to describe his laboratory’s approach to research.

His lab at Stanford, established in 2011, pursues two intertwined goals: exploring the extremes of biology and developing ‘frugal science’ tools

that democratize access to scientific discovery. Frugal science is a philosophical and research approach that focuses on designing ultra-affordable, high-performing, and affordable scientific tools. The philosophy in question aims to break cost barriers to research by utilizing simple materials to create functional tools similar to those found in expensive laboratory settings. Foldscope is the product of the philosophy and research approach under discussion.



*Professor Manu Prakash helping students to assemble foldscopes.*

The Malawi Liverpool Wellcome Programme (MLW) has been a beacon of health research excellence since its founding in 1995. Based at Queen Elizabeth Central Hospital in Blantyre, Malawi, with field sites across Blantyre and Chikwawa districts, MLW conducts high-quality research to improve health while training the next generation of Malawian researchers and leaders.

**Science for All (SCI4O): Inspiring tomorrow's scientists.**

Science for All (SCI4O) initiative operates under the MLW umbrella with a bold vision: to make biomedical and clinical science careers among the top three career choices for youth in Malawi.

**SCI4O works through several impactful channels:**

- School visits that engage students with interactive science sessions



*The organization's first visit to Dzenje CDSS on 20<sup>th</sup> December, 2024. The club patron demonstrates how to connect to the locally made school MiFi.*

- SCI4O innovation clubs established in secondary schools across Malawi



*Dzenje CDSS SCI4O club patron with students, exploring new ideas and innovations.*

- Career guidance days that help students navigate pathways into clinical and biomedical sciences
- Science quizzes that build confidence, presentation skills, and scientific knowledge



*Club patron organizing interclasses school based quiz competition.*

- Internship programmes that select promising students from partner schools for rigorous training

The initiative's name, "science for all" (SCI4O), reflects a commitment to making science accessible to every student, regardless of background. It is precisely under this "Science for All" umbrella that science and innovation clubs, often bearing the name "Scie 4 O Club," operate in schools like Dzenje CDSS.



*Hastings Skinner (club patron) and some of the club members, showcasing innovations at the*

2025 Malawi Liverpool Research Programme  
Innovation week: Blantyre, Malawi

## **The wonder of Foldscope: A Microscope in Every Pocket.**

At the heart of Professor Prakash's visit was the Foldscope. But what exactly is a Foldscope?

A Foldscope is an optical microscope that can be assembled from simple components: a punched sheet of cardstock, a spherical glass lens, an LED, a diffuser panel, and a watch battery. Once assembled, the Foldscope is roughly the size of a bookmark and weighs only 8 grams.



*How the foldscope looks once assembled.*

### **How Does It Work?**

The Foldscope operates on principles that date back to Antonie van Leeuwenhoek, the 17th-century Dutch scientist who first observed single-celled organisms using tiny spherical lenses. The key innovation lies in its simplicity:

1. **The Lens:** A small spherical glass lens is held in place by the paper frame, providing magnification of up to 140x—powerful enough to spot organisms like *Escherichia coli* and malarial parasites.

2. **Illumination:** An LED powered by a watch battery illuminates the specimen from below, while a diffuser panel ensures even lighting.
3. **Focusing:** By simply moving the paper stage, users can bring specimens into sharp focus.
4. **Smartphone Integration:** Magnets embedded in the Foldscope allow it to attach to any smartphone, enabling users to capture and share images of their discoveries.

### **Why It Matters?**

For students who may never have seen a traditional microscope, the Foldscope represents liberation. As Prakash recalls, “I remember having an exam question at school where we were asked to draw a microscope, but we hadn't even seen a microscope. How ironic is that?”

The Foldscope changes this narrative. It puts the power of discovery directly into students' hands, allowing them to explore their world—from the parasites in a louse to the cells in a drop of pond water—with curiosity as their only guide.



*Students using Foldscopes during the training session—examining specimens and drawing their observations in the booklet.*

## The Training Session: Hands-On Discovery at Dzenje CDSS

Dzenje CDSS was the first school in Malawi to have the first training session on Foldscope. Professor Prakash and the MLW team worked directly with members of the school's science and innovation club (SCI4O-Club). Students learned how to assemble their Foldscopes, prepare specimens, and make their first trip into the microscopic world.

