

# SCIENCE PROJECT CONCEPTS

## *Revitalisation of Science Education*



Many developing countries have implemented policies to ensure free universal primary education of acceptable quality. Rising primary enrollment and completion rates, as a result of these policies, have brought increased demand for access to post-primary education. Progress towards achieving Universal Primary Education and the rapidly changing needs and requirements of a modern society and economy has led to a growing demand for secondary education.



Science education has proven to be of vital importance to the development of any nation. And is often considered as one of the most important areas of the curriculum. It is an essential vehicle to provide human resource development, modernization and overall development of countries. Science education is related to some important aspects of development, to mention health, food, agriculture, energy resources, industry and technology, and information transfer. Scientific development is the most effective factor in enabling developing countries to enter the main stream of contemporary technology and commerce.

Devotra has developed several project concepts aimed at the Revitalization of Science Education at different levels:

- ☐ Basic science kits for lower secondary education
- ☐ Science kits for upper secondary education
- ☐ Mobile science trolley for small schools in rural areas
- ☐ Integrated science, technology and ICT education (smart classroom)



Devotra and partners have been working on a variety of science projects including various countries such as Ghana, Libya, Ethiopia, Kenya, Nigeria and Zimbabwe. In all these projects we adopted a turn-key approach which consist of:

- ☐ Expertise for the development of the content of the science kits and experimental worksheets based on current curricula
- ☐ Supply, installation and/ or distribution of the science kits
- ☐ Providing teacher training on the use, maintenance and care of the science equipment



# CREATING A MODERN, SAFE AND IN

## BASIC SCIENCE KITS FOR LOWER SECONDARY EDUCATION



The basic science kits initiative is meant to provide basic, affordable and user friendly apparatus, reagents and related materials to lower secondary schools, with the objective to improve the teaching and learning of science in lower secondary schools. Whereas many lower secondary schools have not received practical science equipment for many years it will be important to start with a basic kit, allowing teachers to familiarize with the equipment provided in a phased manner, while at the same time it will boost science education at all lower secondary schools.



A basic science kit will consist of approximately 200 items, covering biology, chemistry and physics. Equipment can be used for practical education in, for example, using a ticker timer, understanding the physical properties of metals, investigating the factors affecting rate of transpiration, etc. The basic science kit will be provided with more than 50 practical experiments in Biology, 50 in Chemistry and 50 in Physics.



The advantage of the basic science kit, which is delivered together with the practical experiments, is that only limited refresher training is necessary for the teachers, because most secondary school science teachers will already be familiar with the items supplied in the science kits.

## SCIENCE KITS FOR UPPER SECONDARY EDUCATION

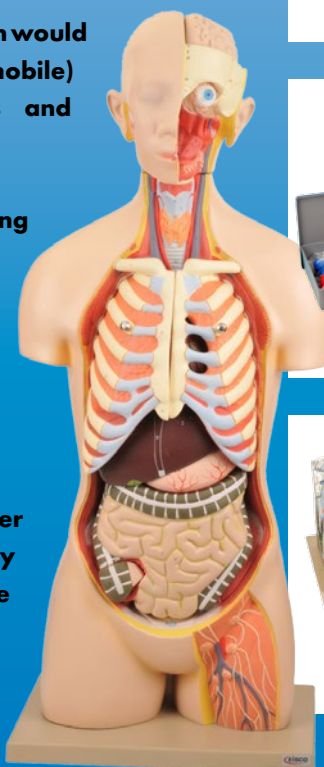
Science at upper secondary education requires a more appropriate and adequate laboratory facility than science at lower secondary education level. The latter usually can still be provided in a normal classroom setting.

For upper secondary education also water, gas and power supply should be considered as part of the solution for quality science teaching.

Additional equipment for upper secondary education would include data logging equipment, IT equipment, (mobile) fume cupboards, additional biological models and microscopes.

Furthermore, in many cases more in-depth training of science teachers will be required. For example whereas a 2-5 days training program should cover initial training needs of qualified teachers at lower secondary education, a 10-14 days training program would be more suitable for qualified upper secondary science teachers.

Lastly, in any classroom albeit lower or upper secondary education sufficient health and safety materials will need to be provided to ensure a safe teaching and learning environment is created.





# INSPIRING LEARNING ENVIRONMENT

## MOBILE SCIENCE TROLLEYS FOR SMALL SCHOOLS

One of the constraints in many classrooms in developing countries include the double-shift and multi-grade classrooms. Furthermore in small schools there is often no separate laboratory facility. Secondary schools are often lacking the right infrastructure to adequately host all students. This problem can be overcome through the use of the mobile science trolleys.



The mobile science trolley has been designed by science teachers for secondary school science teaching. The trolley can convert any classroom into a science classroom, as such a dedicated science classroom is no longer necessary at the schools. The concept includes a unique blend of a self-contained mobile science cart which will include the range of science equipment and learning materials needed to provide secondary education.

The mobile science trolley is fitted with a laboratory-standard Trespa Athlon bench top with curved inset for ease of use. The material has excellent impact, scratch, heat, acid and chemical resistance. The Mobile Science Trolley is fitted with two pull out bench top extensions thereby maximizing the useable workspace. The science cart runs on six castors of which two are lockable to enable secure positioning.

The mobile science trolley can be themed through the equipment trays and populated with the experimental apparatus required covering sessions for:

- ☐ Biology
- ☐ Chemistry
- ☐ Physics

### PHYSICS CONFIGURATION



### STOCKAGE RACKS



### CHEMISTRY CONFIGURATION



## INTEGRATED SCIENCE, TECHNOLOGY AND ICT EDUCATION (SMART CLASSROOM)



**Many countries are starting with the implementation of ICT in the tertiary education sector. Also efforts are made to integrate ICT in primary and secondary education due to its significant impact on education development and improvement. These initiatives can be further enhanced through the introduction of the smart classroom.**

**The smart classroom integrates traditional and ICT based learning. It can combine the best of both worlds. The smart classroom makes it possible to upgrade existing curricula with through the use of a wide variety of ICT based resources, which can be adopted and modified to the requirements of the curricula.**

**In the smart classroom hands-on practical training and assignments are further supported with virtual experiments and engineering systems simulations. These resources provided teachers and students with more insights on a specific educational topic.**

**The smart classroom can be introduced at all educational levels from primary, secondary up to vocational and higher education, covering a wide variety of topics, including science and engineering.**

**The smart classroom consists of the mobile science cart, smart white board, teacher and/ or student computers, state of the art training models and audio-visual materials.**

**The mobile science cart will include virtual science experiments, engineering systems simulations, student response and assessment systems, teacher lesson plans and materials and an ICT based classroom management system.**

