

E-FORUM: MANAGING PANDEMIC CHALLENGES AND OPPORTUNITIES OF TVET IN THE ERA OF DIGITALISATION

IN CONJUNCTION WITH THE 32ND SEAMEO VOTTECH GOVERNING BOARD MEETING



28 OCT
THURSDAY



9.00AM - 5.00PM
BRUNEI TIME (GMT +8)



VIRTUAL
VIA ZOOM & YOUTUBE



SEAMEO VOTTECH

"Preparing TVET for Industry 4.0"



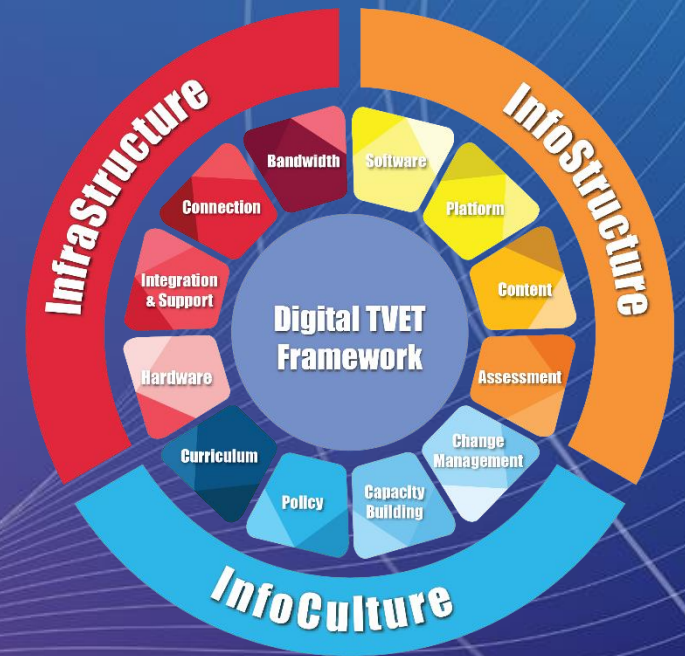
Industry Perspectives in Ensuring a Resilient TVET during a Pandemic and in the Era of Digitalization

Dr. Steven McKee,
President of Labtech International
President Emeritus, Worlddidac

www.worlddidac.org

www.labtech.org

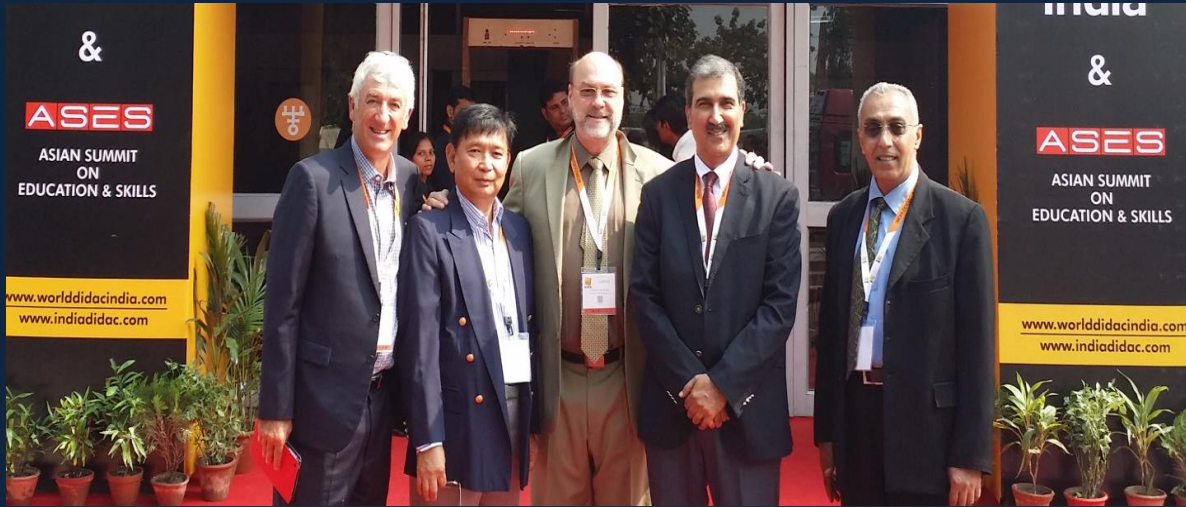
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LABTECH INTERNATIONAL LTD.

“The International Technical Education Company”



- Labtech is one of the leading **Technical Vocational Education & Training** Manufacturers and Designers in the world.
- Labtech is noted for using **Western Educational approach and Technology** while **adapting it to individual country requirements** and focuses on employable skills training (VET and TVET)
- Labtech production base is in Batam, Indonesia and ensures all the products are well **designed for Technical Education and Employable Skills training.**
- Labtech are also leaders in **digital learning for TVET** and have created their **Virtual TVET program** which uses realistic interactive 3D advanced gaming technology for Teaching and learning





PRODUCT TECHNOLOGY AREAS

Over 1,000 Physical Training Systems
and Interactive 3D Digital Learning

QUALITY
INNOVATION

RELEVANCE
EMPLOYABILITY





Current digital training (Labtech Virtual TVET) programs in USA, Peru, Columbia, South Africa, Jordan, Pakistan, India, Malaysia, Kenya, Thailand, Philippines.