For many, it was their first time looking through any microscope—let alone one they had built themselves. The moment of discovery, when a student peers through the lens and sees a hidden world for the first time, is exactly what Prakash designed the Foldscope to deliver.

## Showcasing Local Innovation: Dzenje's Young Inventors Shine.

Following the Foldscope training, the Dzenje CDSS Sci4O club showcased their own creations to the distinguished visitors. The display was a testament to the creativity and the growing innovative skills in the hidden rural Malawian schools, Dzenje CDSS in particular.

### Scientific Innovations

The students presented working models that addressed real-world challenges:

- Weather instruments for monitoring local environmental conditions
- An electric irrigation system (sprinkler) designed to improve agricultural productivity
- An inverter for converting electrical power—a crucial innovation in areas with unreliable electricity access



*A locally made 900-watt inverter. Converts 12V D.C. to 220 V.A.C.*



*Students demonstrating their electric irrigation system (sprinkler) - explaining the design process.*

## Teaching and Learning Resources

The club develops teaching and learning resources, including various models to support science education at its school. Some of the resources include:

**Lung models:** Demonstrating respiratory system mechanics.



**Test tube racks:** Practical laboratory organization



**Model of an atom:** Visualizing atomic structure



**Periscope:** Exploring principles of light reflection



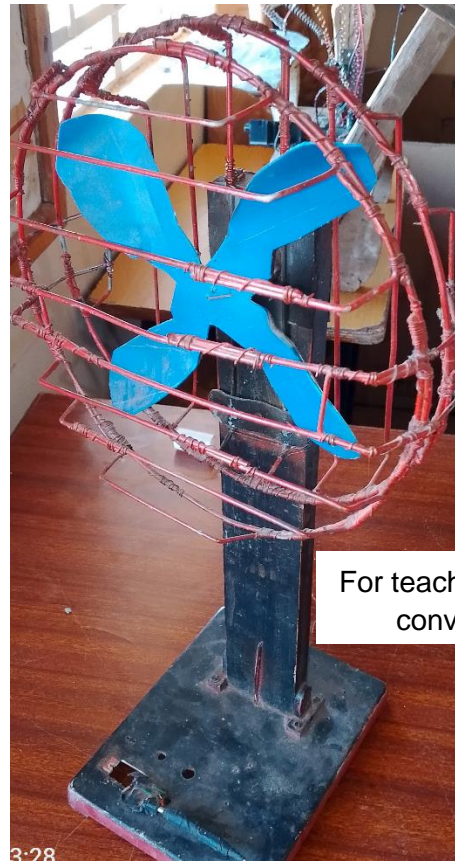
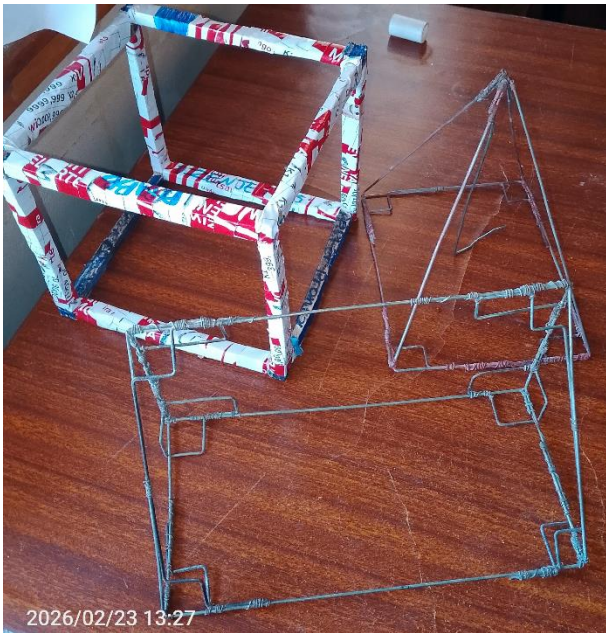
**Periodic table chart:** Chemistry reference material

I THE PERIODIC TABLE VIII									
1	H	II	III	IV	V	VI	VII	He	
2	Li	Be	B	C	N	O	F	Ne	
3	Na	Mg	Al	Si	P	S	Cl	Ar	
4	K	Ca	DZENJE CDSS					SCI40	

