



## Digital Skills, Coding and Robotics

### Pilot Project:

During 2020, the Department of Basic Education plans to launch two different projects in schools before rolling out the new proposed Digital Skills Curriculum in all schools in 2021. Broadly speaking, the idea is that digital skills will be implemented in the Foundation Phase. Robotics is planned for Grades 4 - 9 where it will possibly form part of the Technology Curriculum. After discussions with the DBE, they indicated that they would welcome it if schools wanted to participate in the pilot project.

Please note: The SAOU is therefore not in charge of the pilot project itself and the names of interested schools will be sent to the DBE for further consideration.

However, there are many schools that offer robotics and coding as an extracurricular activity. Here are some ideas for schools that are interested in tackling the world of digital education.

Some special schools already have robotics teams and their autistic learners are thriving. It's not just for mainstream schools.

Here are some options that SAOU is aware of. Unfortunately, SAOU cannot make any recommendations as to which product is best. Each school will have to research and determine what fits into their budget and which meets their needs. Each product has its pros and cons and this piece of information refers to what we are already aware of. However, we are sure that this will be a very good learning curve for all of us. The SAOU is happy to learn and welcome any information and suggestions.

# ROBOTIKA

Lego	
Price	Robotics Kit (EV3 Education CORE and expansion set) R10 000 Lego Boosts R2 000 (download lessons plans)
Number of learners	6 -12 learners (5 ideal group)
Age	Lego Mindstorm 10+ years old Lego Boost (7 - 12 years)
Background	Learners can participate in the Lego League First competitions. Every set also comes with a teacher's guide and even those teachers who are not technologically wise, will be able to follow as you assemble the robot lesson by lesson.
Competitions <a href="#">First SA</a>	FIRST Lego League Junior (6-10 years) FIRST Lego League (Grade 4+, up to 10 members) FIRST Tech Challenge (Grade 7 - 12) <a href="https://www.sciencexpo.org.za/robotics.html">https://www.sciencexpo.org.za/robotics.html</a> <a href="https://www.saasta.ac.za/the-world-robot-olympiad/">https://www.saasta.ac.za/the-world-robot-olympiad/</a>
Consider	<ul style="list-style-type: none"> <li>✓ 6 - 10 learners (max 12)</li> <li>✓ Competitions (optional) can be expensive and often schools can't participate in all competitions due to a lack of funds.</li> <li>✓ Step by step instructions for teachers and learners</li> </ul>
Contact	Contact DR Patricia Gouws (Unisa) for more information. She also has her own robotics team. Patricia Gouws <a href="mailto:GOUWSPM@unisa.ac.za">GOUWSPM@unisa.ac.za</a>
Supplier(s)	<a href="#">HandsonTech</a> <a href="#">Pops Toys</a> <a href="#">Lego Engineering</a>
More information	<a href="http://firstlegoleague.org/challenge">http://firstlegoleague.org/challenge</a> Videos: <a href="https://www.youtube.com/watch?v=R1sAh2BTBgE">https://www.youtube.com/watch?v=R1sAh2BTBgE</a> <a href="https://www.youtube.com/watch?v=ReSKSbTo_k">https://www.youtube.com/watch?v=ReSKSbTo_k</a>



# Lectrobotix

Price	Range from R2836 - R6175
Number of learners	6 -10 learners (6 ideal group)
Age	5 - 12 years +
Background	Lectrobotix are used in the Eastern Block Countries (Russia) - my robot.
Consider	<ul style="list-style-type: none"><li>✓ Lost or broken parts can be replaced</li><li>✓ All the sides of the block can be used (Lego - only 1 side)</li><li>✓ From 5+ years old</li><li>✓ Sets for different ages and learners can progress to the next set</li><li>✓ Learners use creativity to build robots, not prescribed.</li><li>✓ Step by step instructions for teachers and learners</li></ul>
Contact	Mattheus van Emmenis matt@lectrobotix.co.za 083 256 1764
Supplier	Contact Mattheus for more information and prices. He also quotes according to your needs and provide training for educators.
More information	Videos <a href="https://www.youtube.com/watch?v=A2vHxsbsdbc">https://www.youtube.com/watch?v=A2vHxsbsdbc</a> <a href="https://www.youtube.com/watch?v=7LnKTERIsyE">https://www.youtube.com/watch?v=7LnKTERIsyE</a>



**THE MRT3 ROBOT SERIES**

**AGES 8-13**

**3 GREAT SETS THAT FOLLOW ON AFTER EACH OTHER A TOTAL OF 42 DIFFERENT ROBOTS**

**creativity**

**innovation**

**imagination**

**artistic skills**

Designed as an aid for systematic and scientific teaching. Help students to learn the essential STEM (Science, Technology, Engineering and Maths) concepts. With a step by step guide students can learn to build and program their own robots.