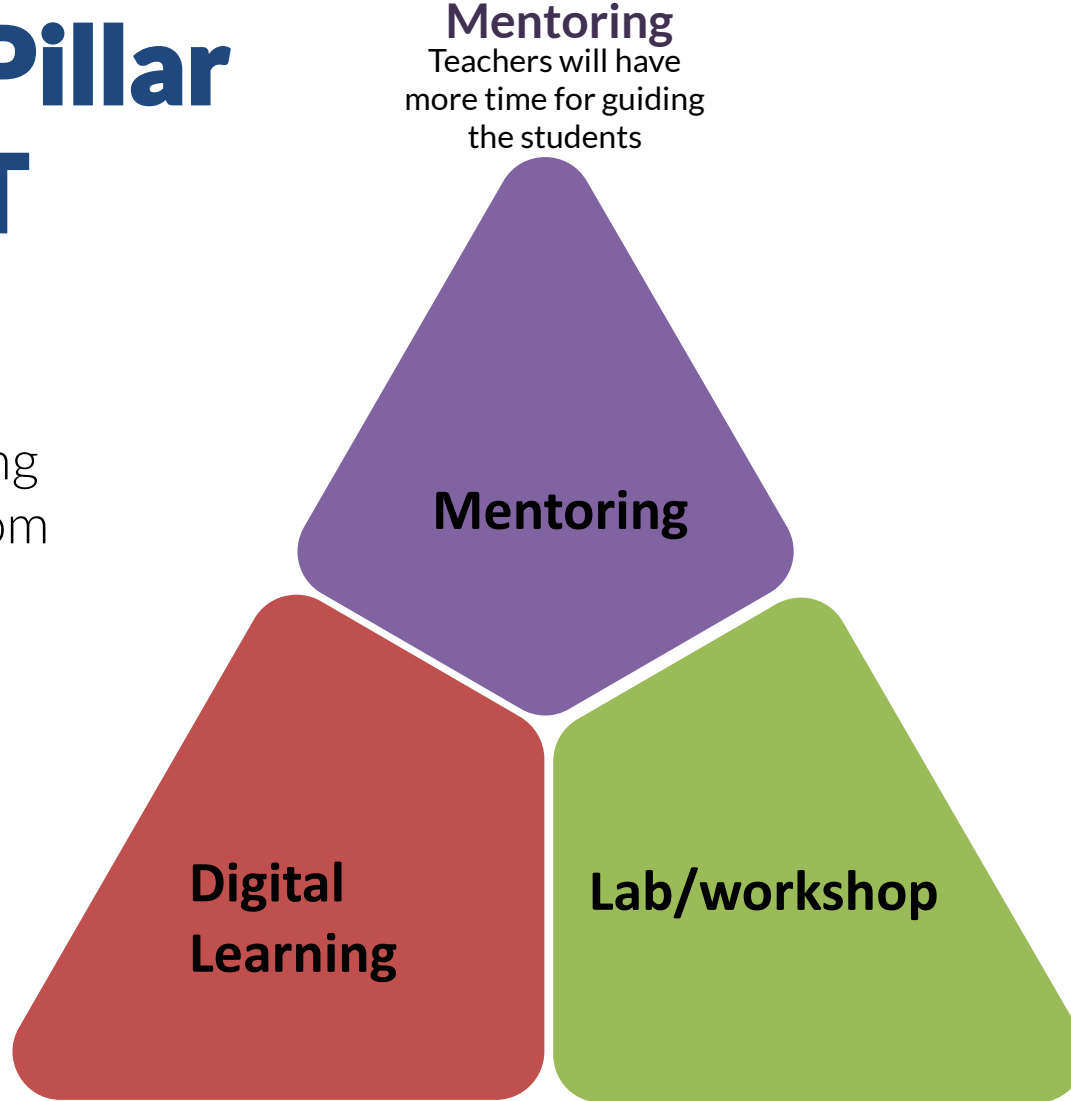


Labtech Training Systems are used in over 85 countries world wide and indicated in **BLUE** on this map. We also have 6 regional operational location marked with a flag.

Digital Learning as the Third Pillar For TVET

The in-school **Blended Learning landscape** can change with digital learning and free up more time from the teacher to guide and mentor the student.

Digital Learning
Providing most **theory** and demonstrating **applied use of technology**
Pre-Lab preparation



Mentoring
Teachers will have more time for guiding the students

Mentoring

Digital Learning

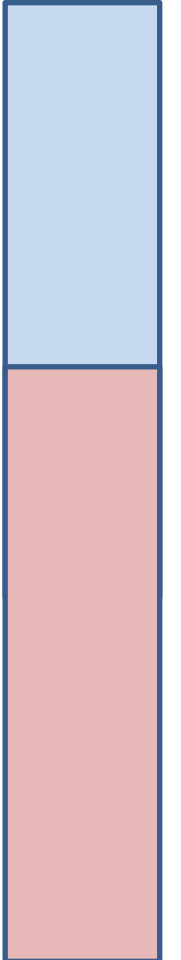
Lab/workshop

Lab or Workshop
For Practical work and exercises – **Lessons occur about 25% faster**

Assessment

Summative Assessment –
for final grades

Formative Assessment –
for boosting understanding and retention real time
immediate feedback



How can industry players contribute tools and resources to ease pandemic changes and transitions in TVET?

- Find Stronger Ways of collaborating for Industry - Education
- Digital Learning platforms have the potential to link industry and learning in ways not able to be done before.
- Link and articulate In-School Learning with Apprenticeship Programs at industry.
- Training and upgrading for existing Employees
- Linking job searches with training requirements so as to provide access for people to upgrade their skills.
- All these can help to reduce the skills mismatch issue
- New Report from ILO on upskilling and reskilling

Global new report from the ILO on:

► Skilling, upskilling and reskilling of employees, apprentices & interns during the COVID-19 pandemic

Findings from a global survey of enterprises



https://www.ilo.org/skills/areas/work-based-learning/WCMS_794569/lang--en/index.htm





**Virtual Signing Ceremony on Memorandum of Agreement (MoA) on:
Cooperation and Collaboration in SEAMEO VOCTECH-LABTECH
TVET Digital Learning Resources**



8th September 2021



- Special Portal for TVET Content for online learning for ASEAN member countries
- Teacher Training and Capacity Development Courses
- Webinars on selected topics about Digital Learning
- Workshops on refining and developing the Digital TVET Framework
- Research into digital learning for TVET and collaboration programs

SEAMEO – Labtech Academy Learning Portal - for teachers and students

LABTECH ACADEMY



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Manage courses

Search courses

- ▶ AUTOMOTIVE & TRANSPORTATION
- ▶ AIR-CONDITIONING & REFRIGERATION
- ▶ ELECTRICAL ENGINEERING
- ▶ RENEWABLE ENERGY
- ▶ STEM TECH

▶ Expand all

Add a new course



Automotive & Transportation

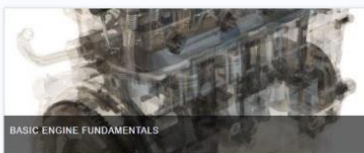
LABTECH Academy

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AVAILABLE COURSES



14 DAY FREE AUTOMOTIVE TRIAL



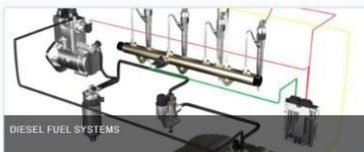
BASIC ENGINE FUNDAMENTALS



AUTOMOTIVE ELECTRICAL AND ELECTRONIC SYSTEMS



PETROL FUEL SYSTEMS



DIESEL FUEL SYSTEMS



ENGINE MANAGEMENT SYSTEMS



Automotive & Transportation

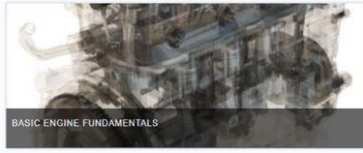
LABTECH Academy

Search courses

AVAILABLE COURSES



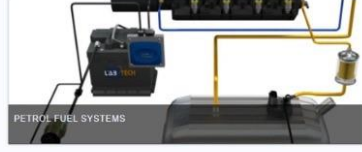
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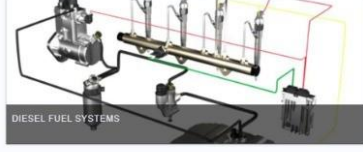
BASIC ENGINE FUNDAMENTALS



