Technology-Enabled Innovation in Education in Southeast Asia (TIESEA)

EdTech interventions proposal

June 2022

ADB

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LearningPossibilities

TECHNOLOGY- ENABLED INNOVATION IN EDUCATION IN SOUTHEAST ASIA (TIESEA) – EDTECH DIAGNOSTICS AND INTERVENTIONS SUPPORT

EDTECH INTERVENTIONS PROPOSAL

TA-6671 REG - CONTRACT N° 167252-S53987

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ABDD	area-based and demand driven
ADB	Asian Development Bank
AI	Artificial intelligence
CAR	Competence Assessment Rating
CHED	Commission on Higher Education
DepEd	Department of Education (Philippines)
DG	Director General
DIT	Department of Information Technology
DOET	Department of Education and Technology (Viet Nam)
EdTech	Education Technology
F2F	Face-to-face
FGD	Focus Group Discussion
FLD	Flexible Learning Delivery
GSED	General Secondary Education Department (Cambodia)
HDD	Hard Disk Drive
HOT	Higher Order Thinking
IBL	Inquiry-Based Learning
ICDL	International Computer Driving License
ICT	Information And Communications Technology
IDR	Indonesian rupiah
IELTS	International English Language Testing System
IOS	iPhone Operating System
ITB	Institut Teknologi Bandung
IT-BPM	Information Technology-Business Process Management
KAPE	Kampuchean Action to Promote Education
LMS	Learning Management System
MC	Merdeka Curriculum

MMP	Merdeka Mengajar Platform
MOECRT	Ministry of Education, Culture, Research, and Technology (Indonesia)
MOET	Ministry of Education and Training (Viet Nam)
MOOC	Massive Open Online Courses
MoEYS	Ministry of Education Youth and Sport (Cambodia)
MRTOP	Multi-Regional TESDA Online Programme
NFP	National Focal Point
NGO	Non-Governmental Organization
NGS	New Generation School
NITESD	National Institute for Training Education and Skills Development
OECD	Organization for Economic Cooperation and Development
OS	Operating System
PBL	Project-Based Learning
PHP	Philippine peso
PISA	Program for International Student Assessment
PV	PhotoVoltaic
RACHEL	Remote Area Community Hotspot for Education and Learning
SEAMOLEC	SEAMEO Regional Open Learning Centre
SES	Socio-Economic Status
SMP	Sekolah Merdaka Penggerak
SMPN	Sekolah Merdaka Penggerak Naringgul
SSD	Solid-State Drive
STEM	Science, Technology, Engineering, Mathematics
TA	Technical Assistance
TESDA	Technical Education and Skills Development Authority (Philippines)
TIESEA	Technology- Enabled Innovation in Education in Southeast Asia
TOP	TESDA Online Program
ToW	Tablet-on-Wheels
TTI	TESDA Technology Institutions

TVET	Technical and Vocational Education and Training
TVI	Technical-Vocational Institutions
TWSP	Training for Work Scholarship Program
UPS	Uninterruptible Power Supply
USD	United States Dollar
USESDP	Upper Secondary School Education Sector Development Project (ADB – Cambodia)
UTPRAS	Unified TVET Program Registration and Accreditation System
VND	Vietnamese Dong

INTRODUCTION

Educational Technology (EdTech) has the power and capacity to significantly enhance teaching and learning for students in all parts of the world. Online, and digitally-enhanced, learning provides a new dimension that offers potentially unlimited opportunities; but, as we learnt during the COVID pandemic, these opportunities are unevenly spread. As a result of school closures, coupled with poor infrastructure, we know that many children in middle-income countries suffered almost two years without access to any form of tuition.

The Technology-Enabled Innovation in Education in South-East Asia (TIESEA) is a two-year multi-country program funded by the Japan Fund for Prosperous and Resilient Asia and the Pacific through the Asian Development Bank (ADB) and implemented by a joint venture between IBF International Consulting and Learning Possibilities. Aimed at piloting EdTech devices both in school and at home for students and teachers at secondary school level in order to assess the extent to which EdTech devices can be used to improve the learning and teaching quality among target students and teachers in the pilot school and community.

The TIESEA project, therefore, has an overriding ambition of proposing EdTech solutions in the four partner countries that are relevant, realistic, scalable, and sustainable; and which serve to bridge rather than deepen the digital divide. A common feature across all the country profiles is weak, unreliable, and uneven access to internet connectivity, especially in non-urban locations, and poor availability of EdTech devices for students.

Accordingly, in most interventions, at least part of the proposed solution is through providing rich and comprehensive learning resources through content-rich “internet in a box” with local distribution networks for universal access, where there is poor internet access. In most proposed cases the student devices are low-cost and durable tablets and cellphone handsets.

Through trialing the proposals in some of the most challenging environments, the hope of the project team is that there will good demonstrations of how technology-enhanced learning can be promoted and experienced by learners in all conditions. In this way, the TA team aims to show how scalability can be achieved through innovative technology applications and sustainable funding mechanisms that involve the private sector.

The country-level eReadiness assessments already conducted by the in-country experts of the TIESEA Technical Assistance (TA) team have identified the following national needs:

- In Cambodia, a need to use EdTech effectively to promote STEM and resource-based, student-centered education.
- In Indonesia, a need to find a mechanism through which schools in areas with limited Internet connectivity can join the rest of the country in adopting *Kurikulum Merdeka* (the recently launched, Freedom to Learn curriculum).
- In the Philippines, a need to find a mechanism through which vocational education can be extended to underserved areas of the country supporting youth in those areas to become skilled and work-ready.
- In Viet Nam, a need to equip students to be able to communicate effectively in English in an increasingly global society.

The challenge for the TIESEA project is to identify and test solutions to these challenges. Educational contexts are always complex. It is never possible to anticipate all of the obstacles and enablers that will impact the outcomes of an intervention in this sector. For that reason, it

is prudent to field test an intervention on a small scale prior to rolling it out across a country or region. This then is the function of the TIESEA TA project.

The TA team is currently in the process of finalizing intervention plans for each country. The interventions will be closely monitored through regular consultations with all stakeholders. The implementations, being small-scale field tests, give the project the flexibility to adjust the intervention as unintended impacts or unanticipated influences become apparent over the course of the trial. At the same time, the judicious selection of a counterfactual (control) to each treatment group will provide a sound basis on which to interpret findings such as improved test results or higher completion rates. While the small sample sizes involved in the trial may not support a robust statistical analysis, nor a consistently reliable experimental or even quasi-experimental design, pilot interventions will be undertaken with multiple treatment groups (classes / schools / institutions) so that co-variant factors such as teacher motivation, parental involvement, and institutional leadership can be controlled to the extent possible. A pre and post-test approach across both treatment and control groups will be adopted to provide further confidence that any differences that emerge can be attributed to the EdTech intervention rather than parallel influences such as increasing student maturity over time or exposure to other government/NGO programs.

It is expected that differences between treatment and counterfactual/control groups will become apparent and the scale of these differences and the confidence with which they can be traced back to the intervention itself, will be the basis on which scaling up of the initiative will be recommended, or further field trails advised. If scaling-up is recommended, the in-depth qualitative analysis of factors influencing outcomes will support a robust design for the larger-scale intervention.

Recognizing that an intervention that may be successful in one context will not necessarily be successful in a different context, TIESEA monitors will be careful to fully document the specific context within which each intervention takes place. For the most part, this is not anticipated to be an issue, since the context has been determined by the challenge identified in each country. For instance, the intervention in Indonesia addresses a gap in the national strategy for scaling up *Kurikulum Merdeka* which is highly dependent on schools having reliable Internet connectivity. Hence the intervention targets a locality with poor or no connectivity and any recommendations made are, in the main, only relevant to similar contexts.

TIESEA is first and foremost an education project yet focused on ways to improve learning outcomes through the use of scalable and innovative application of technologies, which, in themselves are only applicable through the adoption of more open and modern teaching methodologies that are less teacher-centric than are mostly seen in this region. Yet at the heart of the project is an infusion of innovative technologies that will better assure meeting proposed goals. It is crucial to note that TIESEA attempts to follow as much as possible the Digital Principles www.digitalprinciples.org in an effort to reduce waste and increase efficiency in tech for development implementation.

The project has not taken a one-size-fits-all approach to solving the identified key concerns in each of the four countries. As each has a final specific goal that is shared, the approaches are tailored to a unique set of variables per country, but there are commonalities across all the proposed pilots.

As per the four cases outlined, each requires a slightly modified set of innovative technology that is designed specifically to meet or exceed goals.

A. In Cambodia, there is a national interest in the promotion of STEM, student-centered and resource-based education thus the pilot will focus on providing professional development and delivering digital content (via RaspberyPi/RACHEL devices eg. phet.colorado.edu etc…) that assists in learner development in those key skills and providing a supportive and ongoing teacher professional development program to promote teaching styles that are less directive, allowing students independently to explore and develop their expertise with the digital resources.

Table 1: Key technologies to be deployed in the Cambodia pilot

Learner devices	security/charging	facilitators	content	connectivity
~11inch tablet computers at a ratio of 1 device per learner	Locking mobile charging carts to reduce theft, damage and ensure units are kept charged	14inch laptop computers at a ratio of 1 device per facilitator	Mini offline servers running a locally designed and developed offline elibrary	Offline, minimal internet used in the pilot

B. In Indonesia, TIESEA will pilot the implementation of Merdeka Mengajar (LMS platform focused on the new curriculum which introdu21st-centurytury skills and modern approaches to learning). The main infrastructure challenge r a much of the country is access to broadband speed internet in rural/remote locations, therefore this pilot will focus on "offline" solutions that provide rich resources in a controlled digital environment that does not limit student access to digital learning materials.

Table 2: Key technologies to be deployed in the Indonesia pilot

Learner devices	security/charging	facilitators	content	connectivity
13.3inch laptop computers at a ratio of 1 device per learner	Locking mobile charging carts to reduce theft, damage and ensure units are kept charged	13.3inch laptop computers at a ratio of 1 device per facilitator	Mini offline servers on the Raspberry pi 4 running Kolibri (digital library and basic LMS)	Offline, minimal internet used in the pilot

C. In the Philippines, TIESEA will partner with TESDA (Technical Education and Skills Development) to deliver a digital version of a ~250-hour photovoltaic solar panel installation course. There are two modalities of delivery to be examined where the exact same course will be accessed through an existing online learning portal called the TESDA Online Portal (TOP) and at the same time the project will provide an offline version of the exact same course using mini-servers accessible at a set classroom location in hard-to-reach localities with the absence of broadband internet.

