

# Digital STEM – Makerspace Train the Trainers (TTT) Program – Level EXPLORERS INNOVATORS MASTERS

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## Overview

The Explorers Digital STEM – Makerspace Train the Trainer (TTT) program was designed for any aspiring and dedicated individuals (15+) globally who wish to establish Training Services or Tutorial Centers to carry out **Explorers Digital STEM workshops** for students aged 9+ years using our award winning software FlowLogic 6 and myFlowLAB Digital STEM Exploration Learning and Teaching package.

## Training Objectives

The objective of this program is to train and prepare Trainers, who will be certified as Explorers STEM Digital Trainer to carry out **Digital STEM Explorers workshop** – a 16 hours hands-on and minds-on activities in the area of Technology and Engineering blending with Science and Mathematics curriculum incorporating electronics, sensing and programming (coding) building prototype projects from LED to ROBOTICS primarily for Lower primary and Secondary school students.

These Trainers will engage with their students in the workshop to indulge in a joyful process of brainstorming, experimenting, tinkering, investigating, and inventing while carrying various programming challenges to control, monitor and analyse their projects. An activities that further ignite students interest in the subjects related to STEM (Science, Technology, Engineering and Mathematics), as well as enhances their Essential Skills in the following areas:

- Critical Thinking
- Problem Solving
- Creativity
- Communication
- Collaboration
- Digital Literacy
- Data Literacy
- Computer Science
- As well to ignite their interest in Math and Science subjects

## Training Synopsis

The Explorers Trainers will undergo a three (3) days mastering Explorers program contents and Lesson plan delivery method. The training will be conducted using Slide and video presentation. Each Trainer will complete a 24 hours of training covering the following 3 modules:-

### 1. Module 1 - Programming Algorithm ( ~ Coding)

Learn to teach programming algorithm that can be applied across any programming language.

### 2. Module 2 – Electronics, Sensors and Microcontroller

Learn to teach applications of electronics, sensors and microcontroller; building interactive real-world physical systems that can sense and respond.

### 3. Module 3 - Real-World Projects Innovation

Learn to teach innovation and creativity building STEM related real-world applications.

## Training Outcome

Upon completion of the Digital STEM Explorers Train the Trainer program, each trainer will acquire the following knowledge and skills:-

- Become an Entrepreneur providing STEM related trainings services
- Ability to become a Master Trainer, train other aspiring trainers
- Ability to schedule and conduct the 16 hours Digital STEM Explorers Workshop
- Proficient in using myFlowLAB Digital STEM Teaching and learning
- Ability to teach Explorers level electronics, sensors and programming
- Ability to teach building Explorers level STEM related real-world project models
- Ability to access student's Explorers level STEM skills and knowledge
- Help students with their projects for innovation and creativity competitions

## Training Contents

This training program progressively teaches students to innovate and build a fully Automated Explorers Level Real-World STEM project model (to be decided thru brainstorming) with the following topics:

## Day 1

1. **Getting Started** *Group Activity*
  - a. Ice-breaker and participant introduction
  - b. Participant sign-in
  - c. Participant pre-training survey *8.00 am – 8.30 am (30 min)*
  
2. **STEM Explorers program** *Theory*
  - a. What is STEM Explorers program
  - b. The program contents
  - c. Scheduling
  - d. Learning and Teaching package *8.30 am – 9.00 am (30 min)*
  
3. **Mastering FlowLogic 6.0** *Practical*
  - a. Introduction to visual programming
  - b. Installing FlowLogic 6.0 software tool
  - c. Flowchart Block properties
  - d. Editing blocks
  - e. Working with decision blocks
  - f. Working with Text input and output blocks
  - g. Program execution *9.00 am – 10.00 am (60 min)*
  
- Morning Break – 15 min**
  
4. **Programming Algorithm** *Theory & Practical*
  - a. What is programming algorithm
  - b. Explore conditions, loops, variables, and processes *10.15 am – 10.30 am (15min)*
  
5. **Working with Virtual projects** *Theory & Practical*
  - a. Introduction to Virtual projects
  - b. Virtual project blocks properties
  - c. Build an algorithm to single blink virtual LED
  - d. Build an algorithm to Double blink virtual LED
  - e. Assessment *10.30 am – 11.30 am (60 min)*