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PETROL FUEL SYSTEMS



DIESEL FUEL SYSTEMS



ENGINE MANAGEMENT SYSTEMS

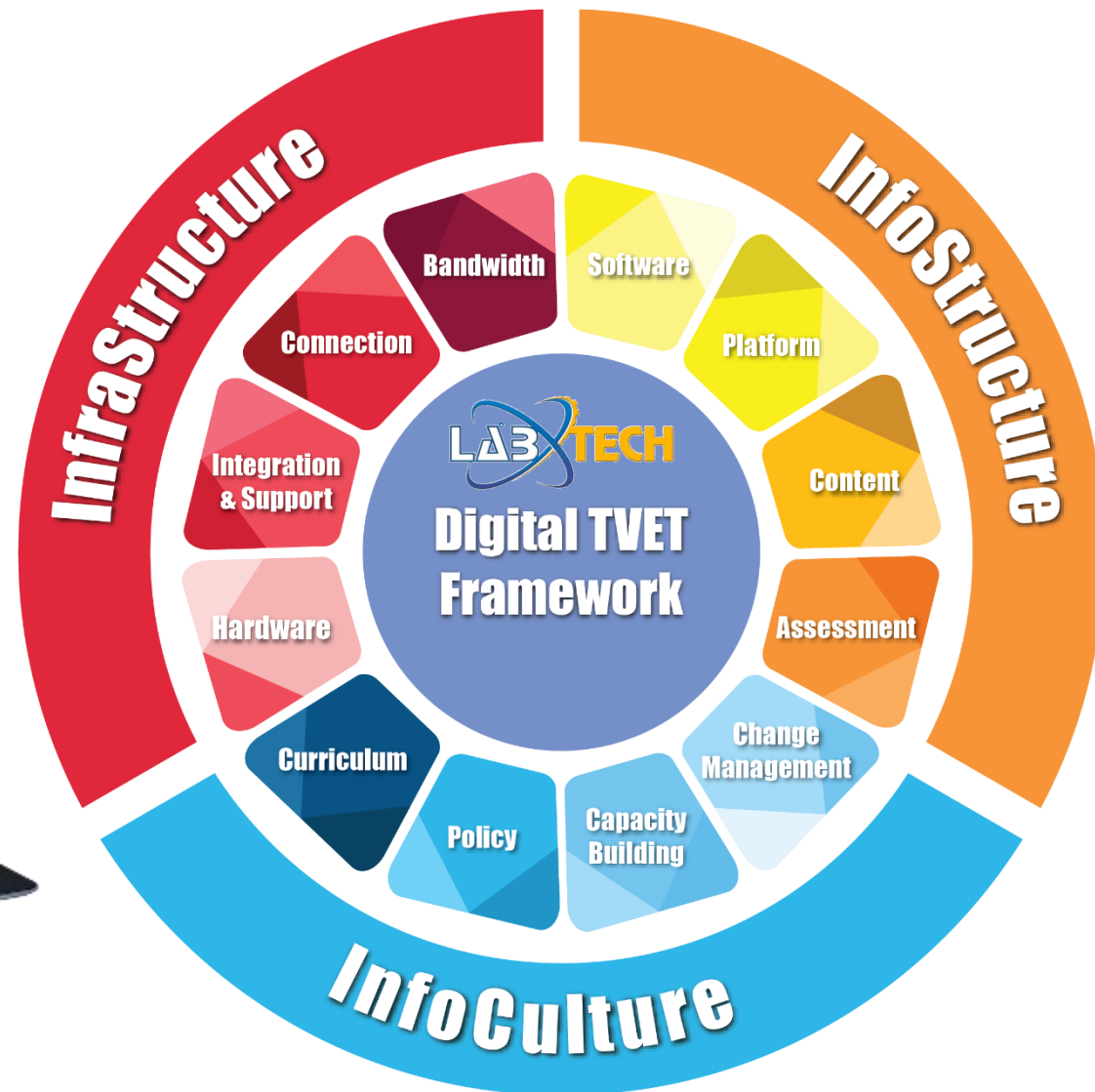
DIGITAL TVET FRAMEWORK –Workshop

Adapting Digital Learning each country's needs

1. Examine requirements and understand the issues
2. Setting Objectives and Goals
3. Assessing where you are – Self assessment
4. Identify what needs to be done – Gap Needs Analysis
5. Adapt and Implement program to match needs

Its not about Hardware any longer, it is about content and delivery platforms and Capacity building.

Remember digital learning will require a continuous development process and it will develop over time. It can be done step by step within your resources



What are some trends in digital TVET that are suitable to implement in Southeast Asia?

- Collaborate with developers of both platforms and content. The wheel does not have to be reinvented.
- We need a Regional Center of Excellence for Digital and Blended learning for ASEAN for TVET.
- Create National Centers of Excellence for TVET Digital and Blended Learning in each country
- Increase Capacity Building and Teacher Training Programs
- Labtech recent cooperation with CPSC for upgrading teachers in digital and online learning. This series will continue to be developed and offered together with SEAMEO Voctech.



Training

Program

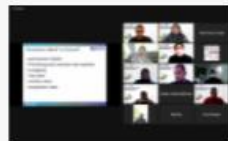
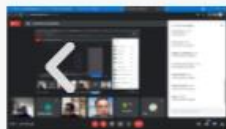


TRAINING PROGRAM OUTLINE

- **Session 1 (4 Hours) – Digital TVET Framework and What is Virtual TVET**
- **Session 2 (4 Hours) – Navigating around the TVET LMS and Reporting**
- **Session 3 (4 Hours) – Creating a Lesson Plan using Virtual TVET**
- **Session 4 (4 Hours) – Ongoing Professional Development (Coaching)**



GALLERY



LATEST INFO

Collaboration Meeting with Lenovo Malaysia

Discussion on future collaboration and partnership.

- Name of Lab: **UTHM-LABTECH Digital Innovation Centre (DICE)**
- Known as the “**Centre of Industry (CoI)**” project.
- **Objectives:**
 1. To establish a fully functional Digital Innovation Centre in UTHM.
 2. To conduct trainings on capacity building including hardware, software and new technology.
 3. To conduct research, development and innovation in creating new TVET digital contents.
 4. To support local and international TVET programmes to enhance the quality of teachers and graduates.
 5. To promote the Digital Innovation Centre in becoming a reference point towards industry 4.0.

Considering the disparity of technology infrastructures in the region, how far can the acceleration of digitalization ensure expansive access to TVET while reducing the digital divide?