Table 3: Key technologies to be deployed in the Philippines pilot

Learner devices	security/charging	facilitators	content	connectivity
~11inch tablet computers at a ratio of 1 device per learner	Locking mobile charging carts to reduce theft, damage and ensure units are kept charged	Laptops to help them monitor student progress and develop materials	Mini offline servers on the Raspberry pi 4 running Moodlebox and through an online portal	Half of the pilot sites will access materials offline and the other half will access online

D. In Viet Nam, the focus will be on communicative approaches to English language learning with and without EdTech enhancement. TIESEA has partnered with ELSA speak, a leading provider of online English learning apps and fully featured teacher dashboards (student metrics). Unique in the Viet Nam pilot will be the use of lower-cost smartphones (30% savings) over tablet and laptop computers. Also unique for Viet Nam will be a fully online delivery modality as unlike the other countries Viet Nam has, in general, a relatively well-developed internet and telecommunications infrastructure thus allowing this model of program delivery.

Table 4: Key technologies to be deployed in the Viet Nam pilot

Learner devices	security/charging	facilitators	content	connectivity
~6.5inch smartphones at a ratio of 1 device per learner	Devices will be in the possession of the learners at all times	Laptops to help them monitor student progress through online dashboards	Partnership with the software company ELSA to deploy their English learning app and sophisticated teacher dashboard	Online – the pilot will provide mobile data SIM cards for all devices with sufficient data balances

1. PILOT INTERVENTION IN CAMBODIA

1.1. Pilot Project Overview, Rationale and Justification

The TIESEA Cambodia e-Readiness Country Report presented in February and March 2022 during the National and Regional EdTech Workshops, identified four common themes. These were:

1. The low levels of ICT literacy and digital capacity of teachers, indicating a need for extensive professional development dealing with the 'pedagogy of EdTech' – not just operational training on the use of ICT (as in computer literacy/International Computer Driving License (ICDL)- type training)
2. Limited or very poor access to devices in the classroom for teaching and learning with ICT; for example, only 1 in 17 schools in Cambodia has a computer lab
3. Poor or zero connectivity to the internet across much of the country, and therefore, inaccessibility of online digital resources
4. At a curriculum level, very little cross-curricular integration of EdTech into schemes of work and lesson planning.
    - about **5%** of the teachers surveyed create PowerPoint slides for teaching purposes on a weekly to daily basis
    - **12%** said they create videos on a weekly to daily basis
    - More than **70%** of the respondents said they 'rarely' or 'never' create online assessments/quizzes for students
    - more than **76%** of the surveyed teachers do not use email or file sharing tools (e.g., Google Drive, OneDrive, Dropbox) regularly
    - not all teachers seem to have access to a personal computer regularly to be able to effectively use a file sharing system.
    - most tend to use social messaging apps such as Telegram or social media apps such as Facebook to share files among themselves or with students
    - **40%** of upper secondary schools have access to the internet; in most of the cases, the internet is solely used for school administration purposes.

These factors have influenced the choice of proposed interventions which are aimed at addressing some of these shortcomings. A common theme emerging across all the TIESEA interventions is the use of low-cost local digital content servers (rich in digital resources, often STEM-based) with local WiFi capability (e.g. a Raspberry Pi / RACHEL local content server) and low-cost student devices – eg. Chromebooks, tablets and/or smartphones) and this model is also well suited to address the issues outlined above.

1.2. Objectives

The objective of the project is to professionally develop teachers, generally, in the use of more student-centered learning techniques and, specifically, in the effective use of EdTech and resource-based learning. The pilot intervention will test EdTech device utilization both in school as well as at home by students and teachers in order to assess the comparative

advantage to students of access to EdTech devices beyond the school day. The focus will be on STEM (Science, Technology, Engineering and Mathematics) and resource-based, student-centered learning in lower secondary education. A control school will serve as basis for evaluating teacher behaviors and student learning outcomes. In this school there will be no technology intervention.

1.3. Pilot Project Hypothesis

For teachers and learners to benefit from the opportunities afforded through access to digital resources, the deployment of the EdTech assets (devices, digital resources and pre-loaded apps) requires there must be a shift in pedagogic practice. Teachers must become more skilled and capable of integrating digital episodes into their lessons, and learners must develop their own learning skills to be able to use digital assets productively. This is in contrast to the highly directive classroom practice seen in Cambodian classrooms, in common with the practice of most teachers in the region[1].

For this reason, the deployment of the EdTech assets will be accompanied by a comprehensive professional development programme on student-centered pedagogic practice and resource-based learning.

Based on an early evaluation of a pre-existing ToW deployment program in Cambodia in Upper Secondary Schools, it is hypothesized that only providing access to Raspberry Pi / RACHEL and other materials and apps during class time will have suboptimal outcomes and that allowing students to take tablets home with them while simultaneously providing them with an affordable means of accessing digital resources from home and appropriate teacher direction will promote learning beyond what can be experienced in the classroom.

Accordingly, the design of the pilot will allow one group of students (the treatment group) to take their tabs home where they will have access to affordable Internet bandwidth while a second group of students (the comparison group) will continue to experience a learning environment similar to that provided by the Tablet-on-Wheels program[2].

Research questions are as follows:

- Are teachers who are provided with targeted professional development based on learner-centered and resource-based learning more accomplished practitioners able better to promote student achievement and progress?
- Do students who have access to EdTech assets and resources both in and out of the school day have better learning outcomes than those whose access to the assets is restricted to lesson times only?
- Are there any associated benefits to the school as a whole and the wider learning community from having i) targeted professional development ii) unrestricted access to EdTech resources at school and home?

[1] Newman,K. and Gentile, E. How Teachers Teach: Comparing Classroom Pedagogical Practices in the Asia and Pacific Region. ADB, 2022. https://tiesea.org/how-teachers-teach-comparing-classroom-pedagogical-practices-in-the-asia-and-pacific-region

[2] This program, part of the ADB-funded USESDP1 project, distributed suites of tablet computers to 50 designated Secondary Resource Schools in all parts of the country, with a focus on STEM learning

- What differences in teacher professional practice and in student learning outcomes are evident when comparing schools where there has been a technology intervention and schools with no technology-enhanced teaching and learning.

1.4. Pilot project description

The current proposed project site is in Kandal province, Saang district. The project schools will include Koh Khel and Khao Khsach Tunlea lower secondary schools. The latter is located on a small island community north of Phnom Penh where our local partner KOOMPI is installing, across the community, a solar-powered WiFi 'mesh' network which would allow students to access the Internet from home, at no cost. The schools are located about 40km from Phnom Penh capital city.

Picture 1: Google (2022). Koh Khel Secondary School and Kaoh Khsach Tonlea. Available at: http://maps.google.co.uk

70 STEM students (two class groups) of Khao Khsach Tunlea lower secondary school will have the ability to take their tabs home with them where they will be able to access the Internet through the mesh network. Meanwhile, the 70 STEM students at Koh Khel (again two class groups) will have access to shared devices during class time. Tablet devices will be pre-installed with selected Apps that have content relevant to education in Cambodia. Content will be sourced from MoEYS and other education providers. TIESEA will install WiFi networks in both treatment and control schools for students to be able to use content in these Apps and

to access other educational content that might be needed to complete class exercises or STEM projects.

Eight STEM teachers (four from each school) will be equipped with laptops and participate in professional development workshops to enhance their STEM teaching practice and their skills in using ICT resources to promote learning. With regard to STEM, workshops will cover best practice STEM teaching methods including how to create a motivating STEM project. Depending on existing levels of expertise, workshops may also cover using Google Drive, installing Apps on teacher laptops and in student tabs, and effective web search approaches. The training will be conducted by a local NGO (KAPE) that supports the New Generation School (NGS) project in Cambodia. In order to help teachers and school principals to better understand how STEM subjects are taught in real classrooms and how students can work together for their STEM project research, one-day visits to NGS in Phnom Penh will be organized.

Teachers and school principals from the two schools will also be trained on how to use the monitoring forms and data forms to record data which, later, will be used for the final assessment of the project. A third school, being a comparable Junior High School in Kandal Province, will be selected, using matching criteria, to act as true control, where there will be no technology enhancement.

Finally, parents and other stakeholders will also be provided with an orientation on the project implementation so that they can support their children in their learning both at home and at school.

The project is being implemented in Cambodia with financial and practical support from country-based commercial partners as follows:

1) KOOMPI a commercial partner who will install Wi-Fi across community and schools and will provide training to students on the use of EdTech devices.
2) DIT and GSED from MoEYS will jointly monitor the project and provide necessary support on accessing schools.
3) KAPE (Kampuchean Action to Promote Education) will support teacher training on STEM and student center learning with the involvements of NGS (New Generation School) in Phnom Penh.

1.5. Expected Outputs

As the result of this pilot intervention, changes are expected in the knowledge, behavior, and practice of EdTech device utilization in teaching and learning, related to STEM subjects.

Specifically, the expected project outputs in Cambodia are:

- Enhanced ability of teachers and students to use EdTech tools to teach and to learn
- Heightened awareness of useful Apps and online resources for learning
- Evidence of independent learning skills
- Improved academic results in STEM

1.6. Budget

Proposed Distribution of Project EdTech Resources with costing:

Item	Specification	Qty	Price (USD)	Total (USD)	Links
Laptops for admin	Intel Celeron N4500 Window 10 (64Bit) 8GB DDR4 (3200MHz) 256GB M.2 PCIe NVMe	2	409	818	Acer Swift 1 SF114-34-C0W6 Silver – PTC Computer (ptc-computer.com.kh)
Laptops for teachers	Intel Celeron N4500 Window 10 (64Bit) 8GB DDR4 (3200MHz) 256GB M.2 PCIe NVMe	8	409	3272	Acer Swift 1 SF114-34-C0W6 Silver – PTC Computer (ptc-computer.com.kh)
Tablets for students	Galaxy Tab A7 Lite 8.7 ″ 2021 Spec Storage: 64GB, 4GB RAM Network: 4G Screen Size: 8.7 Inches OS: Android 10, One UI 2 Battery: Li-Po 7040 mAh,	140	220	30800	https://angkormeas.com/product/galaxy-tab-a7-lite-3/
Content Server Keeping education content for teachers and students use	CPU: Intel Gemini Lake Refresh J4125. Ram: DDR4 8GB Storage: 128GB NVMe SSD Content Storage SSD: 2TB/ 4TB SATA SSD WIFI: WIFI module	2	500	1000	https://www.koompi.com/koompi/mini/specs
Mobile charging cart for tablets	Device It Holds: 40 Outside Dimensions: 24”w x 24.75”d x 46”h. Cart Weight: 189 lbs	4	409	1636	Mobile Charging Cart for Tablets Chromebooks iPad Laptops 30-Device || Toolots
Data projector for teacher and students to use for projecting their work to whole class	Projection Technology 3LCD Native Resolution 1024 x 768 (XGA) Contract Ratio 16,000:1 Brightness 3600 ANSI Lumens Lamp Life 6000 hours normal / 12000 hours eco	2	400	800	https://ptc-computer.com.kh/product/3lcd-projector-epson-eb-x06-business/
UPS	– Capacity: 650VA	4	35	140	UPS Prolink 650VA PRO700SFC – PTC Computer (ptc-computer.com.kh)
WiFi Router - access to content server (2 per site)	Wireless Output Power 2.4GHz: up to 20dBm 5GHz: up to 23dBm	4	58	232	Router Linksys E1200-AP N300 Switch Wireless-N – PTC Computer (ptc-computer.com.kh)
Total				**$ 38,698.00**	

1.7. Activities (timeline)

To achieve the expected outcomes, the following implementation plan will be followed:

Time	Key activities
January 2022	Connecting the project with relevant ministries and government agencies to get official support and collaboration from Cambodia MoEYS, including the Department of General Secondary Education, Department of Information Technology and other relevant departments within the MoEYS.

