A Different Approach to International Development

TGUP's *Science Lab in a Box™*

Overview

International development has failed to lift poor nations out of poverty. Poor countries are worse off today relative to rich countries than they were 80 years ago, at the end of World War II. This is due to the limitations of the traditional development model.

TGUP's ***Science Lab in a Box™*** (SLaB) is offered as a supplement to the traditional model for improving self-sufficiency in developing countries. SLaB-based development projects are small-scale, focus on intellectual, as opposed to physical, infrastructure, and are delivered locally. Because of this, they are effective, inexpensive, and fast to implement.

The Traditional Development Model

Conventional models for international development originated when the U.S. assumed global leadership after World War II. They focus on large-scale projects improving the physical infrastructure of developing nations: ports; dams; railroads; airports; power stations; etc.

The idea behind such projects was that they would leverage Western capital and technology through multinational corporations to help third world countries develop their natural resources: forests, mines, plantations, and such. This, so that they could engage in international trade.

Those projects are large, expensive, slow to implement, and are typically carried out by governments. They are commonly riven with corruption and were never intended to cultivate self-development on the part of developing world people. So, they don't.

TGUP's *Science Lab in a Box™*

TGUP's ***Science Lab in a Box™*** is small-scale, inexpensive, and is deployed locally down to the village level. It is expressly designed to expand human potential among recipient populations. Without having meant to be, SLaB is almost the antithesis of the traditional development model.

SLaB provides the equipment, instruments, supplies, and curriculum to allow developing world schools to carry out world class laboratory work in Biology, Chemistry, and Physics. The only things schools need are university-trained instructors in the core disciplines and the physical facilities to operate a lab.

SLaB is designed around 10 "canonical" experiments in each of the three fields. They demonstrate core concepts in the field. For example:

Exemplary (of 10) experiments in Biology

DNA extraction	Bacterial growth
The cell cycle	Fermentation
Photosynthesis	Plant vs. animal cells

Exemplary (of 10) experiments in Chemistry

Mass, volume & density	Acid/base titration
Universal gas constant	Temperature & solubility
Reactions & reagents	Specific heat of metals

Exemplary (of 10) experiments in Physics

Newton's laws	Circular motion
Conservation of momentum	Sound & light waves
Magnetism/electromagnetism	Harmonic oscillators

SLaB was developed by the AP Science faculty at one of the top high schools in the U.S. The design directive was, "If you could perform only 10 experiments to epitomize the central ideas in your field, what would those be?" SLaB is the result. A single SLaB costs $3,000, installed. It is adapted to the unique needs of every school.

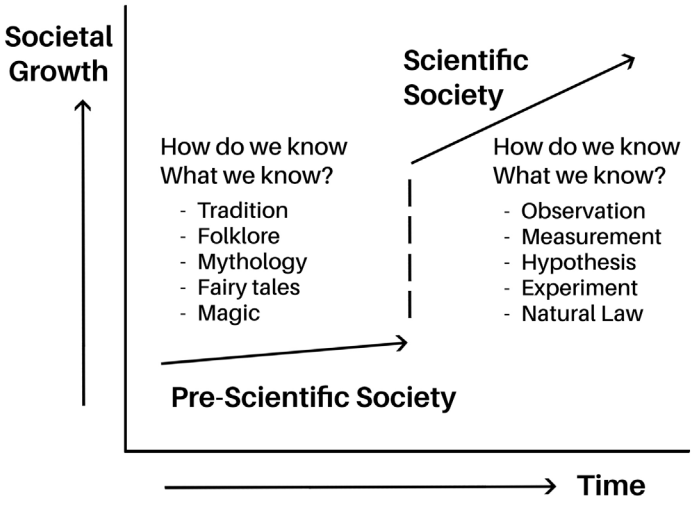
SLaB enables more than just the 30 core experiments. It can also be used to carry out thousands of other experiments, in multiple disciplines. It is, literally, a science lab in a (metaphorical) box, infinitely adaptable to the intentions and needs of every instructor and school.

The Philosophy Behind SLaB: Develop Intellectual vs. Physical Infrastructure

SLaB is grounded in two precepts: 1) invest in people; and 2) specifically, invest in their ability to acquire scientific skills. It is worthwhile understanding this logic.

Physical assets only get you so far. No matter how many typewriters we give to a band of monkeys, it will never produce the works of Shakespeare. Yes, there does have to be a sufficiency of essential physical endowments—water, nutrition, sanitation—but after that, it is the human, intellectual development that matters.

The Impact of Science as Intellectual Infrastructure



Of all the skills to develop, scientific skills are the most powerful. We see that in the fact that all the leading countries in the world—ALL—rely on science to manage their interface with the physical world. The reason is shown at the left.

Without science, societies are left with archaic tools for explaining and engaging the world: mythology; fairy tales; magic; and such. They suffer a low level of development and slow rates of growth. Those societies that embrace science enjoy both higher levels of development and faster rates of growth. There is no disputing these facts.

There is another, powerful reason to invest in growing human potential: It replicates itself. Better educated people ensure that their children are still better educated. If an educated person has three children, there are now four better educated citizens in the society. In the next generation, there will be 12. Next… Physical assets cannot do that.

An Important Test Case

TGUP is working with civic groups in Uganda to install ***Science Lab in a Box***™ in 50 under-resourced high schools throughout the country. More than 200,000 students will be affected. The goal is to uplift the scientific literacy of the entire country. In prototype installations, nationally-normed (SAT-equivalent) test scores rose by 80% in the first six months following the SLaB installation. Matriculation to universities to study STEM subjects rose six-fold.

The impact of the program will be long-term and measured in how it affects the overall society. If it raises national GDP by 1/1000th of 1% in ten years, it will pay for itself 200 times over. We are told it should do much more because scientific talent is so scarce in Uganda. See the below table for calculations.

Estimating Impact of SLaB on Ugandan GDP

		2025	2031 *	2033	2035	2037	2039	2040
GDP ($,Billion)		49.00						
Historical growth %		2%	2%	2%	2%	2%	2%	2%
SLaB increment, % **			0.001%	0.001%	0.001%	0.001%	0.001%	0.001%
GDP without SLaB ($,Billion)			$ 55.182	$ 57.411	$ 59.731	$ 62.144	$ 64.654	$ 65.948
GDP with SLaB ($,Billion)			$ 55.182	$ 57.413	$ 59.734	$ 62.148	$ 64.660	$ 65.954
Difference w/ SLaB ($,Billion)			$ 0.0005	$ 0.0017	$ 0.0029	$ 0.0043	$ 0.0057	$ 0.0065
Expressed as $,Million			$ 0.54	$ 1.69	$ 2.93	$ 4.26	$ 5.71	$ 6.47
Cumulative difference, $,Million			$ 0.54	$ 3.33	$ 8.56	$ 16.41	$ 27.08	$ 33.55
Cost/Payback	$150,000		3X	20X				**200X**

* First year of full implementation

** = 1/1000th of 1%

Conventional approaches to international development have not met the need. TGUP's ***Science Lab in a Box***™ is a potentially revolutionary new approach. By focusing on human rather than physical assets (specifically, science), and low-cost rather than high-cost projects, SLaB can dramatically accelerate the pace at which developing countries evolve, and grow themselves.

Uganda will prove a determinative test. It is TGUP's bet that the $150,000 spent on this project will deliver a far greater improvement to the country than would 100 times that amount ($15 million) spent through conventional development channels. We'll keep you informed of progress.