- The Digital divide exists for not just students but also teachers and in TVET as well as for workers and companies.
- It also needs to have the support from the telecom sector.
Citizen rights for data access
- New Development initiatives should focus more on improving learning and creation of new systems, content, platforms and capacity building and less on buildings themselves.
- Make all the content and systems mobile friendly as that is the main medium. Example of Data from Labtech Academy.
- Create a Community of Practice for teachers and maybe students to support each other to develop

www.Labtech.org
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Dr. Steven McKee, President and Founder of
Labtech International Ltd. -- Email: steve@labtech.org

Contact us for
further
information



Additional Slides and
information on Virtual TVET for
Blended Learning

Examples of Interactive
Learning Content and Delivery
Platforms and performance
indicators

The Future is changing - We must too

- Technologies are changing
- Jobs are changing
- Skills are changing
- How about Education?

NEW
Tech

NEW
Jobs

NEW
Skills

NEW
Learn-
ing



COMPOUNDING ACCELERATING CHANGE

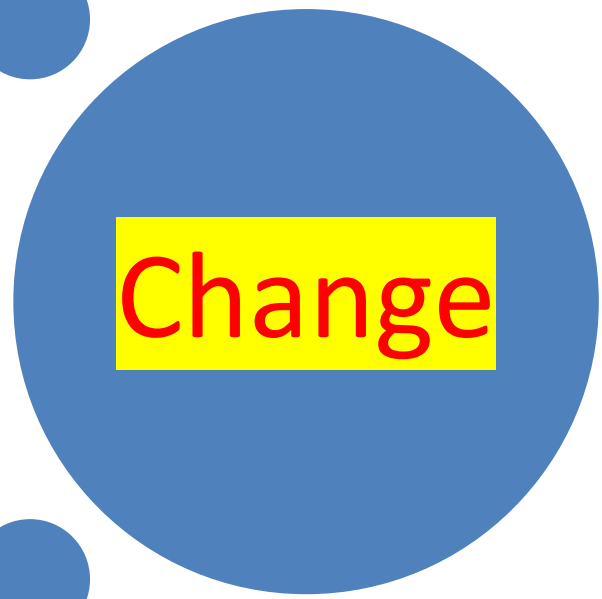
Covid Impacts



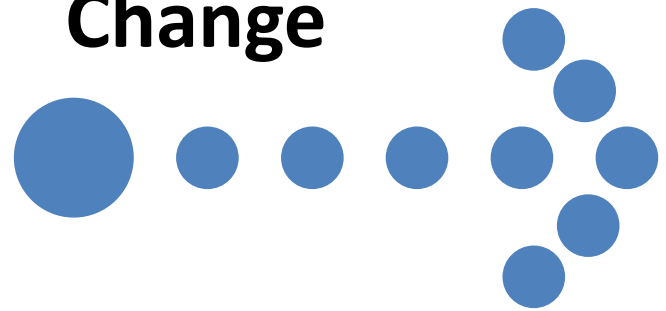
IR 4.0 Impacts



Societal and work change



Accelerated Change



DIGITAL



Making TVET Education more Effective and less costly

Most Educational Projects seem to be designed to build monuments; **It is time to Put Learning First** – It is the prime goal, invest in teachers and content.

- **No More Buildings:** Schools can have double capacity, New projects do not need to spend budgets on more building, just make them more effective
- **Less Equipment:** Less equipment is needed, should complement the digital content and be planned together.
- **More Learning: Invest in Digital content** - Students will have a better grasp of the principles, Students can learn quicker, Pedagogy-Andragogy-Heutagogy. Better teacher support and training.

VIRTUAL TVET: Creating the Right Balance between Theory and Practical Hands-on Learning



Higher Order Thinking Skills (HOTS)

Psychomotor

Affective

Cognitive

Practical



Theory

EXAMPLE OF SMART CLASS – TEACHER LED & BLENDED LEARNING



What is Digital or **Virtual TVET**?

- Using **Realistic** 3D advanced **Gaming Technology** for Teaching and learning
- **Infusing new technologies** for the benefit of learning (Web AR, VR, 360, scanning, real-time translation, AI, mobile tech, etc.)
- **Interactive 3D animations and simulations**
- **Visualization** of technical processes and applications
- Delivered with standard 2D PCs, Tablets, VR, AR
- **Blended (braided) Learning** with Practical hands-on
- Content delivered through an **TVET LMS** system that can provide student performance info to the schools and educational managers.
- **Data driven learning and AI** – Can aid the student in formative learning and eventually adaptive and differentiated learning. Game platform tools
- Enabling **Learning off campus and on campus AWAT**

INTERACTIVE REALISTIC ENGAGING AND EFFECTIVE LEARNING

The screenshot shows a web browser with multiple tabs open, including 'Refrigeration and Air', 'Open Type Compres', and 'Labtech HOME'. The address bar shows 'labtech-academy.com/index.php'. The website header features the 'LABTECH Academy' logo on the left and a navigation menu with 'HOME', 'NEWS', 'LINKS', 'SHOP', 'COURSES', 'INFO', 'TVET TRAINING', and 'HELP' on the right. There are also 'Log in' and 'Register' buttons. Below the header is a 'Latest News' banner with a green button labeled 'Virtual TVET Collaboration'. To the right of the banner, a text box states 'Labtech Academy signs MoA's with... SEAMEO VOCTECH CPSC Colombo Plan Staff College'.

LABTECH ACADEMY

Virtual TVET Online

Transforming TVET with
3D Gaming Technology for
Interactive Learning

Welcome to the new Labtech Academy. Labtech is one of the largest technical education (TVET) providers in the world

Automotive



The learning materials or topics are designed to cover from the introduction to automotive systems such as basic engine fundamentals, electricity and electronics, braking systems, wheels and drive systems, steering and suspension systems. It also goes onto developing the students' knowledge and skills leading to more advanced studies such as petrol and diesel fuel, systems, engine management, transmissions, and hybrid vehicles.

