Developing Computational Thinking and Making as a National Capability

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“I don’t do a lot of coding as Prime Minister, but understanding how algorithms work, understanding the science is so important in equipping Canada for the Fourth Industrial Revolution.”
Coding is the practice of developing a set of instructions that a computer can understand and execute. <technical skill>

Computer Science is the study of computers and algorithmic processes, including their principles, their hardware and software designs, their applications and their impact on society. <academic discipline>

Computational Thinking is a way of solving problems, designing systems, and understanding human behaviour that draws on concepts fundamental to computer science. <problem-solving process e.g. decompose the problem, recognise the pattern, pattern generalisation and abstraction, design the algorithm>
Learn computing skills through Play at the **PlayMaker** programme

Develop interest in coding through “**Code for Fun**” enrichment programme

Deepen students’ understanding in ICT and Media through **Infocomm Clubs**

Promote digital making for students and community through the **Digital Maker Programme**
South Fayette Coding Progression

Scratch Clubs

Scratch & Kodable

App Inventor

Block-based Programming

Text-based Programming

App Inventor Club

AP Computer Science

Java & Python

Software Development Team
Code for Fun Enrichment Programme

Procurement done by IMDA to reduce administrative effort required by teachers

Available to all primary and secondary levels

Robotic and Microcontroller tracks used to facilitate the learning

Co-funding for student training and educational kits

Primary school: Block-based visual programming
Secondary school: Block-based visual programming or syntax-based programming

20-hours over 2 years

MOE-IMDA Collaboration

More than 150 schools and 85,000 students have benefitted since 2014
School Infocomm Clubs

- App Developer
- Cyber Security
- Data Analytics
- Robotics and Makers
- Web Developer Jr
- Ethical Hacker Jr
- Business Analytics Jr
- Roboticist Jr
- Mobile App Developer Jr
- Digital Forensics Jr
- Maker Jr
- Game Developer Jr
- Storyboarding

Media modules available in 2018 -
- Storytelling
- Digital Media Production
Technology is making it easier for more people to do things that previously only an elite few could do.
Educators Workshops

651 educators from 142 schools have gone through 1.5-day workshop curated by IMDA, sponsored by Microsoft Singapore.

1st session on Day 1:
Introduction & Basics of micro:bit

2nd session on Day 1:
Introduction of external sensors/peripherals that work with micro:bit

3rd session on Day 2 morning:
Digital Making with micro:bits based on the different themes
Schools: Subject-based
- Integrate digital making into lessons

(BY Tanjong Katong Girls’ School)
Math: micro:bit as clinometer to measure height of flag pole

(BY Clementi Town Sec School)
Interactive art: painting lights up when it detects motion

(BY Eunos Primary School)
Science: micro:bit attached to the bottle rocket to measure acceleration

(BY Dunman High School)
Designed by teacher for CCA: Hand stabilizer for air rifle practice
Schools : Project-based
- Integrate digital making into project work

Pei Hwa Secondary School
Panic Button to alert caregiver if the patient falls.

Geylang Methodist School (Secondary)
Using micro:bits to lock/unlock lockers from within to resolve school’s common issue of lockers’ locks being tampered with.

Montfort Junior School
Using micro:bit to trigger alarm if the bag is being tampered with.
Winner for The Best Instructions at Micro:bit Foundation - Raffles Girls’ Primary School

- The two 10-year old girls, Aretha and Xinyi have done Singapore proud at this international platform, competing with other submissions from different parts of the world.

- Won one of the 3 prizes awarded by the micro:bit Foundation in UK at their 1st Anniversary Challenge

- They came up with an innovative solution to prevent road accidents using micro:bits.
LEARNING WITH TECH

**BEE-BOT**
Use arrow keys to form a series of instructions for Bee-Bot to move

**KIBO**
Use wooden blocks to create a series of instructions for Kibo to move

**CODE-A-PILLAR**
Arrange easy-to-connect movements segments to form a sequence of instructions

**LITTLEBITS**
Easy-to-use electronic building blocks that snap together with magnets to invent anything

**CIRCUIT STICKERS**
A creative way & fun way to learn electronics through peel-and-stick stickers

**HACKABALL**
A throwable, programmable ball that allows kids to code their own active games

**LEGO WEDO**
Construct a Lego model & program it through simple click-and-drag icons to activate motors or sensors

**OZOBOIT**
Use basic programming to train these tiny robots to follow lines or colour codes

**TINKERCAD**
Use basic geometric shapes to create 3D designs & models

**KODU GAME LAB**
Create games with simple visual programming language

**DRONE**
Use block-based programming to code aerial manoeuvres

**SPHERO**
Execute motor movements & light displays using block-based programming

**MICROBIT**
Pocket-sized codeable computer that promotes maker’s mentality

**ARDUINO**
Open-source microprocessor used to create interactive electronic objects

**MBOT**
Programmable build-it-yourself robotic kit

To find out more, you may enquire on the following programmes:
Israel’s surprising way of teaching skills for innovation

It’s true that Israeli kids lag behind in standardized tests. But that’s not where the genius of Israeli education lies.

By Inbal Arieli  |  April 27, 2017, 8:00 AM

“So let your kids get stuck. They will always learn something on the way.”

Bottom 40 percent in PISA Mathematics and Science, yet highest density of start ups per capita in the world

Secret lies in making the children get “stuck”. True growth and learning comes from that place of not knowing the solution and having to come up with one anyway. Contradict the image of teacher as the expert and the inexhaustible source of knowledge

Looking at failures, not successes.