DEVOTRA

Smart Classrooms for Education Improvement in Rwanda

DEVOTRA Smart Classrooms for Primary -, Secondary -, Higher Education and TVET

Rwanda Vision 2020 aims at moving Rwanda from "an agriculture based economy to a knowledge-based society" and middle-income country 2020. The use of ICT in education is considered an important strategy for achieving this transformation. This is also in line with the strategic goal of the ESSP to strengthen the relevance of education and training to the labour market including the insertion of 21st century skills. Rwanda Vision for ICT in Education is: "To harness the innovative and cost-effective potential of world-class educational technology tools and resources, for knowledge creation and deepening, to push out the boundaries of education: improve quality, increase access, enhance diversity of learning methods and materials, include new categories of learners, foster both communication and collaboration skills, and build capacity of all those involved in providing education."

The Devotra Smart Classroom is able to bring 21st century education systems to Rwanda, through the inclusion of new, relevant and ICT based technologies. The Smart Classroom is available for TVET, Primary-, Secondary- and Higher Education, allowing for smooth integration of teaching and learning at all levels.

The Devotra Smart Classroom seamlessly integrates the following components:
- Digital Learning Resources Library with 8.500 ready-made learning units
- Learning units mapped against curricula and programmes
- Practical demo and training units which are linked to the Digital Learning Resources Library
- State-of-the-art ICT laboratory for hands-on exploration, investigation and production
- Using on-screen simulations, virtual experiments and presentations
- Top quality ergonomic designed furniture for a safe and modern learning environment
- Future proof solution that is available offline or online via a suitable e-learning platform
- Teacher training, technical support and after-sales

Maglev workstation

The Devotra Smart Classroom acts as an incubator area for ideas based on industry and labour market requirements. It changes students and teachers mind-sets and brings innovation, spur creative and catalytic thinking, triggers students' exploration skills, enhance problem-solving based learning and provide the opportunity to teach and learn design, programming, engineering and production skills.
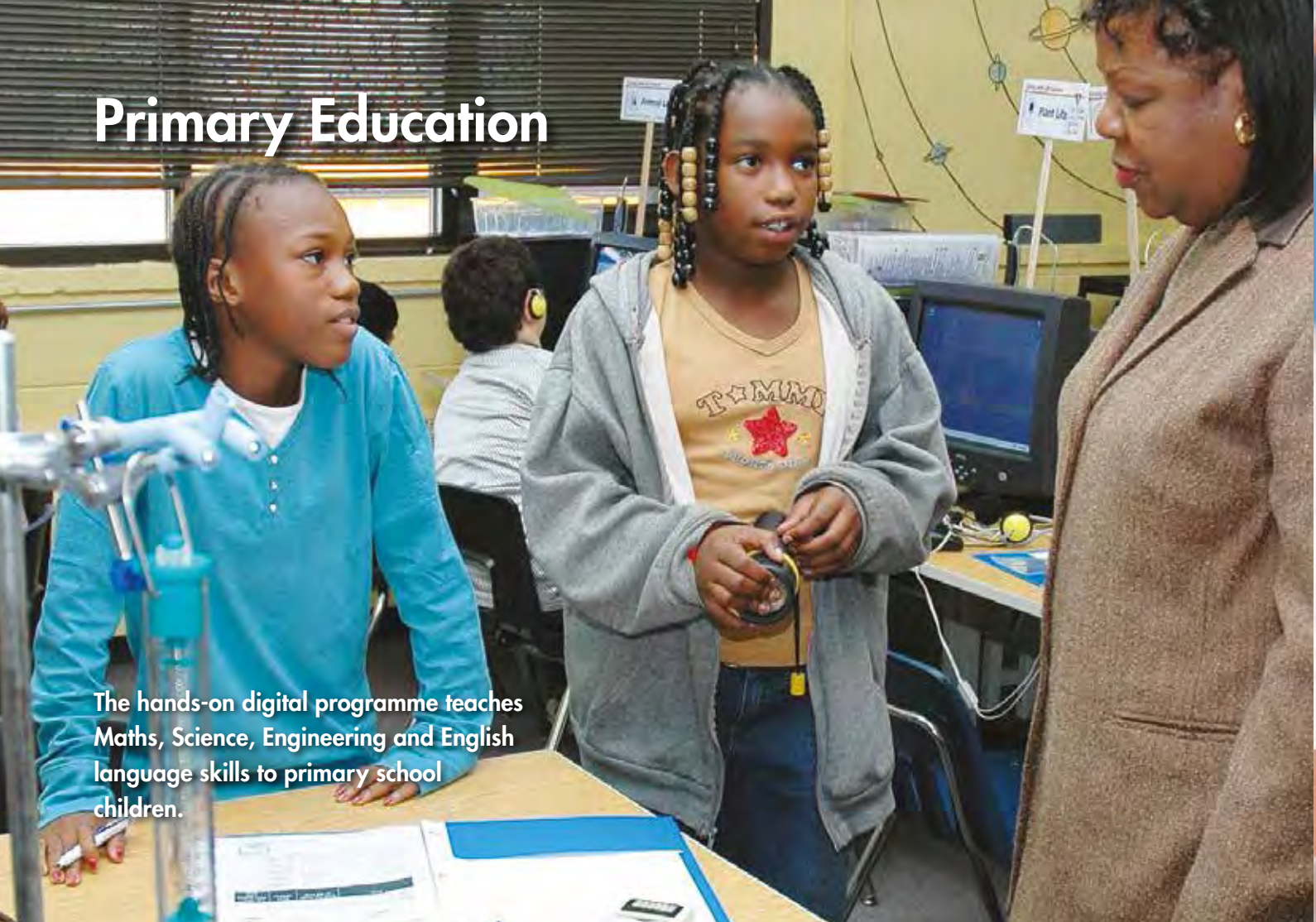
Primary Education