January 2022	Looking for commercial EdTech partners in Cambodia to deploy projects;
April 2022	Working with commercial partners to agree on what interventions activities to be implementing
April 2022	Visit potential schools meeting with school directors to discuss the possible pilot project.
April 2022	Pilot project proposal development.
April 2022	Meeting with international experts to discuss the possible interventions and M&E.
May 2022	Gather necessary data from schools and community.
May 2022	Coordinate with the DIT, commercial partners and schools to decide what activities to be implemented at school level. Conduct semi-structured interview with teachers at Koh Khel Secondary school to select teachers for participation in the pilot.
May 2022	Revise project proposal and submitting for approval.
June-July 2022	Install necessary equipment & conduct orientation on the project interventions to homeroom teachers and other relevant implementers.
June-July 2022	Provide orientation to both students and their parent in treatment and control schools on the project implementation.
August 2022	Starting the implementation of procurement activities, installation of hardware equipment, software, lecture content and electronic lesson plans for teachers and students, along with training for teachers.
September 2022 to July 2023	Continue to provide support and monitoring the implementation of the program in the school, provide additional training for teachers and students if necessary, maintain equipment and guide the effective use of software;
July 2023	Summarize the student's learning results at the end of the school year and noticeable improvements in teacher training activities according to specific, objective criteria.
July 2023	Provide a recommendation report to MoEYS on the effectiveness of program implementation and scalability modality.

1.8. Monitoring and Evaluation

In the treatment group (Khao Khach Tunlea Lower Secondary School) there are 8 teachers and 67 students in grade 8 who study STEM and will be joining the pilot project. In the control group (Koh Khel Secondary school) there are comparable number of teachers and students in grade 8, however, the same number will be taken (70 from treatment and 70 from control group) for joining the project. As far as possible, classes at Koh Khel Secondary school will be selected so that teacher experience, qualifications, and confidence and motivation to use ICT in teaching will match that of teachers selected for the intervention at Khsuch Tunlea (based on the findings from a pre-intervention semi-structured interview). If possible, the intervention will aim for gender parity in the two student groups. Since experimental or quasi-experimental approaches are not used to select the sample, a difference-in-differences approach will be adopted to the study design. This will involve pre-test and post-test for both groups at baseline and endline. A matched school, in Kandal Province, will be selected to evaluate the added value provided by the technology interventions.

As part of a process evaluation to support and inform the final impact evaluation, regular monitoring visits will be undertaken which will involve teacher, parent and school leader interviews, student FGDs and classroom observations. The objective of these visits will be to assess whether constructive use is being made of the tabs and the Raspberry Pi/RACHEL resources in class time, whether the teachers are working towards enhancing student creativity, collaboration and critical thinking skills in advance of doing the project, whether teachers in the treatment group are giving homework assignments which encourage students to access wider resources on the Internet, how students are using the tabs outside school hours and any challenges faced by either teachers or students. In addition to the post-test, the impact evaluation will be informed by student presentations of their project work and teacher and student reflections on the value of integrating EdTech tools into the learning environment.

Stakeholder involvement leads to stakeholder ownership, which is essential to the success of the project and acceptance of its results. The intervention will include Ministry of Education staff and others who have a stake in ICT in the assessment of results by making them part of the project partners, consulting them at key decision points. To reach a consensus on the targeted population the project will conduct a workshop with key partners and stakeholders on how to interpret data in their schools and a second workshop to present the findings of our research and intervention result.

In order to assess the outcome of the pilot, the classes that receive the devices will be expected to closely monitor the use of the tablet devices for teaching and learning in the STEM subjects. They will need to record their frequency of use of the EdTech assets, the subjects that are making most use of the tablets; the impact of the devices deployment on students' motivation, their quality of learning, their academic achievement. Additionally, teachers are required to complete a self-evaluation of their lessons using the tablets.

2. PILOT INTERVENTION IN INDONESIA

2.1 Pilot Project Overview, Rationale and Justification

The unprecedented global pandemic forced school closures requiring emergency remote learning. Teachers were required to deliver their materials at a distance supported by Education Technology (EdTech), while students were expected to have access to digital devices and skill in utilizing EdTech to learn at home with assistance from parents. Despite the unpreparedness of all stakeholders to deploy remote learning, the massive use of EdTech during the pandemic accelerated a global digital transformation in education provision.

In Indonesia, the transformation was applied at scale to 389,752 schools including madrasahs, 59,089,347 students, and 3,780,557 teachers[3]. Among the number are 58,773 junior high schools with 13,417,040 students, and 841,352 teachers. In addition, it also applied to 4,593 higher education institutions, 8,483,213 students, and 312,890 lecturers[4]. Even though the use of online learning had started before the pandemic era, it was progressing at a very slow pace. Thus, the pandemic has been a strong driver to push forward a digital transformation, especially in the education sector.

The assessment of Indonesia's EdTech readiness has been successfully conducted by the TIESEA project in-country expert with improving teachers' digital literacy being one of the recommendations made. In her recommendations, the in-country expert has emphasised that teachers need to implement student-centered learning facilitated by EdTech in a way that promotes learner-led instruction rather than technology driven. It is anticipated that the implementation of the EdTech intervention under TIESEA which will target better STEM[5] education, will prepare teachers for the implementation of student-centered learning, the innovative teaching of STEM, and the implementation of the *Merdeka* Curriculum. The *Merdeka* curriculum was introduced in February 2022 by the Ministry of Education, Culture, Research, and Technology (MOECRT). It is supported by digital learning tools hosted on the *Merdeka Mengajar* (Freedom to Learn) platform. The intervention will provide an opportunity for teachers in pilot schools to learn more about this valuable resource.

The intervention is to be carried out through a collaboration with public and private stakeholders, to optimize the intervention impact as well as promote the sustainability of project initiatives for wider audiences.

Based on the result of the consultative meeting with the MOECRT and ADB, it is expected that:

- Four schools will be involved in this project
    - SMPN 3 Naringgul: 8th grade students = 87, teachers = 19 (Ex), STEM teachers 3, 3 groups of Grade 8
    - SMPN 6 Naringgul: 8th grade students = 18, teachers = 8 (Control), STEM teachers 2, 1 group of Grade 8

[3] Publication of National ICT and Data Centre released February 2021, http://publikasi.data.kemdikbud.go.id/index.php?thn=2020
[4] Higher Education Statistics, 2020
[5] Science, Technology, Engineering and Mathematics

  - SMPN 8 Naringgul: 8th grade students =23, teachers = 7 (Ex), STEM teachers 2, 1 group of Grade 8
  - SMPN 9 Naringgul: 8th grade students = 57, teachers = 6 (Control), STEM teachers 3, 2 group of Grade 8.
- Two will be the experimental/treatment schools and the other two will be control schools;
- None of the schools are part of the transformational schools program (*Sekolah Penggerak*);
- They are in a remote area with limited or no connectivity and devices
- Grade 8 students will be the target of the intervention
- The village has been selected randomly from Cianjur District, and the schools have been selected randomly from the area surrounding the village.
- There will be ten STEM teachers and around 100 8th grade students participating in this intervention, supported by two Guru Penggerak SMP from Bandung. Additional participating teachers may also be provided by Microsoft as trainers and based on recommendations from the Cianjur education office.

For students of SMPN 3 and SMPN 9 Naringgul, class participation will be based on a comparison of students' STEM grades in the previous semester. The STEM's grade in the previous semester will be used to identify a high performing and a low performing class from the two schools to participate in the intervention.

To minimise any 'spillover' between the various control and treatment schools, any movement of students across and between schools will be monitored and reported in the project appraisal literature. The project team expects this to amount to less than 5% of the enrolled students and would not impact the learning outcomes of the entire chohort in the respective schools.

The tables below summarize numbers of participants.

First phase: Jan - March 2023 (3 months)

No	Components	Treatment/Experimental Beneficiaries	Control Beneficiaries
1	Number of Class (learning groups)	2	2
2	Number of STEM Teachers	5	5
3	Number of students	52 (29 from SMP 3 and 23 from SMP 8)	47 (29 from SMP 9 and 18 from SMP 6)

Second phase: April - June 2023 (3 months)

No	Components	Treatment/Experimental Beneficiaries
1	Number of Class (learning groups)	4
2	Number of STEM Teachers	10
3	Number of students	99

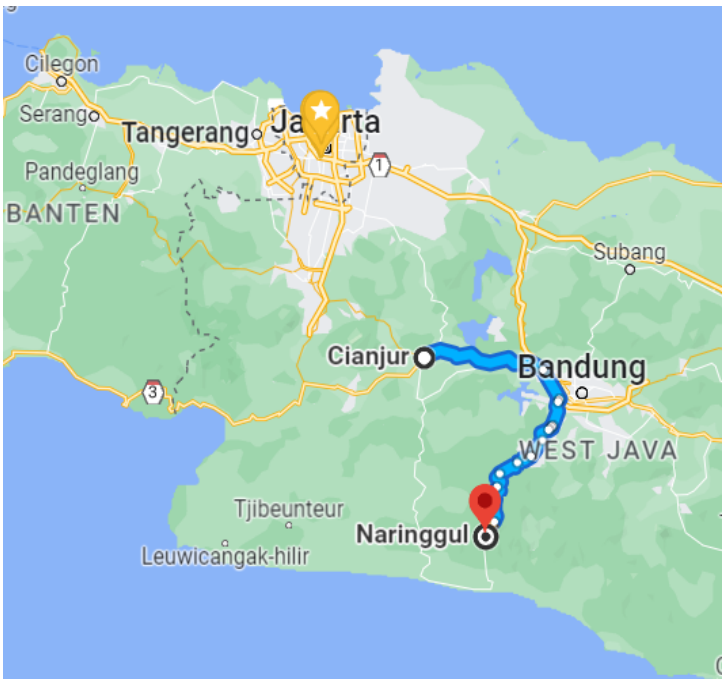
Project location

Naringgul village has been selected randomly from the group of low socioeconomic, lack of internet connectivity but highly populated area in Indonesia.