6. **Prepare Software & hardware for Physical Computing** *Theory & Practical*
- What is Physical Computing
  - Introduction to a microcontroller
  - Installing devices drivers
  - Uploading FlowLogic 6 Firmware into your board
  - Explore breadboard-circuit development board
  - Assembling the Workstation
  - Establishing communication between PC and workstation
  - Explore Physical Digital Input and Output process
  - Explore Resistors and LEDs
  - Control Block properties
  - Build and integrate physical LED circuit – 1 LED
  - Build a physical Blinking LED and Strobe light project *11.30am–1.00 pm (90 min)*

**Lunch break – 60 min**

7. **Building real-world Digital Output project** *Practical*
- Build digital output circuit – 2 LEDs
  - Testing and Troubleshoot
  - Develop police car siren system with audio *2.00 pm –2.45 pm (45 min)*

8. **Building real-world Digital Output project** *Practical*
- Build digital Output circuit – 3 LEDs
  - Testing and Troubleshooting
  - Develop Traffic light system project
  - Integrate delay counter to the Traffic light project *2.45 pm – 3.30 pm (45 min)*

**Evening Break – 15 min**

9. **Building real-world Digital Input / Output project** *Practical*
- Build digital input/output circuit – 1 push button,1 Led
  - Testing and Troubleshoot
  - Build light On/OFF project
  - Develop light switching with condition project *3.45 pm – 4.30 pm (45 min)*

10. **Building real-world Digital Input / Output project** *Practical*
- Build digital input/output circuit – 1 push button,1 Led & 1 Buzzer
  - Testing and Troubleshoot
  - Develop Panic Alarm system with audio *4.30 pm – 5.15 pm (45 min)*

## Break for Dinner – 2 hours (5.15 pm to 8 pm)

11. **Building real-world Digital / Analog Input output project** *Practical*
- a. Build digital output circuit – 1 Temperature, 1 Buzzer & 1 LED
  - b. Testing and Troubleshoot
  - c. Measurement conversion using math function
  - d. Develop Fire Alarm system with audio *8.00 am – 9.00 am (60 min)*
12. **Building real-world Digital / Analog Input output project** *Practical*
- a. Build Digital /analog output circuit – 1 (LDR) Light sensor & 1 LED
  - b. Testing and Troubleshoot
  - c. Develop Smart Street Light system project *9.00 am – 10.00 am (60 min)*

## Day 2

1. **Getting Started** *Group Activity*
- a. Review Day 1 activities
  - b. Question and Answers *8.30 am – 9.00 am (30 hours)*
2. **Building real-world Digital/ Analog Output project** *Practical*
- Build Digital /analog output circuit – 1 RGB LED  
Testing and Troubleshoot  
Randomization using Math function  
Develop digital Color mixing and mood lamp project *9.00 am – 10.00 am (60 min)*

## Morning Break – 15 min

3. **Building real-world Data Sensor project** *Practical*
- a. Build digital output circuit – 1 proximity sonar sensor & 1 RGB
  - b. Testing and Troubleshoot
  - c. Develop Object detection system project *10.15 am – 11.00 am (45 min)*
4. **Building real-world Data Sensor project** *Practical*
- d. Build digital output circuit – 1 proximity sonar sensor, 1 Buzzer & 1 RGB
  - e. Testing and Troubleshoot
  - f. Develop anti-collision project for blind person *11.00 am – 1.00 pm (45 min)*

## Lunch Break – 60 Min

## 5. Final Project

*Practical*

- a. Build a fully automated Real-World system model
- b. Brain storm with participant on project requirements
- c. Each student must apply some uniqueness to their model
- d. Must include LEDs, Buzzer and Sensors
- e. Must Include Media file for audio

*2.00am – 3.30 pm (90 min)*

### 1. Project sharing session - Activity

*3.30 pm – 4.30 pm (60 min)*

### 2. Certificate presentation and Closing - Activity

*4.30 pm – 5.00 pm (30 min)*

## Pre-requisites

None

## Duration

- 2 Days – Day 1 - 8.30 am to 10.00 pm and Day – 8.30 am to 5 pm

## Venue/ Date / Time:

## Price

- RM X,XXX.00/- per participant

## Training material

Each participant will receive the following:-

- 1 unit of Explorer STEM Starter Kit (Visual Programming Tool, Microcontroller, Electronics, Sensor and Accessories)
- Lesson Plan Softcopy

**Certification of COMPETENCY will be awarded**