The hands-on digital programme teaches Maths, Science, Engineering and English language skills to primary school children.

The ICT in Education Master Plan states that while more children are enrolled in basic education, the key challenge remains the quality of education they are receiving. Technology can be used to improve the quality of teaching and learning materials through the use of digital learning resources. Multimedia interactive digital content can be used to motivate students, improve conceptual understanding and retention of key topics.

The Smart Classroom active learning program for primary education is composed of creative hands-on tasks and interactive virtual software applications that work together flawlessly. These activities encourage children to explore scientific scenarios by themselves, and enables them to explain what they have learned about STEM. A combination of high quality content and practical experiment kits, provides teachers with the necessary tools to ensure the STEM learning experience becomes very existing and understandable for young children. This specific primary education Digital Learning Resources Library covers more than 1.000 lessons, including 300 exciting inquiry-based digital investigations and simulations.

The typical primary education STEM Lab configuration (content and experiment kits) covers 6 STEM learning areas:
- Life science
- Earth Science
- Physical Science
- Mathematics
- Engineering
- Science Practices

Secondary Education

The Smart Classroom meets the specific needs of Upper Primary and Secondary Schools in Kenya, in order to improve access, quality, and relevance of the secondary education system. Students are prepared for a career in the sector of their choice and for continuing education, through a blended mix of hardware and software resources.

The ICT in Education Master Plan includes the focus of MINEDUC on providing each secondary level school with a number of Smart Classrooms that enable shared 1:1 learning environments. This approach is feasible, cost efficient and ensures equity of access in the shortest time possible. Smart Classrooms are technology enhanced classrooms that foster opportunities for teaching and learning by integrating learning technology, such as computers, digital content and specialized educational software, assistive technologies, audio-visual equipment and networking equipment.

The Digital Learning Resource Library provides students with a wide range of educational experiences that can integrate Science, Technology, Engineering and Mathematics (STEM). Modern technologies, with an emphasis on exploring science are featured. With a wealth of practical hands-on and virtual assignments the Smart Classroom can significantly contribute to improved education outcomes.

The Digital Learning Resource Library for secondary education covers 3.000 lessons.
The typical STEM ICT-based lab configuration includes the following 12 themes:

- Architectural technology
- Construction engineering
- Electronics technology
- Energy in buildings
- Engineering design
- Biomedical technology
- Mobile robotics
- Mechatronics
- Manufacturing technology
- Mass transportation
- Industrial robotics
- Transportation technology

Higher Education STEM programmes

The Smart Classroom can be used for the improvement of Higher Education Science, Technology, Engineering, and Mathematics (STEM) programmes.