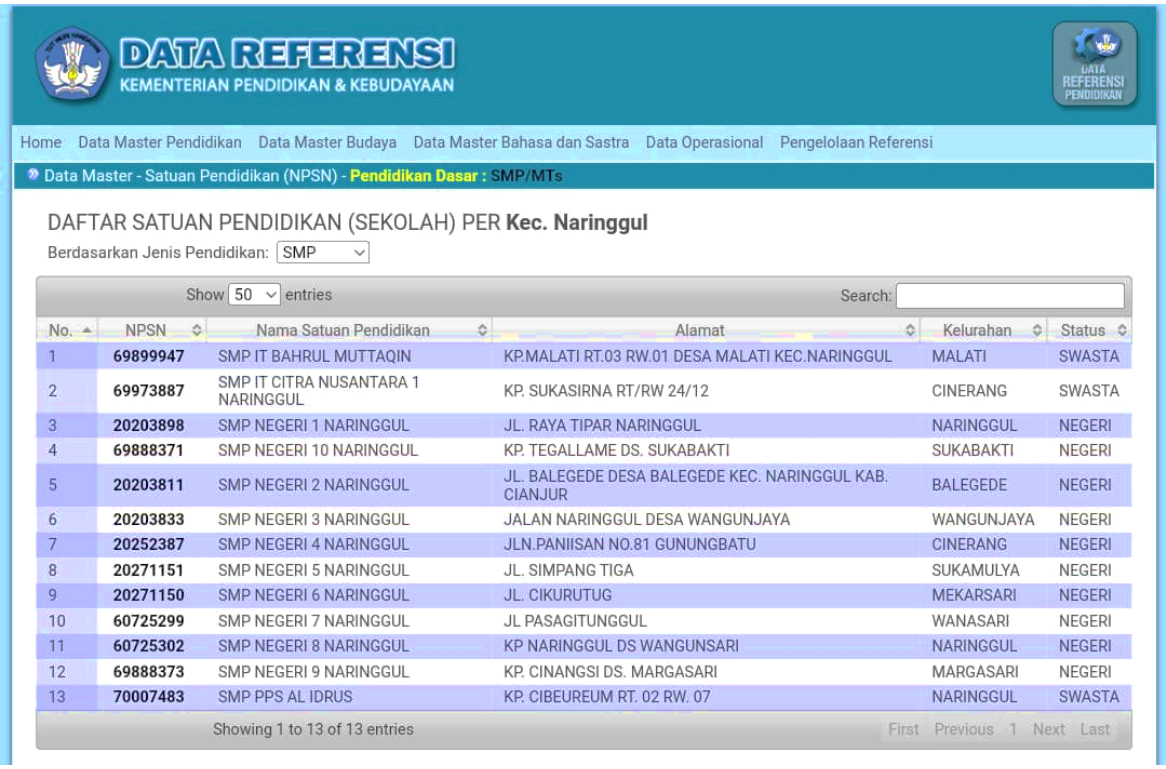
The junior high schools selected for the intervention are four schools in Naringgul village under the District of Cianjur – West Java, Indonesia. Although they are located in Java – southern part of Java, the areas lack internet connectivity, families have low socioeconomic status, and the area is highly populated.

The schools are located in southern part of Bandung under the District of Cianjur. From downtown Cianjur to Naringgul, there are 131km.

In Naringgul Village, there are 10 junior high schools. For the TIESEA intervention, 4 schools are selected randomly: SMPN 3, 6, 8, and SMPN 9 Naringgul.



Picture 2: Google (2022). Directions for Driving from Cianjur to Naringgul. Available at: http://maps.google.co.uk



DATA REFERENSI
KEMENTERIAN PENDIDIKAN & KEBUDAYAAN

Home | Data Master Pendidikan | Data Master Budaya | Data Master Bahasa dan Sastra | Data Operasional | Pengelolaan Referensi

Data Master - Satuan Pendidikan (NPSN) - Pendidikan Dasar : SMP/MTs

DAFTAR SATUAN PENDIDIKAN (SEKOLAH) PER **Kec. Naringgul**

Berdasarkan Jenis Pendidikan: SMP

Show 50 entries Search:

No.	NPSN	Nama Satuan Pendidikan	Alamat	Kelurahan	Status
1	69899947	SMP IT BAHRUL MUTTAQIN	KP.MALATI RT.03 RW.01 DESA MALATI KEC.NARINGGUL	MALATI	SWASTA
2	69973887	SMP IT CITRA NUSANTARA 1 NARINGGUL	KP. SUKASIRNA RT/RW 24/12	CINERANG	SWASTA
3	20203898	SMP NEGERI 1 NARINGGUL	JL. RAYA TIPAR NARINGGUL	NARINGGUL	NEGERI
4	69888371	SMP NEGERI 10 NARINGGUL	KP. TEGALLAME DS. SUKABAKTI	SUKABAKTI	NEGERI
5	20203811	SMP NEGERI 2 NARINGGUL	JL. BALEGEDE DESA BALEGEDE KEC. NARINGGUL KAB. CIANJUR	BALEGEDE	NEGERI
6	20203833	SMP NEGERI 3 NARINGGUL	JALAN NARINGGUL DESA WANGUNJAYA	WANGUNJAYA	NEGERI
7	20252387	SMP NEGERI 4 NARINGGUL	JLN.PANIISAN NO.81 GUNUNGBATU	CINERANG	NEGERI
8	20271151	SMP NEGERI 5 NARINGGUL	JL. SIMPANG TIGA	SUKAMULYA	NEGERI
9	20271150	SMP NEGERI 6 NARINGGUL	JL. CIKURUTUG	MEKARSARI	NEGERI
10	60725299	SMP NEGERI 7 NARINGGUL	JL PASAGITUNGGUL	WANASARI	NEGERI
11	60725302	SMP NEGERI 8 NARINGGUL	KP NARINGGUL DS WANGUNSARI	NARINGGUL	NEGERI
12	69888373	SMP NEGERI 9 NARINGGUL	KP. CINANGSI DS. MARGASARI	MARGASARI	NEGERI
13	70007483	SMP PPS AL IDRUS	KP. CIBEUREUM RT. 02 RW. 07	NARINGGUL	SWASTA

Showing 1 to 13 of 13 entries First Previous 1 Next Last

Picture 3: Reference data from the Ministry of Education & Culture, education unit list for Naringgul district. Available at https://referensi.data.kemdikbud.go.id

When Guru Penggerak is to be involved, they will be available from Bandung (4 hours drive) and one also from SMPN 3 Naringgul. It is believed that the school principals in all four schools are to be involved as “penggerak” – change agents for the teachers under the TIESEA intervention.

2.2 Objectives

This TIESEA intervention aims to respond to the learning crisis by leveraging technology in combination with evolving educational methodologies and system support based on the country’s EdTech readiness assessment.

In general, the intervention is intended to empower junior high school teachers with digital literacy and technology, so that they are ready to use the *Merdeka Mengajar* Platform (MMP) and implement the Merdeka Curriculum (MC). Specifically, the program will:

- introduce technology to teachers to support them using the *Merdeka Mengajar* Platform and the *Merdeka* Curriculum
- guide teachers to use education technology in their teaching of STEM courses and, thereby raise students’ attainment in STEM
- guide teachers to use teaching strategies that promote higher order thinking (HOT) in STEM education
- promote HOT in students, indicated by the capacity to apply science principles to problem solving eg. energy conservation / climate change

- guide teachers to pilot test their plan for teaching STEM using technology
- promote teachers' and students' attitudes toward the use of technology and higher order thinking strategies in teaching and learning on STEM courses.

At the end of the TIESEA intervention program, it is expected that junior high school teachers will be able to use technology and higher-order thinking strategies to teach STEM courses and be ready to support the use of the MMP and the implementation of the MC in their future teaching. These objectives will be supported by a series of training workshops for capacity building of teachers in the area of MMP, digital literacy, and also Project-Based Learning (PBL). These enhanced skills for teachers will be reflected in the students' skill and capacity in applying science to real world issues, rather than just seeing science as a body of knowledge to be absorbed.

2.3 Pilot Project Hypothesis

Research Questions: How will the use of EdTech affect teachers' teaching and student learning in STEM?

Hypotheses:

- students' learning achievement in STEM classes using EdTech will be greater than that of students learning STEM without EdTech
- teachers will have a positive perception of the use of EdTech in teaching STEM
- students will have a positive perception of the use of EdTech in learning STEM

2.4 Description of the Pilot Project

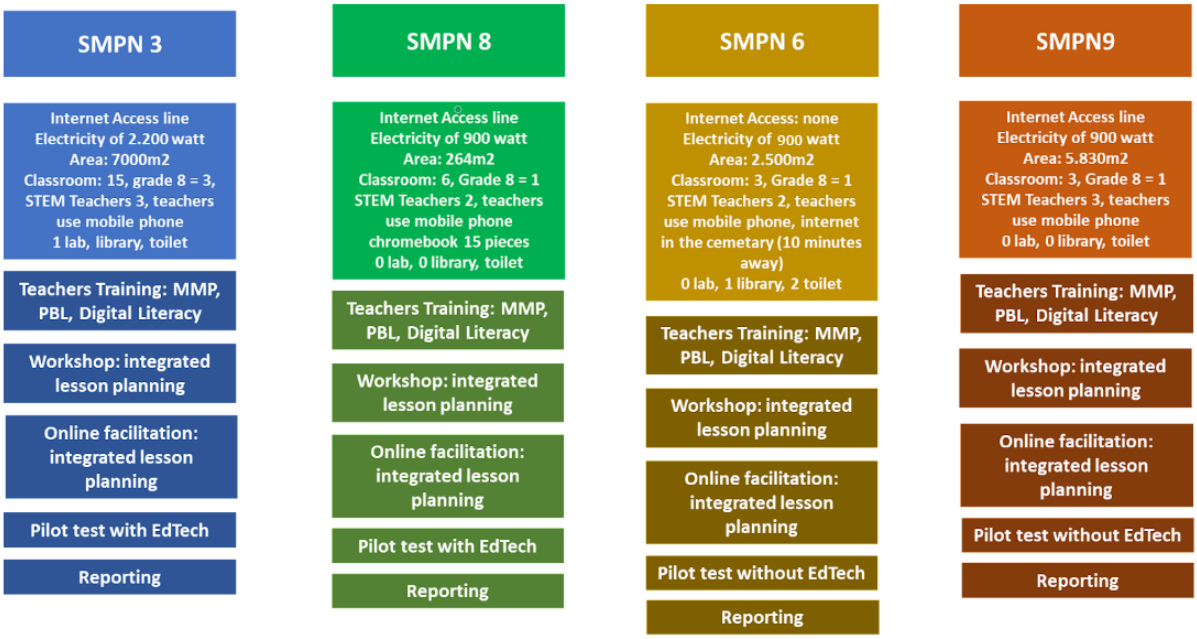
This intervention is designed to provide capacity building for teachers to develop their digital literacy by introducing the *Merdeka Mengajar* platform and to teach STEM using technology within a minimal internet connectivity area. It includes a series of capacity-building workshops, learning materials development, pilot testing, and reporting. It is expected that this intervention will ensure the readiness of teachers to implement the *Merdeka* Curriculum. The general design of this intervention is pre-post-test and control design on teachers' perception, students' perception, and gain score.