**START ON SET 1 AND MOVE ON TO SET 4**

SENSORS AND SOUNDS

## Lesson 1

Learn parts, Make the piglet



### Lesson Goal

1. Know what is robot and what can robots do.
2. Learn all the parts in MRT3-1.
3. Learn how to assemble each part and its function.
4. Learn about pig, understand their characteristics and living habits.
5. Students create a simple model - cute pig, to develop their imagination skill and motor skill.

### Preparation

1. MRT3-1 equipment and materials.
2. Multimedia classroom with overhead projector
3. Marker pen for labeling

# CODING

## TANKS app and puzzles

Price	R2500 p/set (8 sets, 7 lesson plans, instructional videos, solutions etc.)
Number of learners	40 learners (5 p/set) can participate simultaneously
Age	Ideal for Gr 3 - 9
Background	TANKS introduce learners to basic coding concepts by using a game that make use of puzzles, image recognition and a cell phone app that can work offline.
Consider	<ul style="list-style-type: none"><li>✓ NO internet access necessary to use app</li><li>✓ Need a phone with a camera (at least one per class, one per group ideal)</li><li>✓ Easy to store</li><li>✓ Educational principles: * groupwork * problem solving * learners not just on their phones * gamification * immediate feedback</li></ul>
Contact	Contact Prof Greyling (Nelson Mandela University) <a href="mailto:Jean.Greyling@mandela.ac.za">Jean.Greyling@mandela.ac.za</a> 0835544183
Supplier	Prof Jean Greyling
More Information	Download App: <a href="#">Google Play</a> or <a href="#">iStore</a> <a href="#">Video</a> <a href="#">Facebook</a>



## BOATS board game, app and puzzles

Price	R550 (Complete board game and puzzles for app)
Number of learners	2 players
Background	BOATS powered by Tangibl is a two-player mobile game aimed at introducing players to the challenge of plastics in the ocean. Each player needs to move a boat through a grid, removing plastic tokens from the ocean by landing on them. This is done through the use of tangible tokens which allows for commands. Once the set of tokens are packed out, a photo is taken. Through image recognition, the commands then become executable in the app, moving the boat through the grid. A set of multiple-choice questions that relates to plastics in the ocean educates its players through the basic science of computer coding
Consider	<ul style="list-style-type: none"><li>✓ There is an app and a board game version</li><li>✓ Teaches learners about looking after our marine life</li><li>✓ Boardgame (ideal for GR R - I) - introduction to coding</li></ul>
Contact	Prof Jean Greyling
Supplier	Jean.Greyling@mandela.ac.za
More information	Download App: <a href="#">Google Play</a> OR iStore <a href="https://www.news24.com/SouthAfrica/Local/PE-Express/primary-schools-in-gaming-challenge-20190415">https://www.news24.com/SouthAfrica/Local/PE-Express/primary-schools-in-gaming-challenge-20190415</a> <a href="https://news.mandela.ac.za/News/EC-pupils-discover-world-of-coding">https://news.mandela.ac.za/News/EC-pupils-discover-world-of-coding</a> <a href="https://www.heraldive.co.za/weekend-post/your-weekend/2018-08-12-tanks-app-firing-up-future-programmers/">https://www.heraldive.co.za/weekend-post/your-weekend/2018-08-12-tanks-app-firing-up-future-programmers/</a>





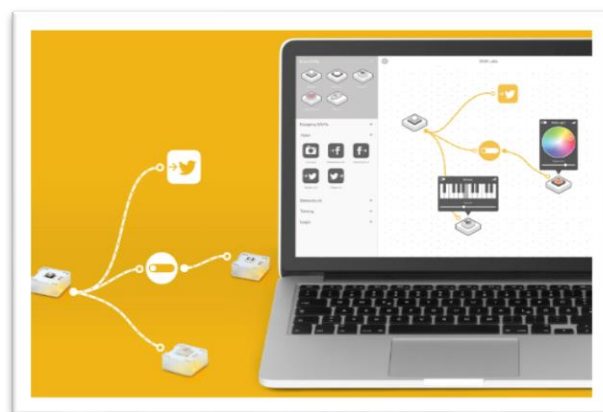
## Scratch & Scratch Jnr

Price	Free download of programme, but learners need a computer with internet access to use Scratch.
Number of learners	Depend on number of computers
Background	Scratch is a free programming language and online community where you can create your own animation, interactive stories and games. It is specifically developed to teach learners coding. Grades 1 - 3 Scratch Jnr; Grades 4 - 9 Scratch
Consider	<ul style="list-style-type: none"> <li>✓ Need high speed internet access</li> <li>✓ Ideally one computer per learner/per pair</li> <li>✓ Should you offer this as subject - each teacher needs training/appointment of a full time IT teacher</li> </ul>
More information	<ul style="list-style-type: none"> <li>□ <a href="#">Kids who Code</a></li> <li>□ <a href="#">Code maker</a> (list of good websites re Scratch - even a video isiZulu)</li> </ul>