HVAC



The learning materials or topics are designed to cover from the introduction to HVAC fundamentals, electrical controls and components, instruments and meters, electric motors, HVAC components, etc. It also goes onto developing the students' knowledge and skills leading to more

Turn Average students into “A” Students

LABTECH ACADEMY – GRADE AVERAGES as at July 2021

Overall Grade Averages Pre-Test = 50.2% and Post-Test = 93.5%

HVAC (4,853 Users)	Quiz: Squirrel Cage Motor 1 Phase Pre-Test (Real)	Quiz: Squirrel Cage Motor 1 Phase Post-Test (Real)	Quiz: Cold Room Refrigeration Pre-Test (Real)	Quiz: Cold Room Refrigeration Post-Test (Real)	Quiz: Accumulator Pre- Test (Real)	Quiz: Accumulator Post- Test (Real)
Averages	5.07	9.86	4.54	9.61	4.22	9.38

Basic Electrical (6,954 Users)	Quiz: Squirrel Cage Induction Motors, 3 Phase Pre-Test (Real)	Quiz: Squirrel Cage Induction Motors, 3 Phase Post-Test (Real)	Quiz: Basic Low Voltage Electricity Pre-Test (Real)	Quiz: Basic Low Voltage Electricity Post-Test (Real)	Quiz: DC Motors Pre-Test (Real)	Quiz: DC Motors Post-Test (Real)
Averages	4.86	9.57	6.45	9.22	4.11	9.08

Automotive (6,258 Users)	Quiz: Hybrid Fundamentals Pre-Test (Real)	Quiz: Hybrid Fundamentals Post-Test (Real)	Quiz: Hybrid Transaxle Pre- Test (Real)	Quiz: Hybrid Transaxle Post-Test (Real)	Quiz: Hydraulic Power Steering Pre-Test (Real)	Quiz: Hydraulic Power Steering Post-Test (Real)
Averages	4.99	8.96	5.13	9.12	5.82	9.18

- **Maximum Impact through Digital learning**
 - \$1 investment in Digital learning gives the same impact on learning as \$10 traditional building approach.
 - It is **Quick and scalable**, can uplift training across classes, schools and the country.
 - Can provide an update to older schools
- **Improved Student Comprehension**
 - Students learn from engaging and detailed content which improves their understanding and retention
 - Better comprehension of fundamentals improves skills training and reduces time to learn in the lab.

- **Blended learning Lower Costs by 50 to 75%**
 - Redesigned labs for digital learning
 - Less equipment, different equipment
 - Digital upgrade is equivalent to a physical lab upgrade
- **Better Teacher Support**
 - Reduces Workshop or Lab time for students
 - Frees up teacher's time to mentor students
 - Enables teachers to train more students
 - Increased capacity of labs and schools

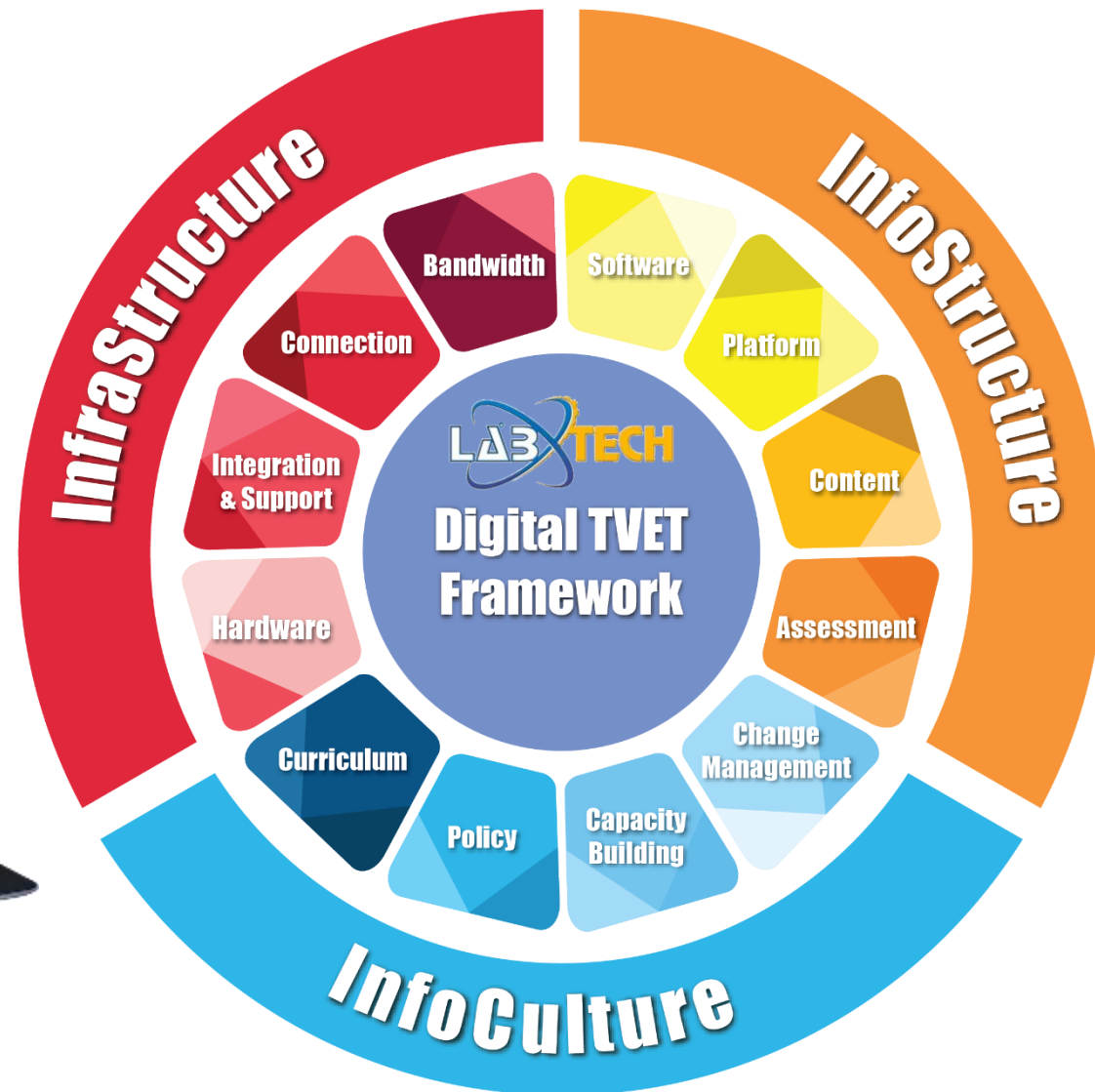
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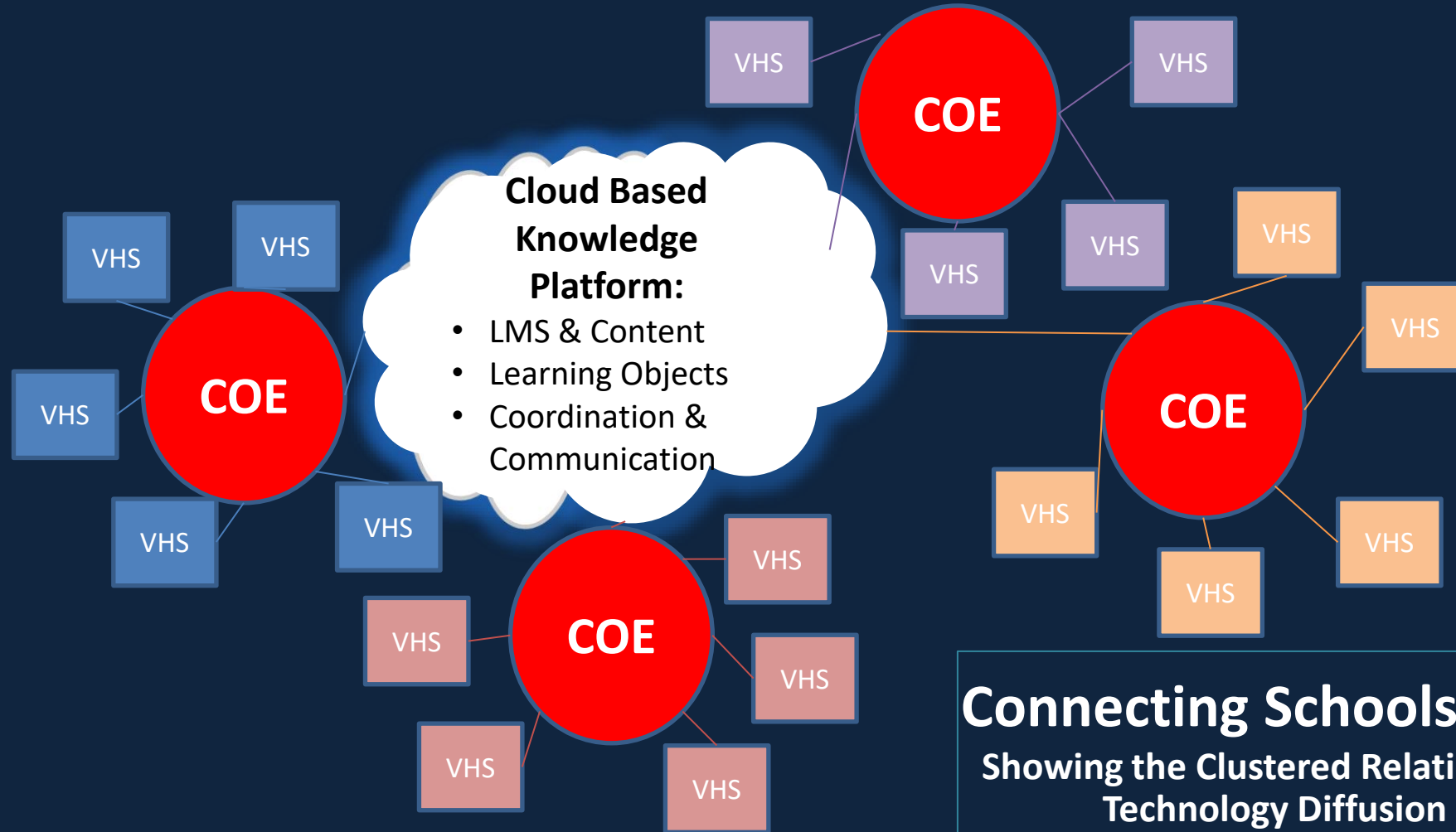
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Its not about Hardware any longer, it is about content and delivery platforms and Capacity building.