The strategies based on the objectives of the intervention are as follows:

No	Objectives	Activity and Coverage	Instructors/ Resource Person
1	Teachers are introduced to *Merdeka Mengajar* Platform and the *Merdeka* Curriculum	Training/Workshop on Integration of STEM approach into science education including introduction to the Merdeka Mengajar platform and Merdeka Curriculum	Guru Penggerak, Trainer from Pusdatin,

No	Objectives	Activity and Coverage	Instructors/ Resource Person
2	Teachers are able to use education technology in their teaching for STEM courses	- Training/Workshop on Integration of STEM approach into science education including digital literation and lesson plan development that integrate EdTech into their teaching. This workshop is continued by online facilitation. - Workshop on the development of digital learning materials based on lesson plan under the assistance/supervision of instructional media experts. After this workshop, those teachers will get online assistance from instructors. - Workshop on the integration of learning materials into knowledge sharing platform.	Guru Penggerak, Trainer from Microsoft, SEAMOLEC trainers, Trainer from Pusdatin,
3	Teachers are able to use higher order thinking skills teaching strategies in teaching STEM courses	- Training/Workshop on Integration of STEM approach into science education including an introduction to the project-based learning followed by online facilitation. - Workshop on the assessment development for the PBL - STEM approach followed by online assistance. - Workshop on the development of digital learning materials based on lesson plan under the assistance/supervision of instructional media experts. After this workshop, those teachers will get online assistance from instructors.	Guru Penggerak, SEAMOLEC Trainer
4	Teachers pilot test their plan for teaching STEM using technology	- Total 9 times online facilitation/assistance for lesson plan, assessment, and learning materials development. - Implementation of Edtech integrated learning activities	Guru Penggerak
5	Teachers' perception toward the use of technology and higher order thinking strategies in teaching STEM courses	- Questionnaire of teachers perception (pre and post) – tech, HOT, communication/collaborative skills, PBL. - Questionnaire of students perception (pre and post) – tech, HOT, communication/collaborative skills, PBL. - Gain score (pre and post test)	Country Expert team for number 1 & 2 STEM Teachers and Guru Penggerak for number 3.

The design of the EdTech intervention can be summarized as follows:



2.5 Expected Outputs

As a result of this pilot intervention, the project team expects to have strong evidence to support the project's contribution to the national ambition of the MoECRT to modernize teaching and learning practices in Indonesia, with the following outputs:

- Enhanced teachers' skills in the application of higher-order thinking skills to learning and teaching, especially in respect of STEM education
- More effective and productive integration of EdTech into regular pedagogic practice
- Students demonstrate evident improvements in their capacity for enquiry and problem-based learning and collaborative learning.
- Through effective and independent application of EdTech skills students show a deeper capacity for self-directed learning.

2.6 Budget

The tentative budget for the TIESEA-EdTech intervention in Indonesia - Teachers Capacity Building Programme – is summarized below.

Subsequent to the project design and budget summary, the DG for Higher Education in Indonesia announced that it will donate 80 laptop computers to the TIESEA project – these are locally produced from the Institut Teknologi Bandung (ITB) under the brand name of "LaptopMerahPutih-Sosialisi". This has resulted in a significant saving on the equipment which

may give the project team added latitude in varying the project design, acquire additional equipment and involve larger numbers of learners and teachers.

Item	Specification	Qty	Price (USD)	Total (USD)	Link
Digital projector	Full HD (1920 x 1080) 3,500 ANSI lumens 10,000:1	4	887	3,549	https://www.tokopedia.com/mdshopholic/proyektor-acer-h6531bd-full-hd
Sound system	Bluetooth enabled, with battery	4	280	1,121	https://id.jbl.com/bluetooth-portables/JBL+LINK+20.html
Mini server for digital library	Raspberry Pi 4 RAM 4GB	4	117	467	https://www.tokopedia.com/labkesprima/raspberry-pi-4-model-b-4gb
Raspberry pi 4B Case	Dual Fan, easily accessible Connectors	4	23	93	https://www.tokopedia.com/dngding/case-raspberry-pi-4-dual-cooling-fans-aluminium-alloy
Wifi Access Point:	802.11a/b/g/n/ac	4	111	445	https://www.bhinneka.com/ruijie-access-point-rg-ap720-l-sku3333795814
SD Card	128GB 100MBPS SDXC CLASS 10	4	15	60	https://www.tokopedia.com/travelycious/micro-sd-card-128-gb-256-gb-v-gen-class-10-turbo-128-gb
Charging Cart	40 devices with 1.1″-wide slot	4	2,736	10,944	https://ergonomic.co.id/product/zip40-charging-cart-for-laptops/
Uninterrupted power supply	3000VA / 2700W	4	1,801	7,204	https://www.bhinneka.com/apc-smart-ups-srt-3000va-srt3000xli-skusku00217495
Electrical accessories	Power set (ties cable, insulation tape, nails, etc)	4	67	267	
	NYYHY Cable 3x2,5mm, 50 meters	8	73	587	https://www.tokopedia.com/rizqula-berkah/kabel-nyy-3x2-5-supreme-50-meter-kabel-nyy-3x2-5-supreme-50-meter
	NYM Cable 3x2,5mm 50 meter	4	55	219	https://www.tokopedia.com/rizqula-berkah/kabel-nym-3x2-5-eterna-3x2-5-eterna-50-meter
	NYM Cable 2x1,5mm 50 meter	4	31	125	https://www.tokopedia.com/rizqula-berkah/kabel-nym-2x1-5-eterna-nym-2x1-5-50meter
	Stop contact, 4 holes, USB	25	25	617	https://www.tokopedia.com/sparepartskonvek/pdu4g2-stop-kontak-meja-4-desktop-with-2-port-usb-2-0-anti-petir
	240v 50Hz, 3 pin with arde	20	1	13	https://www.tokopedia.com/fajarelektrik-1/steker-arde-broco-bengkok-putih-colokan-broco
	Lamp set (TL 2x40 watt)	32	15	480	https://www.tokopedia.com/bintang-electric/kap-lampu-t8-fluorescent-lampu-led-t8-2x40-watt-220v-cover-plastik-putih
	Double Switch lamp	4	4	15	https://www.tokopedia.com/mitraled88/sakelar-seri-double-panasonic-silver-style-series-saklar-lampu
	Under floor duct cable	36	2	60	https://www.tokopedia.com/kanglistrik/floor-duct-kabel-duct-lantai-oval-70x20-mm-pvc-putih
Total		**$26,266**			

2.7 Activities (timeline)

Time	Key activities
January 2022	Connecting the project with relevant ministries and government's agencies to get official support and collaboration from Indonesia MoECRT; seeking support from commercial partners in the country
April 2022	Preliminary surveys of locations and potential sites for pilot intervention and pilot proposal development
April 2022	Visit potential schools meeting with school directors to discuss the possible pilot project.
April 2022	Pilot project proposal development; liaising with international TIESEA project team on project proposal and M&E strategy
May 2022	Gathering necessary data from schools and community; initial outlines of equipment specifications; coordination with schools, teachers, potential commercial partners
May 2022	Revise project proposal and submission to TIESEA international team for approvals
June-July 2022	Submission and liaison with ADB over project proposal prior to procurement and initiation
June-July 2022	Site visits from international team to confirm project locations and implementation protocols
August 2022	Finalize equipment specification and initiate procurement procedures
August 2022	Initiate workshops 1) – integration of STEM approach to science education. Online facilitation and face to face meetings as possible. Baseline assessment and teacher surveys
September 2022	Workshop 2) Assessment instrument development. Online facilitation and face to face meetings as possible.
October 2022	Workshop 3) Learning material development. Online facilitation and face to face meetings as possible
October 2022	Monitoring visit from TIESEA international team
November 2022	Pilot test preparation and administration
December 2022	Pilot test administration and analysis
January 2023	Pilot test administration and analysis
February 2023	Pilot monitoring and ongoing project support
March 2023	Monitoring visit from TIESEA international team
May-June 2023	Surveys to teachers and to students
July 2023	Final evaluation and analysis and reporting

2.8 Monitoring and Evaluation

Monitoring of the intervention is done in various ways and at different points of time across the intervention as follows:

1. **Workshop 1**: attendance list and questionnaire (pre-intervention questionnaire of teachers' perception on the use of technology for teaching STEM, HOT, communication/collaborative skills, and PBL.
2. **Workshop 2:** attendance list, the outline of the evidence to be gathered from the students and evidence criteria used to determine the quality of learning performance.
3. **Workshop 3**: attendance list, identification of problems faced by teachers in preparing learning material as well as in integrating edtech and 21st Century Skills to teach STEM
4. Online facilitation (via online meeting): attendance list, identification of problems faced by teachers in preparing course materials, test items, and strategy for their classroom action research in the pilot test.
5. **Pilot test**: checking the time plan of teachers doing their classroom action research, questionnaire for students (pre-pilot test perception on the use of technology for learning STEM, HOT, communication/collaborative skills, PBL), pretest on the topics, identification of problems faced by teachers and students (online meeting).
6. **Pilot test**: questionnaire for students (post-pilot test perception on the use of technology for learning STEM, HOT, communication/collaborative skills, PBL), post-test on the topics, identification of problems faced by teachers (implementing CAR) (online meeting) and problems faced by students.

Site visits by the TIESEA international team will also be done at regular intervals for monitoring activity during the project implementations, so as to capture the real action of teachers in teaching STEM.

3. PILOT INTERVENTION IN THE PHILIPPINES

3.1 Pilot Project Overview, Rationale and Justification

The Philippines has a tri-focalized education system representing basic education under the Department of Education (DepEd), technical vocational education and training (TVET) under the Technical Education and Skills Development Authority (TESDA), and higher education under the Commission on Higher Education (CHED).

On the basis of the original scoping mission carried out by ADB officers during 2019, it was recommended that the institutional focus of the intervention should be the Technical Education and Skills Development Authority (TESDA), rather than the general education directorate for K-12 education (DepEd).

TVET in the country follows a competency-based approach to respond to the skilling, re-skilling and upskilling needs of Filipinos to meet labor-market demands, entrepreneurship and other livelihood opportunities as well as for lifelong learning.

During the peak of the pandemic, the three (3) education agencies responded to the needs of their stakeholders using digital technologies and other modes of distance education. Basic education utilized the DepEd Commons platform. TVET, through TESDA, was able to provide continuity of learning through the TESDA Online Program (TOP) despite restrictions in mobility and face-to-face interactions. The experience of the TOP highlighted the potency of EdTech in delivering learning through ICT.