## SAM Labs

Price	Classroom kit R30 000 (VAT excl)
Number of learners	Classroom kit = 30 learners STEAM kit = 4 - 6 learners
Background	Designed by teachers and engineers, SMART Coding Kits by SA SAM Labs combines lesson plans, apps and electronics to reward curiosity and imagination with a real impact on learning and progression.
Consider	<ul style="list-style-type: none"> <li>✓ iOS, Android, Windows and Chromebook</li> <li>✓ Need a computer/tablet per 3 learners</li> <li>✓ Can replace lost or broken parts as needed</li> <li>✓ 43 Lesson plans</li> <li>✓ Work via Bluetooth and charge via USB</li> <li>✓ Can work offline once programme has been downloaded</li> <li>✓ Comes with a teacher's guide and workbook for learners</li> <li>✓ Introduction and visual aid to coding to develop computational thinking skills</li> <li>✓ Aimed at GR R - 4 learners</li> <li>✓ Can be used on Lego robots</li> </ul>
Contact	Norman Stratford <a href="mailto:normans@fybotech.com">normans@fybotech.com</a> 0100072607
Supplier	Norman Stratford - Fybotech
More information	<a href="https://uk.samlabs.com/pages/learn-to-code-course">https://uk.samlabs.com/pages/learn-to-code-course</a> <a href="https://www.youtube.com/channel/UCAdCYuI37KxSiMxlw7DFYw">https://www.youtube.com/channel/UCAdCYuI37KxSiMxlw7DFYw</a> <a href="https://www.businesswire.com/news/home/20190624005184/en/SAM-Labs-Launches-New-Hands-On-Learn-Code">https://www.businesswire.com/news/home/20190624005184/en/SAM-Labs-Launches-New-Hands-On-Learn-Code</a>



# DIGITAL SKILLS

The DBE also aims to develop typing skills and key board skills. Computers in the classroom are also a fantastic resource for learners experiencing learning barriers.

Free games/programmes to develop keyboard skills:

- [Dance Mat Typing](#) (BBC)
- [Typing Club](#)
- [Keyboard Climber 2](#)
- The Typing of the Ghosts
- KeyMan
- Key Seeker

## RAISING CLASSROOM AWARENESS

Create an IT corner in every Foundation Phase classroom (especially Gr R) where you introduce the correct vocabulary. Give learners access to a variety of devices by putting old phones, screens and keyboards in this area to explore.