Remember digital learning will require a continuous development process and it will develop over time. It can be done step by step within your resources



Cluster School Concept using Digital Technology



Connecting Schools Together

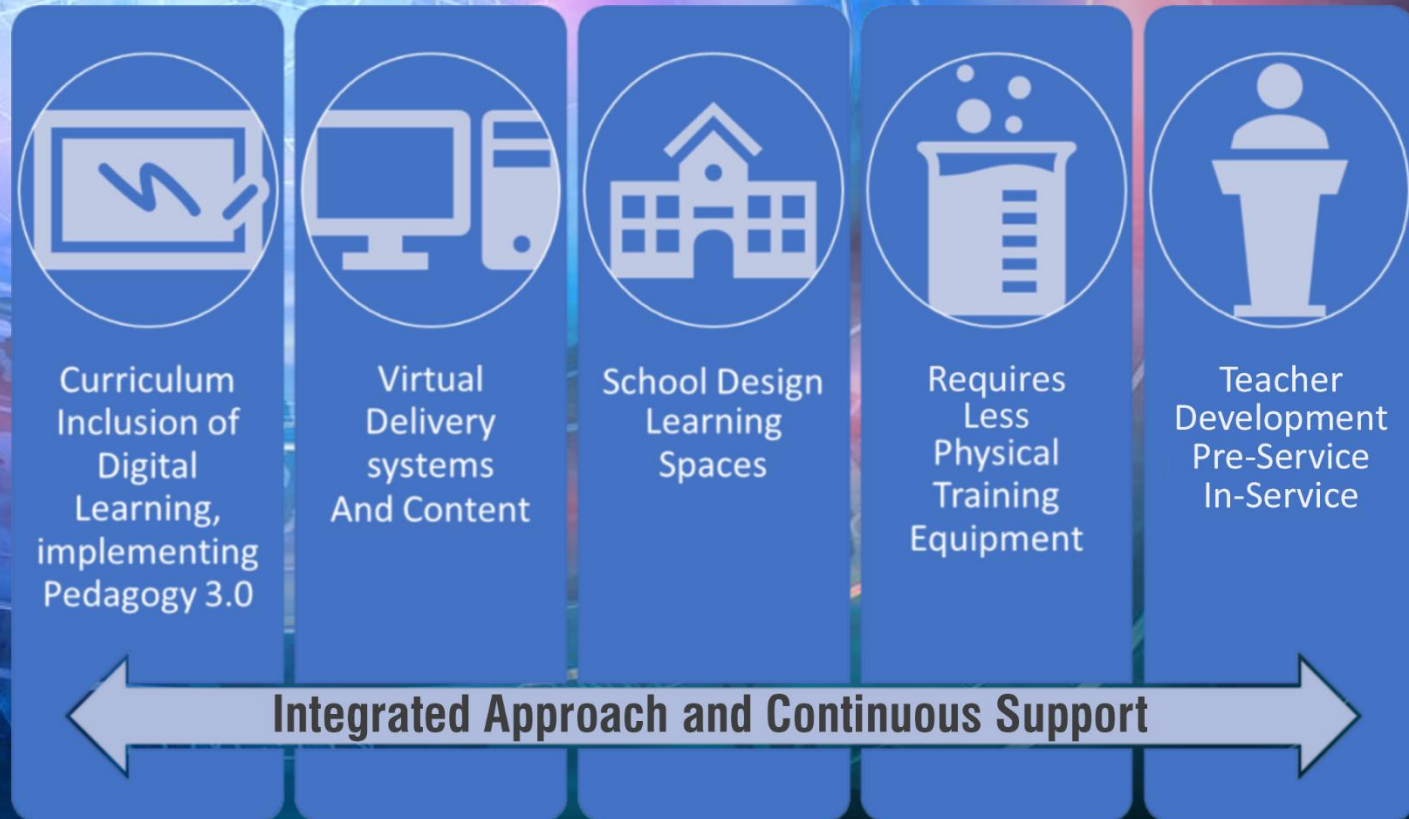
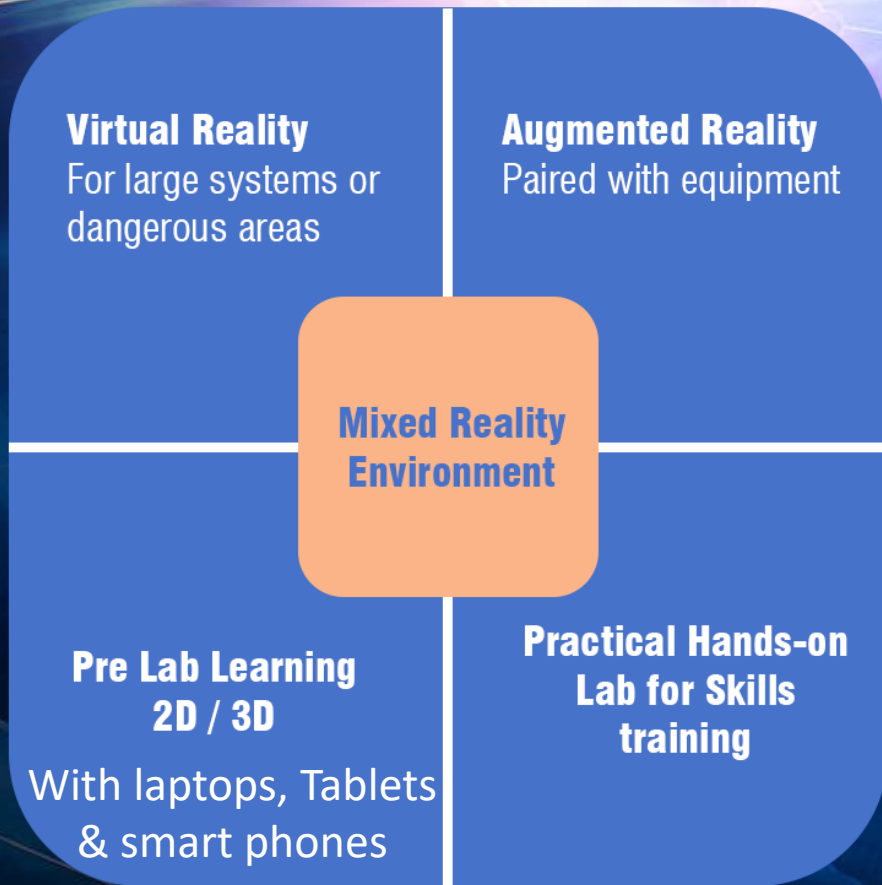
Showing the Clustered Relationship With a Technology Diffusion Model