When it was launched in 2012, the TOP was initially conceived as an eLearning platform to offer Massive Open Online Courses (MOOCs) for TVET. Aside from the traction eLearning has been gaining in recent years because of the fourth industrial revolution (4IR), the popularity and massive success of the TOP can be attributed to the sudden and forced shift to eLearning imposed by pandemic restrictions. The experience showcased the potential of ICT, specifically EdTech for TVET, and accelerated the re-design of the TOP to allow for self-paced MOOCs and for facilitated online and blended learning in TESDA Technology Institutions (TTIs). A value-added service in the new iteration of the TOP is the development of a mobile application for offline and mobile learning. The TOP is further envisioned to create a community of practice for eLearning in TVET and provide support to both public and private Technical-Vocational Institutions (TVIs).

These experiences and innovations in eLearning for TVET encourage the exploration of other training and learning solutions through EdTech. Further studies will be recommended to investigate the use of EdTech for quality-assured, accessible, inclusive, gender-neutral, and sustainable learning and training to address socio-economic inequities within the different education systems in the country especially DepEd and TESDA.

The TIESEA Philippine e-Readiness Country Report (ADB, 2022) presented in February and March 2022 during the National and Regional EdTech Workshops showed that the country has a major challenge in terms of Internet infrastructure across its more than 7,000 islands. It stated that, with 22.50 mbps average mobile speed, the Philippines is in the 84th spot out of 134 countries. Hence, providing high quality, accessible, inclusive, gender-fair, and sustainable TVET to remote communities through the TOP will require solutions that effectively address this constraint.

The focus on access and quality in the Pilot Project is guided by the ADB pillars for EdTech Assessment, specifically “ensuring learning for all”, and “enhancing employability” in helping poverty alleviation in the country. The Pilot Project is expected to generate valuable lessons learned in how quality TVET can be provided cost-effectively for all, enhancing employability beyond urban centers.

Indicative project sites

Picture 4: Picture 2: Google (2022). Rosario and Tagaloan. Available at: http://maps.google.co.uk

The above locations at Rosario, in the north and Tagaloan in the south of the archipelago are possible target sites for the “offline” pilot intervention, to test the “Moodlebox” solution in areas with poor connectivity. These are also communities that would benefit directly from the local electrical power generation that the PV course from eTESDA facilitates.

3.2 Objectives

The objectives of the Pilot Project are to:

1) Determine the comparative effectiveness of a blended learning delivery through the TOP using its mobile offline and online features served either through the Internet or through a local content server.
2) Test the effectiveness of a local server using low cost, energy efficient gadgets and equipment to deliver a TOP course and the ability of TESDA training institutions to utilize and maintain such devices.
2) Determine the overall training and learning experiences of learners and trainers using EdTech.

3.3 Pilot Project Hypothesis

The working hypothesis is that: appropriate EdTech equipment and modern training strategies, including online/offline technical workarounds, are effective in improving access, equity and quality in the delivery of the TVET courses and, specifically, the 'Photovoltaic Systems Installation NC II'.

Arising from this general hypothesis, the research questions to be addressed are:-
Is the TOP PVS Installation program, when delivered in a hybrid mode with an offline content server, as effective as program operating in areas with good internet access and connectivity ? (metrics include: student satisfaction / progression / employment success)

Where the program in running in the outlying provinces, are the program participants able to apply the skills that they have learnt on the PV Installation program and improve community access to electricity?

3.4 Description of the Pilot Project

The pilot project will be implemented by TESDA through its eTESDA Division in coordination with TTIs. The eTESDA Division is the division in charge of the TOP. The objective of the pilot is to successfully deliver the TOP eLearning course, 'Photovoltaic Systems Installation NC II', to students in areas with limited or no internet infrastructure by enabling TOP materials to be accessed locally through a content server and Wi-Fi router rather than through the Internet.

The TOP eLearning materials may be used as supplemental training materials and will include videos, digital activities, quizzes and other instructional resources. Twenty-five (25) Tablets shall be used by trainees/learners to access the eLearning content and perform the various activities called for by the course (training regulation[6]).

[6] In the Philippines, a course of instruction is known as a training regulation.

Accordingly, the Pilot Project shall focus on the effectiveness and efficiency of MoodleBox on a Raspberry Pi as a local server of TVET blended learning materials in comparison with the standard practice of accessing the materials through the Internet.

TESDA Online Program

The TESDA Online Program or TOP is the national eLearning platform for TVET developed and managed by TESDA. Currently it offers 141 TVET courses developed in-house, and co-developed and shared by partners. Currently, it has 3,841,640 registered users.

Since its launch in 2012, the TOP uses the open-source learning management system (LMS) Moodle which is free and considered one of the leading LMS software applications with a community of practitioners and developers. Moodle is globally supported by educators, trainers, developers, system administrators, and learners.

As part of the continuing improvements to eLearning delivery of the Agency, the eTESDA Division, which has primary responsibility for the TOP, has undertaken a re-construction of the LMS architecture for large-scale, multi-tenant use. The project, the TOP customization for multi-regional implementation, shall create a central LMS administration with a dual-access modality. The first modality is the TOP for Massive Open Online Courses (MOOCs) which allows public access for self-paced learning and the second, the multi-regional TOP or MRTOP.

The MRTOP makes the seventeen (17) Regional Offices and the 191 TTIs cohorts and category managers to the LMS. TTI trainers will also have teacher accounts to allow them to organize and control the learning environment for blended/facilitated TVET. This dual-access modality shall substantially increase the absorptive capacity for eLearning for TVET; address issues on ensuring competency based training through blended/facilitated learning; support area-based and demand driven (ABDD) TVET through contextualized/localized enhancements of TOP courses; and create a unified/centralized approach to eLearning implementation as well as establishing centralized monitoring of eLearning delivery.

The MRTOP creates authentic learning experiences and supports the implementation of competency based TVET through facilitated learning.

Local Server using Raspberry Pi and MoodleBox

In addressing interconnectivity challenges, the Pilot Project shall use a MoodleBox, a Moodle platform running on a Raspberry Pi.

A Raspberry Pi is an inexpensive computing device that can be used for computer education as well as providing network access for offline use of eLearning materials in a learning management system (LMS). A MoodleBox is a Raspberry Pi-specific version of the Moodle LMS. Generally, a MoodleBox is a standalone small and cheap mobile device working without Internet. It combines a wireless access point with a full featured Moodle server. With the help of this device, connected through a Wi-Fi router, learners can access the offline version of learning materials that are uploaded in the content server using cell phones, tablets, and laptops without an Internet connection. And with its compact and portable design, this device can easily be brought to far-flung areas, expanding access to quality TVET.

For the purposes of this pilot, the Raspberry Pi will be used in a MoodleBox configuration enabling Moodle as the LMS software. The LMS shall be configured to mimic the TOP LMS environment. Only one TVET program, the Photovoltaic Systems Installation NC II, shall be contained in the local server which shall serve as the eLearning modules for the training program. Although this headless local server may work without a router, a Wi-Fi router will be installed to handle the connection of multiple gadgets to the local server.

In the same way, to handle a more efficient transfer of data between multiple gadgets and the local server, a solid-state drive (SSD) will be used.

TOP Mobile Application

As part of the intervention of TESDA, the TOP Mobile Application was developed. The TOP Mobile App aims to increase the accessibility of the platform, facilitate mobile learning, and allow the offline use of the TOP to address the digital divide. The TOP Mobile App is now available for download in Android and IOS devices.

Flexible Learning Delivery in TVET

To cope with the changing needs in training and learning and in light of the disruptions posed by the Covid-19 pandemic, TESDA has issued the TESDA policy for Flexible Learning Delivery (FLD) through TESDA Circular No. 62, s. 2020 to address the different context of learners and TVET institutions in the field.

The policy identifies FLD as being composed of a combination of online, blended, distance, and face-to-face (F2F) modalities. The FLD policy was designed to provide a learning environment that is responsive to the shifting needs, requirements, and conditions of our society. It allows for the continuity of TVET during social, environmental, health, and all forms of crises and disruptions to ensure that our stakeholders are able to receive relevant social services when they need them, wherever they are, and in the most convenient way possible.

Consequently, to support the implementation of MRTOP, a TESDA Circular No. 21, s. 2022 was issued providing the guidelines for its the utilization of flexible learning delivery in TVET.

Both FLD and MRTOP policies provide the parameters for the implementation of online and blended TVET programs, these include but are not limited to:

a. the requirements that training institutions have to comply with prior to running online and blended trainings
b. submission of a competency-based curriculum reflecting an online or blended learning modality in delivering the TVET program
c. submission of the digital learning contents, and the online or blended learning infrastructure
d. technical support provision.

In addition, the conduct of the TVET programs must be in accordance with the Unified TVET Program Registration and Accreditation System (UTPRAS) for the registration of TVET programs. Further details of the program is included in Annex 3.

Target Beneficiaries

Four (4) TTIs offering the 'Photovoltaic Systems Installation NC II' course shall be chosen as the site of the Pilot Test. These TTIs shall run 2 batches of 25 learners each during the duration of the Pilot.

The learner-participants will be Training for Work Scholarship Program (TWSP) beneficiaries. The Training-for-Work Scholarship (TWSP) "seeks to support rapid, inclusive, and sustained economic growth through course offerings in priority industries and key employment generators such as agrifishery/agri-business/agro-industrial, tourism, Information Technology-Business Process Management (IT-BPM), semi-conductor and electronics, automotive, other priority manufacturing industries, logistics, general infrastructure, and new and emerging sectors." The TWSP covers free skills training and free assessment. A TWSP beneficiary must be a Filipino Citizen and must be at least 18 years of age at the time he/she finishes the training program. (Source: TESDA Circular No. 03, s. 2018, Omnibus Guidelines for 2018 Training for Work Scholarship Program (TWSP) and Special Training for Employment Program).