Higher education is critical to spark an innovation economy to transform Rwanda. ICT is seen as a key ingredient and catalyst. Investments in higher education will be prioritized by the government to increase access to higher education, improve quality and drive research and innovation. Therefore enhance teaching, learning & research through ICT integration in Higher Learning Institutions (HLIs) is one of the strategic objectives of the ICT in Education Policy.

With the online and offline applications, the Smart Classroom can significantly contribute to the quality improvement and inclusion of new technologies and innovations within this specific sector.

The Smart Classroom for the specific integration of STEM in Higher Education includes the following rooms:

Teacher led presentation rooms

- Based on maximum 32 students
- Direct access to Digital Learning Resource Library for lecturers
- Numerous presentations and background materials

Student exploration and investigation room

- Based on maximum 32 students
- 16 workstations with direct access to Digital Learning Resource Library server
- Practical demo and training units linked to the Digital Learning Resource Library

Example topics for Research, Design & Technology

- Rapid Prototyping/Industrial Manufacturing,
- Laser cutting/engraving
- 3D printing and 3D scanning
- CNC simulation
- CNC manufacturing
- Machine tools
- Control & Instrumentation
- Electronics
- Computer programming
- Automotive Engineering
- Mechanical & fluid power
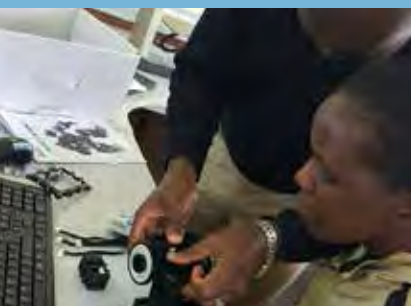
Technical Vocational Education and Training

Introducing a unique TVET teaching and learning concept, combining state-of-the-art technologies, software, simulations, experiments and hands-on practical education, for a future proof environment.

In recent years many developments have taken place in the TVET sector. TVET is more widely accessible now than ever before in Rwanda at Technical Secondary Schools (TSSs), Vocational Training Centres (VTCs) and Integrated Polytechnic Regional Centres (IPRCs), also industry involvement increased significantly. The Education Sector Strategic Plan indicates improvement of the TVET sector through the development of a new competency-based curriculum, harmonisation of curriculum standards across the East African Community, include the reform of examination and assessment practices, improvements in the quality and supply of teaching and learning resources, and roll out of the appropriate use of ICT in teaching and learning.

The TVET Smart Classroom provides a world-class learning facility, introducing a unique TVET teaching and learning concept, combining state-of-the-art technologies, software, simulations, experiments and hands-on practical education, making TVET institutes future proof. The TVET Smart Classroom harnesses emerging technologies and fully integrates ICT based learning and best practices in TVET.

The Smart Classroom optimizes the CBET implementation, examination and assessment, as well as the use of ICT in teaching and learning while also contributing to improved use of practical hands-on training at the workshops, through better preparation, amongst others, through;
- Presentations
- Digital lessons
- Investigations
- Engineering simulations
- Virtual experiments
- Practical exercises
- Projects and group work

The Smart Classroom for TVET includes the following components;
- Project design
- Site-surveys and recommendations
- Creation of a virtual learning environment
- Digital Learning Resources Library
- Small scale practical demo units
- IT infrastructure
- Supply, installation and commissioning of equipment
- Training of teachers and Smart Classroom managers
- Long term technical support, training and maintenance
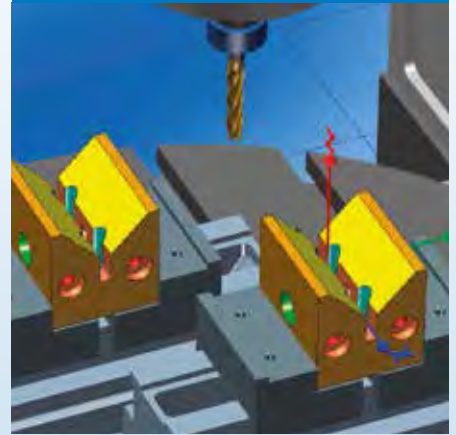
Smart Classroom workstation examples

RENEWABLE ENERGY

MACHINE TOOLS & CNC

CNC SIMULATION

MATERIALS & PROCESSES

INDUSTRIAL CONTROLS

HYDRAULICS

AUTOMOTIVE

2D/3D DESIGN SOFTWARE

PNEUMATICS