COE – Mother school or Model School

VHS = Vocational High School or Satellite School

NEW ARCHITECTURE

ENHANCED LEARNING POTENTIAL



FLEXIBLE IMPLEMENTATION OPTIONS



Teacher Led

1 to Many
Class Group
Learning



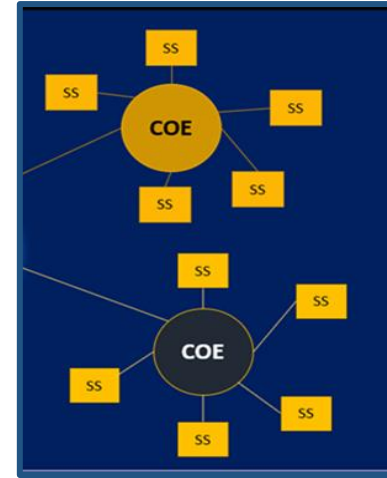
Mobile Class

Mobile Trolley
or Case
1 to 1
Student
Learning



School Wide

Local Network
1 to 1
& Teacher Led
Learning



Cluster School

Multi Campus
1 to 1
& Teacher Led
Learning



CLOUD Based

Link to CTE
LMS & Sync
1 to 1
& Teacher Led
Learning

OUR GOALS SHOULD BE: Enhanced Student Learning Potentials

IR – 4.0 applied to Learning

New Generation of Interactive Digital Learning

- **Self Paced – Differentiated & Adaptive materials and courses**
- **Enhanced & Quicker & Deeper Learning**
- **Recognition of Prior Learning**
- **Flexible (Non-Linear) Learning pathways**
- **Strengthens Fundamental Concepts**
- **Skills Cluster Approach – Cross Training**
- **Formative Assessment tools for Competency as part of the learning process**
- **Learning on Demand: anywhere and anytime**
- **Learning process more similar to work**
- **Moving beyond time-based education to performance or competency based.**

For Use by Whom, When

- For Institutions to use for their students and bridging apprenticeships with Industry
- For Adults for Life-Long Learning
- For Teacher upgrading on new technologies
- For Industry – For upgrading Staff –
- Up-Skilling and Re-Skilling for those out of work





6 ° 39'

Left (-)

Right (+)

Virtual Reality - VR



PLATFORM - TVET LEARNING MANAGEMENT SYSTEM (LMS)

- Fully loaded TVET LMS Platform designed for TVET learning
- Easy navigation through topics and courses
- KPI to monitor student's performance
- Non-linear learning so students can be sequenced in multiple ways
- **Can be mapped to existing curriculums**
- Designed for learning anywhere and anytime
- Teaching through visualization of complex topics
- **Interactive 3D gaming technology with many simulations**
- Photo realistic images and simulations
- **Innovative formative and summative assessments**
- Grade reporting and certificates of completion
- Extensive information and analytics built-in
- **Runs on multiple devices (smartphones, tablets, laptops and desktops)**
- **LTI compliant so can be incorporated into existing LMS platforms**





Electric Motor and Generator

Electrical Motor
 Electrical Generator
 Regenerative Braking Cooperative

Diagram Sine Wave

Frequency (f) 40 Hz

Synchronous speed 2400

Steps

Pole (p) = 2

Panel Diagram Electric Motor and Generator

Power Control Unit (PCU)

INVERTER

Power Split Device

MG1

MG2

Battery Recharging

After the Engine runs, ECM (Engine control module) sends signal to HV ECU in order to indicate the engine is running properly. HV ECU then sends signal to PCU to stop the HV Battery supplying power to MG1 and MG2. MG1 is then driven by the engine, rotates as generator. The electric power generated by MG1 is routed to MG2 through the inverter inside the PCU. Now MG2 is receiving power from MG1. MG2 rotates and provides additional motive force to the Power Split Unit.