3.5 Expected Outputs

The Pilot Project outputs shall be:

1) Provision of an EdTech hardware package (see below for details) to two (2) rural TTIs to enable the blended learning delivery of PhotoVoltaic Systems Installation NC II through the TOP
2) Eight (8) batches of PhotoVoltaic Systems Installation NC II training conducted
3) Eight (8) M/E documentation (1 M/E documentation per batch); and
4) One (1) Pilot Project Report

3.6 Proposed Budget

Item	Specification	Qty	Price (USD)	Total (USD)	Links
Mobile Tablet for learners	4GB RAM; 64GB ROM; Android 11; 10.5 inch display LTE; 7040 mAh	100	198	19,788	https://www.realme.com/ph/realme-pad
Mobile tablets for eTESDA-NITESD	4GB RAM; 64GB ROM; Android 11; 10.5 inch display LTE; 7040 mAh	25	198	4,947	https://www.realme.com/ph/realme-pad
Mobile charging cart	30-Device capacity	4	393	1,572	https://www.toolots.com/charging-cart.html
Laptops for facilitators	Intel Core i7, 11th Gen 512GB SSD Windows Full HD Resolution	4	900	3,601	https://www.abenson.com/acer-aspire-5-a515-56-74n5-charcoal-black.html

Laptop for eTESDA-NITESD (will also serve as spare)	Intel Core i7, 11th Gen 512GB SSD Windows 10 or 11 Full HD Resolution	1	900	900	https://www.abenson.com/acer-aspire-5-a515-56-74n5-charcoal-black.html
WiFi Router for offline test sites (MOODLE Box)	Dual band 2.4 GHz band: 2400 - 2483.5 MHz 5 GHz band: 5150 - 5250 MHz, 5724 - 5850 MHz	2	45	90	https://villman.com/Product-Detail/D-Link_DIR-809L
WiFi Router for online test sites	Dual band 2.4 GHz band: 2400 - 2483.5 MHz 5 GHz band: 5150 - 5250 MHz, 5724 - 5850 MHz	2	45	90	https://villman.com/Product-Detail/D-Link_DIR-809L
Solid State Drive for MOODLE Box	128 GB	3	45	135	https://villman.com/Product-Detail/Plextor_PX-128S3G
Raspberry Pi 4B Case for MOODLE Box	Aluminum Case with M.2 SATA SSD Expansion Slot	3	83	248	https://www.aliexpress.com/item/1005001721899988.html
Raspberry Pi 4b and Kit	Computer and full kit,	3	178	533	https://www.aliexpress.com/item/4000544231246.html
Uninterruptible Power Supply	650VA, Universal Outlet, 230V	4	65	259	https://pcx.com.ph/shop/apc-easy-ups-bv-650va-avr-universal-outlet-230v-bv650i-ms/
Total		**$32,165**			

TESDA Direct and Indirect Costs

In the implementation of the Pilot Project, TESDA shall be incurring **direct and indirect costs**:

1. Training cost for the run of the PhotoVoltaic Systems Installation NC II of the TTIs through the TWSP including use of existing facilities, equipment and other resources of the TTIs to run the program for the Pilot Project.
2. Technical assistance and support of eTESDA Division personnel including existing facilities, equipment, and other resources of the Institute.

Training Costs: The training shall be funded by TESDA through the Training for Work Scholarship Program (TWSP). As such, the training program shall adhere to the usual training duration and requirements for all scholarship programs under the TWSP. The training implementation of the 2 batches per TTI is scheduled from July 2022 to June 2023 following the training calendars of the TTIs and their corresponding scholarship program schedules.

Item	Cost per pax (PHP)	Number of pax	Total Cost (PHP)	Total Cost (USD)
Scholarship: Training and Assessment Cost	7,289.00	200	1,457,800.00	$27,698.20

3.7 Activities (timeline)

Time	Key activities
January, 2022	Seeking potential public and private partners with whom to collaborate intervention
May, 2022	Development of pilot proposal
June, 2022	Survey and initial selection of potential project sites
July, 2022	Develop training plan for TESDA officers and staff involved in project
July , 2022	Finalisation of M&E procedures and protocols
August, 2022	Training and preparation of project staff
September, 2022	Deployment of equipment and initiation of pilot project
October, 2022	Monitoring visit by international key experts
November / December, 2022	Mid-term project review (FGD interviews with first learner cohort
March / April, 2023	Monitoring visits from international key experts
May / June, 2023	Continuation of M&E protocols
July, 2023	Preparation of for project close-out
July / August, 2023	Liaison with TESDA and other key government agencies to plan for national scale-up of intervention
September, 2023	Project findings shared at TIESEA international close-out conference

3.8 Monitoring and Evaluation

The Monitoring and Evaluation Component of the Pilot Project shall be guided by the over-all Pilot Project M&E framework.

The following are the **proposed indicators** for the pilot study:

- **Completion rate** - this shall be indicated by the number of graduates per batch. All graduates should pass Institutional Competency Assessment administered by the trainer of the program following Competency-based assessment principles with the following methods:
  - Written test;
  - Practical/performance test;
  - Interview/oral questioning, and;
  - Demonstration
- **Certification rate** - this shall be indicated by the passing rate to the National Competency Assessment conducted through a system wherein the assessor is required to be other than the trainer of the specified batch.
- **Pre-test/Post-test** gap analysis. Tests will deal with soft skills only. It can be assumed that students will not have prior knowledge of PV systems installation.
- **Employability survey**: Local employers to conduct mock employment interviews with sample of students following a rubric negotiated between themselves and TESDA and provide an assessment based on comparison with available local human resources.
- **Overall feedback on teaching and learning experience** - feedback shall be collected through a carefully developed survey and interview tool. These tools shall collect data

on usefulness and effectiveness of 1) Ed Tech Equipment and gadgets; 2) training strategies and practices; and other related matrices such as motivation and commitment to finish the course.

Baseline survey:
At baseline it will be necessary to establish**:**

a. The training background of students (particularly any online or TESDA training courses completed), motivation for enrolling in the course, perceived value of online training, level of current engagement with ICT and purpose thereof (just social media or do they commonly use apps and for what), existing ownership of devices, employment status since leaving school, basic demographic data (age, sex).

b. The background and qualifications of course instructors including years of experience with TechVoc training especially with TESDA and/or any other online courses taught or followed, preferred pedagogical style, prior exposure to use of EdTech, personal use of ICT and device ownership, age, sex.

c. **General background of region**: employment prospects, Internet connectivity, SES pattern

Process evaluation (to be performed during monitoring visits):
Are the instructors keeping to their course delivery plans, are they making use of formative evaluation through the LMS, what use are students making of the tabs during face-to-face sessions and what use are they making of them at home, are instructors using resources outside those provided by TESDA, which of the TESDA-provided materials are considered most useful, what teaching methods are used by the instructor, what problems (if any) are instructors and students encountering? Visits should include at least one student FGD, one classroom observation, one instructor interview.

Site visits, surveys, interviews, and focused group discussions shall be done to monitor and evaluate results of the pilot study.

4. PILOT INTERVENTION IN VIET NAM

4.1 Pilot project overview, rationale, and justification

The focus of the TIESEA Pilot Project in Viet Nam is on English language teaching. As part of an intervention involving a shift in language teaching methodology, the pilot will be testing the efficacy of EdTech support for improving the English communicative language teaching. The particular focus will be on K-12 students, especially in listening, speaking and communication skills. Student participants for the pilot project will be drawn from students in grade 7.

All teachers in both control and pilot schools will be trained in the use of modern communicative language teaching methodologies. The pilot treatment schools will use a blended learning approach whereby in-class sessions are reinforced through student self-study. A major justification for this is that blended learning is an educational model strongly encouraged by the Ministry of Education and Training (MOET) due to its resilience in the face of school closures such as has been experienced both during and after the pandemic. The pilot project was designed and implemented following the Government of Viet Nam's digital transformation in education program, led by the Information Technology Department of MOET and follows Decision No. 131/QD-TTg of the Prime Minister on strengthening the application of information technology and digital transformation in education in the period of 2022 – 2025.

Mobile learning, using widely popular devices like smartphones & tablets has been endorsed by MOET since 2020 when it issued a document which allowed students to bring smartphones into the classroom to assist their digital learning (under the guidance & supervision of teachers). It is hoped that the use of mobile technology will enable Viet Nam to overcome its current limitations whereby:

- Only 50% of students and educators currently have the capacity (communication lines, software) to participate in online teaching and learning activities.
- The proportion of the general education curriculum implemented in the online form is an average of 5% in primary and 10% in secondary education.

The Information Technology Department of MOET is expected to be a government partner in the pilot as they have responsibility for the digital transformation of education in Viet Nam and it is anticipated that the findings of this pilot intervention will contribute to the body of evidence they are gathering in order to find a modern and sustainable education model for Viet Nam.

English is a significant subject in schools in Viet Nam, playing a fundamental role in students' learning and their future careers. However, the current traditional English teaching program is focused on grammar, reading, and writing skills. Listening, speaking, and verbal communication are major pain points in Viet Nam's English education sector. Addressing this deficiency will serve the goal of developing human resources and the national economy. The role of EdTech in enhancing communicative language skills is of particular interest to the education and training ministry.

Indicative Project Sites

The following criteria have been used to select the location and field of implementation:

- Local/ provincial level II, with low or medium income compared to the country on average.

- Located within a radius of no more than 150 km from Hanoi for the convenience of inviting MOET representatives to observe & evaluate the program (most of the MOET's agencies or departments are located in central Hanoi).
- Support from the provincial Department of Education and Technology (DOET) and School Administrators for the implementation of the project including committing the necessary resources and facilitating teacher participation in the program.
- Convenient for the team of experts to conduct in-person training for teachers.
- Convenient for the National Focal Point (NFP) to support the school activities and teacher training, and supervision of the organization, periodic quality monitoring & evaluation, etc.
- The school has a basic Internet connection infrastructure that can be in the service area/teachers' meeting room (classrooms either do not have or have a very poor Internet connection insufficient to access electronic learning materials in the classrooms).
- Teachers have basic ICT skills.

Based on these criteria, the country team is researching sites for program implementation in the following localities:

- In the countryside or mountainous areas surrounding Hanoi such as Ba Vi district and Quoc Oai district which are between 20 Km to 30 km from the center of Hanoi.
- In Hoa Binh. Hoa Binh is a province in northern Viet Nam, southwest of Hanoi, about 75 km from Hanoi; Area: 4.600 km², Population: 854,131 (2019).
- In the coastal lowlands about 150Km south of Hanoi at THann Hoa and Thu Nguyen

Picture 5: Google (2022). Ba Vi, Quoc Oai, Hoa Binh, Thann Hoa and Thu Nguyen. Available at: http://maps.google.co.uk

4.2 Project objectives

The overall objective of the pilot is to test the impact of enabling a blended learning approach in a communicative language teaching classroom. Compared with a non-tech-enhanced classroom, the pilot study will test the effect of a scaffolded EdTech intervention, on 1) student academic outcomes in the study of English language, 2) teacher capacity to enhance the learning environment in their classrooms through the integration of EdTech tools, and 3) school resilience in the face of natural disasters. Based on the findings of this pilot study, recommendations will be made to MOET for national scale-up. Since the majority (65% - 70%) out of the nearly 18 million high school students in Viet Nam, study in schools in middle-income regions outside major urban centers where Internet connectivity is sub-optimal, it is imperative that such recommendations be made on the basis of evidence drawn from a pilot conducted in this same context.