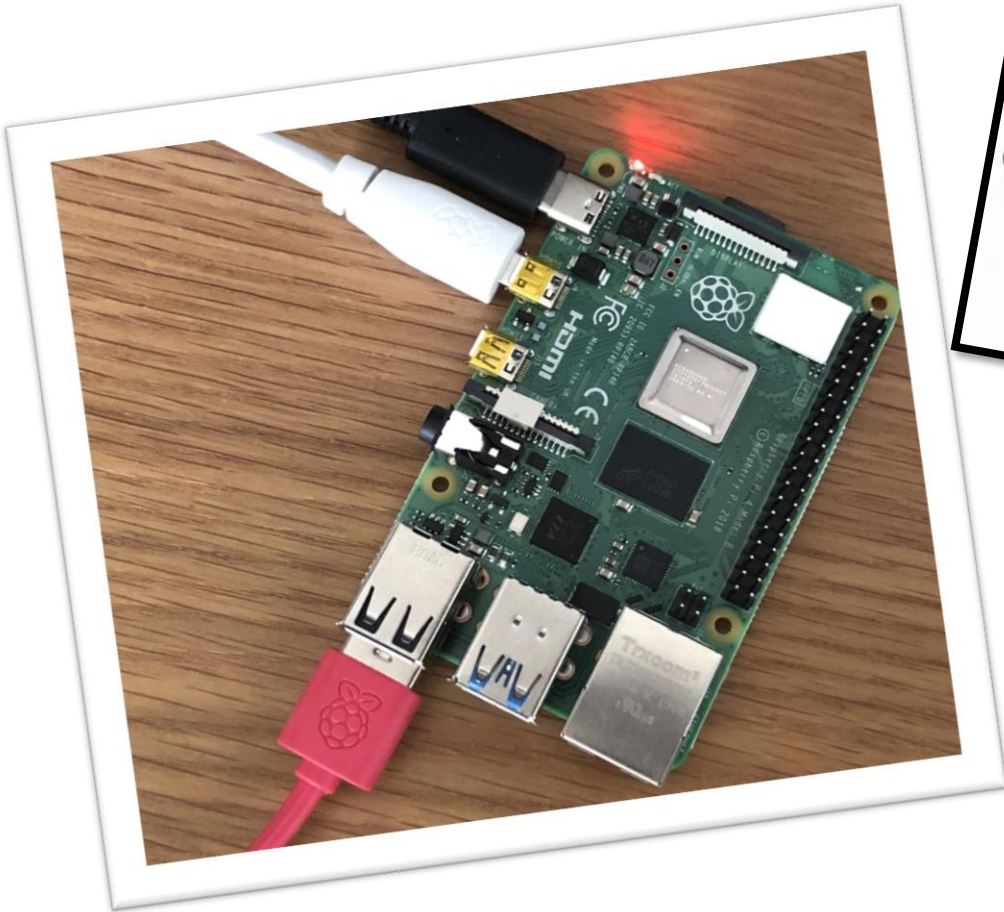
## ELECTRONIC EQUIPMENT

[Raspberry Pi & Pi Zero](#) (coding and robotics) (Available PiShop)

An affordable computer (~R1000 Raspberry Pi; R180 Pi Zero) that plugs into a TV, runs free home and education software and acts as a platform for robotics and automation. Every child can have his/her own to store information on.

Raspberry Pi in the classroom:

- <https://www.raspberrypi.org/learning/teachers-guide/>
- <https://opensource.com/article/17/8/raspberry-pi-teachers>
- <https://www.raspberrypi.org/blog/teaching-pinet/>
- <https://www.makeuseof.com/tag/5-ways-raspberry-pi-can-used-schools/>



### Advantages:

- ✓ Can work with any (HDMI/RCA/VGA) computer screen
- ✓ Practically no value for common thief
- ✓ Easy to store and keep safe
- ✓ Much cheaper than a computer or tablet

### Other options to explore:

[Microbit](#) (UK) - should work well for Gr 4 - 6

The board costs around R275.00 but you can also use it virtually on the screen (without the board)!

[Makro](#) R279



# TRAINING

UNISA: i-set robotics - components and pedagogy (lecturer- DR GOUWS)

EDx-online training: Programming in Scratch, MyCS: Computer Science for Beginners (Scratch), The Beauty and Joy of Computing - AP® CS Principles Part I (Scratch), Logic and Computational Thinking, Introduction to Computational Thinking and Data Science, Think. Create. Code.

## Other options (Google)

ORT SA: ROBOTICS & CODING EXTRA CURRICULAR - PUPILS, TEACHERS

V.J Robotics: VR Robotics focuses on coding and robotics

They also sell Sphero Mini Robot (R999), Bee Bot (R3100) and Arduino kits. They also offer practical lessons for learners at schools.

CodeSpace: Based in the Western Cape. Hosted by the UCT School of IT, this camp is an engaging and educational six-day holiday camp for high school pupils, which introduces multiple aspects of coding and robotics. R2500 for 6 days, 9 Dec - 14 Dec

## DBE INFORMATION

In the proposed plans of the DBE they refer to the following programmes and apps:

- Raspberry Pi
- Scratch
- Gr 7 onwards - internet access
- Robotics-taught through cardboard activities (no robots needed)
- Linking robotics with the coding will require additional resources such as PicoBoards, etc. Depending on the extension, the cost could be between R1000.00 and R3000.00 + per kit.

# CRITERIA FOR PILOT PROJECT

## Foundation Phase: Digital Skills (50 schools)

As your province is one of the provinces identified for piloting the subject, you are kindly requested to identify ten (10) schools in your province according to the following criteria:

- Variety of schools included (rural, township and urban);
- Schools where sound management is in place to drive this project;
- Schools where curriculum delivery is on point;
- Schools should have adequate security to safeguard equipment; and
- Schools should have adequate electricity for implementing the subject.

*ABIONE*

2020

Timeframe	Activity	
Jan 2020	Pilot implementation: Grades R – 3	
Feb 2020	Identification of Pilot schools: Grades 4 – 6 (EC, FS, GP, KZN & MP)	
Feb – Aug 2020	Monitoring and evaluation of pilot: Grades R – 3	
March 2020	Development of LTSM: Grades 4 – 6	
June 2020	Teacher Training: Grades R – 3: 1st phase – All teachers	
	Teacher Training: Grades 4 – 6: 1st phase (pilot)	
July – Sept 2020	Distribution of resources for pilot schools: Grades 4 – 6	
	Distribution of resources for implementation: Grades R – 3	
August 2020	Determine institutional readiness for piloting Grades 4 – 6	
Aug – Oct 2020	Finalise Grade R – 3 curriculum based on feedback from pilot	
Sept 2020	Teacher Training: Grades R – 3: 2nd phase – All teachers	
	Teacher Training: Grades 4 – 6: 2nd phase (pilot)	