Series-Parallel Hybrid System

SpeedoMeter: 86 KM/H, 76% [Battery]

[Engine] [Motor]

READY

Cruising Mode

High fuel efficiency operation using the engine as the main power source. Engine power is divided between two systems by a power split device. One of these systems drives the generator to produce electricity, which in turn drives the motor. The other directly powers the wheel. The relative power distribution between the two systems is controlled to ensure maximum efficiency.

Series-Parallel Hybrid System

HV Battery

Generator

PCU

Motor

Reduction Gear

Hybrid Driving Mode Operations

- Startup Mode
- Rapid Acceleration and Uphill
- Deceleration or Braking
- Battery Recharging
- Vehicle Stationary

● Mechanical Power
● Electrical Power

Valve Timing Diagram

Valve Trains

Animation Speed

Low Speed | High Speed

VT-I Operation Angle

VT-E Operation Angle

TDC

BDC

I/V O

E/V O

I/V C

E/V C

Description		
Operation State	Objective	Effect
At medium load	Elimination overlap to reduce blow back to the intake side	Improved to medium speed range

Learning through Applied Technology

**FINISH with
Employable
Skill**

**Psychomotor
Practical**

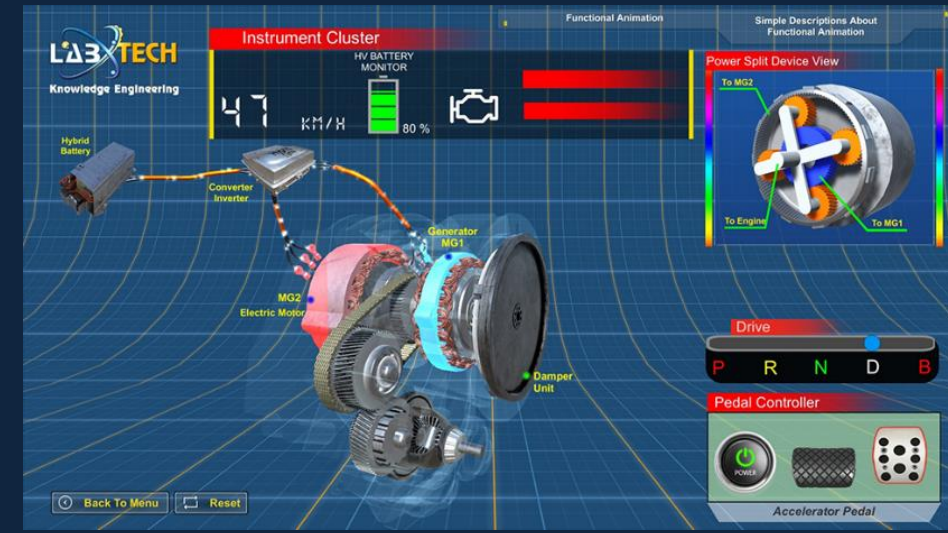
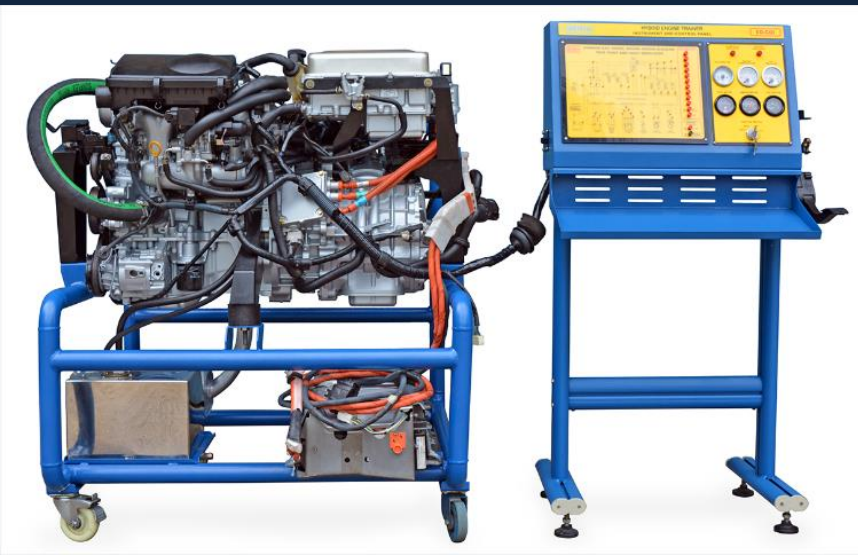
Higher Order Thinking Skills (HOTS)

Affective



**Cognitive
Theory**

**START with
Zero
knowledge**





Combined Learning – Physical, AR, VR, 2D/3D – Learning program for Toyota Prius - Hybrid Vehicle technology



What our users are saying ...

"Learning here in Labtech Academy is great experience and helps you a lot to gain more knowledge and actual experience for the 3D design they impose for all the lessons they provided. Great Job Labtech Academy."

Teacher, PAKISTAN

ANY TIME

Biomedical Technology, HVAC, Electrical Technology, Electronics, Green Technology, Computer and Network Technology, Automotive

Welcome to the new Labtech Academy. Labtech is one of the largest technical education (TVET) providers in the world established since 1990. This online learning site features a new generation of advanced interactive and graphic rich content for technical and vocational education subjects.

It is meant to be used by individual learners that may be already taking courses at their local institutions. It can also be used for reskilling for a new job or even if you are just curious and want to acquire new knowledge and skills.

Teachers can also use this site to supplement their existing learning materials for their students.

ENJOY YOUR LEARNING EXPERIENCE !

Hybrid Vehicle Fundamental

LABTECH Knowledge Engineering

Cruising Mode
High fuel efficiency operation using the engine as the main power source. Engine power is divided between two systems by a power split device. One of these systems drives the generator to produce electricity, which in turn drives the motor. The other directly powers the wheels. The relative power distribution between the two systems is controlled to ensure maximum efficiency.

Speedometer: 77 KM/H, 76% (Battery)

Series-Parallel Hybrid System

Hybrid Driving Mode Operations

Startup Mode, Rapid Acceleration and Uphill, Deceleration or Braking, Battery Recharging, Vehicle Stationary

LABTECH Knowledge Engineering DC Motors

Brush Holder, Stator Core

$E_b = V - I_a R_a = 148.8$ Volt
 $N = K_1 \frac{E_b}{\Phi} = 577$ rpm
 $T = K_2 \Phi I_a = 116.1$ Nm

1. $R_{sh} = 110$ Ohm
 2. $R_a = 0.25$ Ohm
 3. $I_L = 48.6$ A
 4. $V = 160.6$ V
 5. $Z = 782$ conductors
 6. $P = 4$ poles
 7. $A = 4$ parallel paths
 8. Flux per pole = 0.02 Weber

Graphs: % Rated Torque vs % Rated Speed, % Efficiency vs % Torque (to rated value)

www.labtech-academy.com

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