**Model of microscope:** Understanding microscope components

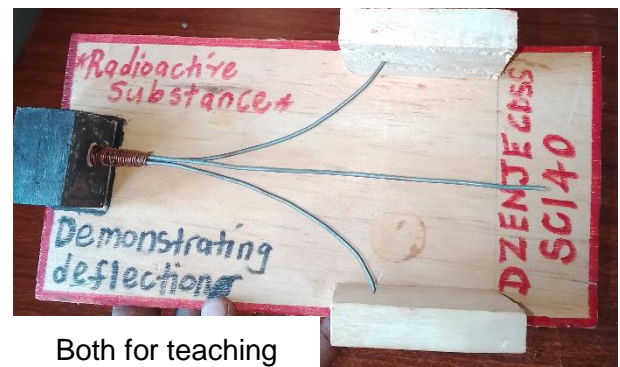


Some 3-D models are used in Mathematics lessons in senior classes, specifically for mensuration (3-dimensional figures).



For teaching energy converters-

**Solenoid:** Demonstrating electromagnetism

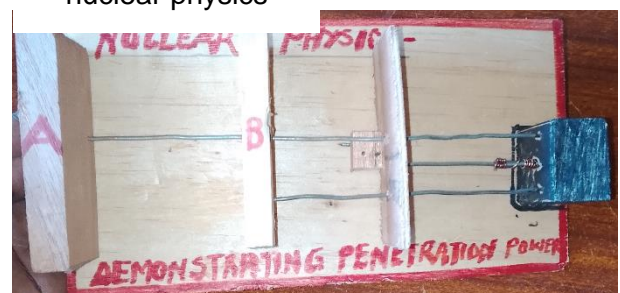


Both for teaching introduction to nuclear physics

**Others innovations**



Locally made Weather instruments





*Manu is interacting with students during the showcasing time.*

The collection of the teaching and learning materials demonstrated that even with limited resources, passionate students and dedicated teachers can create powerful learning tools. The models, made from locally available materials, make abstract scientific concepts tangible and accessible to all learners at the school.

### **Voices from Dzenje: Gratitude and Inspiration**

The visit left an indelible mark on the Dzenje CDSS community, with educators and students alike expressing their appreciation.

#### **The Club Patron's Appreciation**

Mr. Hastings Skinner, the dedicated patron of the Science and Innovation Club (SCI4O), spoke warmly of the team's impact:

*“The visit from Professor Prakash and the Malawi Liverpool Wellcome Programme has motivated our students tremendously. To see a world-renowned scientist taking time to visit our school and work directly with our learners—it shows them that science is truly for everyone, and that their dreams are valid. Our students will never forget this day.”*



*The club patron, Mr. Hastings Skinner during the training session.*

In a touching gesture of appreciation, Skinner presented Professor Prakash with a gift crafted by the students themselves: one of their lung models, a token of gratitude for the inspiration the visit had brought.

#### **The Head teacher's Wellcome**

Mr. Harrison Parapandu, head teacher of Dzenje CDSS, expressed profound gratitude for the historic nature of the visit:

*“We are deeply honoured that Professor Prakash and the MLW team chose Dzenje CDSS to be the first school in Malawi to receive training on how the Foldscope works. This places our school—and our students—at the forefront of scientific innovation in our country. The message this sends to our learners is powerful: you matter, your education matters, and you too can be part of the global scientific community.”*



*The head teacher for Dzenje CDSS, Mr. Harrison Parapandu, observing microorganisms through the powerful foldscope during the training.*

The partnership between MLW's Science for All initiative and schools like Dzenje CDSS represents exactly what Professor Prakash advocates: bringing scientific tools and experiences to those who have never had the chance to engage before. It's about nurturing the next generation of Malawian scientists, innovators, and problem-solvers.

**Written by**

**HASTINGS SKINNER**

Club patron

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### **A Future Built on Curiosity.**

As Professor Prakash's visit to Dzenje CDSS drew to a close, one could sense the shift in the air. Students who had never looked through a microscope had now built their own and explored hidden worlds. Young innovators had seen their creations appreciated by one of the world's leading minds in frugal science. A rural Malawian school had taken its place on the global map of scientific curiosity.



*Professor Prakash during the training session.*