Project impact will be assessed in terms of:

- Student learning outcomes: improvement in their listening, speaking, and communication skills in English compared to their peers in similar schools operating outside the project. Achievement will be measured using the IELTS[7] criteria.
- Teacher capacity to support learning with technology: digital skills and application of technology to enhance classroom practice.
- The potential to integrate the use of EdTech tools into the national curriculum.
- Demonstrated effectiveness of smartphones to create an enhanced learning environment with appropriate safeguards for students under the monitoring and management of schools and teachers.

4.3 Project hypothesis

A blended learning approach which utilizes the ELSA Speak App to extend the exposure of middle school students to spoken English, beyond that which can be accommodated within the normal school program, will improve student achievement in English and enhance their motivation to learn English. With basic training in digital literacy and guidance in using the ELSA Speak dashboard to adapt the learning environment in their classrooms, English language teachers will have the capacity and be motivated to support their students in improving their English language speaking, listening and communication skills.

The research question is simply: In the communicative language classroom, how does EdTech, specifically in the form of the ELSA app installed on a smartphone, improve learners' fluency and competency in language acquisition and use over those learners who do not have access to EdTech in the form of the ELSA app?

[7] International English Language Testing System – an international standardized test of English language proficiency for non-native English language speakers.

4.4 Pilot project description

Within the framework of the pilot project in Viet Nam, the project will provide the selected schools with the following educational technologies:

1) **Treatment schools**, their teachers and students, will be provided with the following items:
   - **Each teacher will be equipped/ provided with:**
     - **Hardware (details in the table - Part 9)**
       - 01 Laptop and 1-year 4G Sim package for laptop
       - 01 speaker set
       - 01 projector (per school)
     - **Software**
       - ELSA Speak for schools application provided by Elsa including ELSA Pro 3 month license and the Pearson textbook - English Discovery 7
       - Teacher 12-month access to their student's data through the ELSA dashboard
     - **Digital lesson plan**
       - 01 set of standard blended lesson plans integrating the ELSA Speak application into the standard English curriculum. This will mainly focus on homework assignments although there will be flexibility for teachers to use the App in the classroom, particularly in the early stages of the intervention. This will be developed either by ELSA team in collaboration with TIESEA's experts in Viet Nam or with the support from the Edtech faculty of the University of Education (National University in Viet Nam).
       - This syllabus consists of 2 versions, paper & electronic
     - **Teacher training program**

       Teacher training activities are related to the application of communicative language learning techniques and, in the treatment schools, the introduction of the ELSA Speak App, which will follow a 3-stage program:

       - 01. Three sessions for teachers and school administrators within the first week of August to understand the ELSA App, its digital content and, most importantly, the use of the App dashboard to support the effective integration of student self-study and classroom teaching. In this session, teachers will be guided in how they can provide instruction, guidance, and feedback to support their student's self-study, encouraging them to learn how to learn and to improve their learning outcome even outside of schools. An essential component of a blended learning approach, the capacity for self-study is a pain point in traditional education in Viet Nam.
       - 02. The second stage will be organized in the second month of the first semester to receive the feedback of teachers after one month of applying for the new program, so that the implementation team can make timely adjustments and re-training for teachers to strengthen the implementation capacity & ensure the results of the project.

- 03. The third stage will be organized one or two weeks before the second semester to re-evaluate the implementation capacity of teachers after the first semester.

This training will be provided by the ELSA Speak Team, and in collaboration with the Faculty of Education Technology.

The Microsoft Education program, which encompasses the principles of communicative language learning, will be provided by Microsoft, Viet Nam. The timing of teacher professional development will be scheduled to avoid over-burdening teachers and school administrators at the start of the new school year.

- **Each student will be equipped with:**
  - **Hardware (details in the table - Part 9)**
    - 01 smartphone with a wired headset (included with the phone)
    - 4G sim card with 01 year paid in advance (in addition to high-speed wifi access, they can choose a callable or a noncallable package, only for learning purposes)

Note:

- Students will be permitted to bring the device home for their homework and self-study activities purposes.
- The student's device will be pre-installed with the software for the subject and software to monitor their activities on the device and will be locked down to prevent access to potentially harmful sites. Software tools currently being reviewed for this purpose include Kid Place, Kid Zone, MM Guardian, and Custodia.

  - **Software & Apps**
    - ELSA Pro 12-month license
    - Pearson textbook - English Discovery 7

Control schools and their teachers will be provided with the following items:

- 2 laptops for the school ICT classroom to enable English teachers to follow the Microsoft Global Creative Education Expert with a special focus on communicative language training and teaching practice.

This pilot project is an example of private-public partnership with the main commercial and public sector partners including ELSA, Microsoft and The National Institute of Educational Sciences. Their contributions to the project can be briefly described as**:**

- ELSA will provide ELSA Pro accounts & student e-books for a discount of 60%, and support with teacher training during the whole school year.
- Microsoft Education will conduct the Microsoft Education program and Global Creative Education Expert certification to build teacher digital literacy and motivation to introduce EdTech into student-centered classrooms

- The National Institute of Educational Science will provide academic experts to advise on the operation of the pilot and on the testing of the student learning outcomes.

4.5 Expected outputs

In keeping with the thrust of all the country pilots the project outputs are strongly related to teachers' pedagogic practice, student centered learning and the use of digital resources to promote self-directed learning.

The project outputs in Viet Nam, therefore, will include:

- Enhanced understanding and capacity to apply communicative approaches to language learning amongst the teachers involved in the pilot – in both control and treatment schools
- Improved English language speaking skills amongst the students in the treatment schools who have access to the ELSA speak app
- A contribution to the implementation of the policies of the MoET to modernize pedagogic practice in Viet Nam and to embrace the use of EdTech for teaching and learning
- EdTech roadmap for enhanced language learning in Viet Nam based on the findings of the pilot study based upon communicative teaching and enhancement through the utilization of EdTech in the form of the ELSA speak app

4.6 Proposed Budget

Items	Specification	QTY	Price (USD)	Total (USD)	Links
Laptops for teachers to implement blended learning	14 inch, Intel, Core i3, 4 GB, DDR4, SSD 128 GB	5	359	1,796	https://fptshop.com.vn/may-tinh-xach-tay/lenovo-ideapad-3-i3-1005g1-nk
Smartphones for students- 01 smartphone per student	3GB-64GB 6.53 inch, IPS LCD, HD+, 720 x 1600	150	128	19,204	https://fptshop.com.vn/dien-thoai/xiaomi-redmi-9c-64gb
Projectors for display learning materials - 1 projector per class	DLP Native Resolution SVGA (800 x 600) Contrast Ratio 13000:1	3	342	1,025	https://hacom.vn/may-chieu-benq-ms527
Projector screens - 1 screen per projector	Dalite P70WS 1m78 x 1m78 100 inch	3	32	95	https://hacom.vn/man-chieu-treo-tuong-dalite-p70ws-1m78-x-1m78-100-inch
Speakers for whole classroom of around - 1 set of loud speakers per class	Bluetooth, 2.0 40W Optical, AUX, Bluetooth, USB	3	77	231	https://hacom.vn/loa-fenda-r40bt-bluetooth-2-0
Sim 4G Viettel to provide internet for teachers	Sim 4G Viettel	5	16	82	https://tiki.vn/sim-4g-d500-viettel-tron-goi-1-nam-hang-chinh-hang-p51407765.html

Sim 4G Viettel to provide internet for students -	Sim 4G Viettel	150	16	2,460	https://tiki.vn/sim-4g-d500-viettel-tron-goi-1-nam-hang-chinh-hang-p51407765.html
USB 4G dongle for laptop to install Sim 4G 01 USB per laptop per teacher	Dcom Huawei	4	11	44	https://fptshop.store/dcom-ket-noi-mang-cho-laptop-pc-bang-sim-3g-4g-l919699129.html
ELSA speak software (1 year) student accounts	150 student subscriptions	150	27	4,006	60% discount secured
ELSA speak software subscription (3 months) teacher accounts	Full teacher dashboards	10	0	0	donated by ELSA https://elsaspeak.com/en/
Laptops - 2 laptops per control schools	14 inch, 4 GB, DDR4, SSD 128 GB	4	359	1,437	https://fptshop.com.vn/may-tinh-xach-tay/lenovo-ideapad-3-i3-1005g1-nk
Spare smartphones (in case of breakage)	3GB-64GB 6.53 inch, IPS LCD, HD+, 720 x 1600	30	128	3,841	https://fptshop.com.vn/dien-thoai/xiaomi-redmi-9c-64gb
Installation and maintenance/ replacement fees (Estimated)		5	214	1,070	
Total		**$34,221**			

4.7 Activities (timeline)

To achieve the goals, the implementation team in Viet Nam plans to take the following steps:

Time	Key activities
January, 2022	Connect the project with relevant ministries and the government's agencies to get official support from Viet Nam's MOET, including the Department of General Education, Department of International Cooperation, and the Department of Information Technology.
January, 2022	Looking for commercial edtech partners in Viet Nam to deploy projects
March, 2022	Draft the first master plan and finalize the financial and non-financial commitment of the private sector partners
May, 2022	Coordinate with the Faculty of Education Technology, University of Education, to research and design a blended learning program suitable to the specific educational conditions in Viet Nam and for English language teaching.
June, 2022	Finalize the pilot intervention plan and get approval from the ADB team.
August, 2022	Carry out synchronous implementation of procurement activities, installation of hardware, software, and electronic lesson plans for teachers and students, along with training for teachers.
September, 2022 to May, 2023	Accompany and supervise the implementation of the program in the school, provide additional training for teachers and students if necessary, maintain equipment and guide the effective use of software;
October, 2022 and March, 2023	Monitoring visit from International Key Experts

May 2023	Summarize the student's learning results at the end of the school year and any noticeable improvements in teacher training activities according to specific, objective criteria.
June, 2023	Make a recommendation report to MOET on the effectiveness of program implementation and nationwide scalability, positive impacts for MOET and provincial education departments to invest, encourage replication of the program.
July, 2023	Project close-out report and agreement with MOET on EdTech roadmap for Viet Nam
September, 2023	Participation in project close-out conference

The program is expected to be successful and have a far-reaching impact on Vietnamese education in these post-pandemic education reconstruction times.

4.8 Monitoring and Evaluation:

To monitor and evaluate the effectiveness of the program, the following steps will be taken:

1. Project preparation phase:

Phase 1: Survey & evaluate the school's infrastructure, focusing on the following factors:

- Internet/WiFi connection in the main areas of the school, such as administrative/ management areas, teachers' rooms, classrooms, and outside the school grounds.
- Equipment for learning such as laptops, speakers, radio for teachers, projector for classes, etc.

Phase 2: Teacher & student competency survey & assessment

- Teachers: assessment of the capacity to use information technology & education technology in training and teaching.
- Students: (1) Assess their ability to use information technology in online learning; (2) evaluate their speaking and communication skills in English through IELTS-style testing by an independent organization/ institution; (3) evaluate speaking and communication skills in English using ELSA's AI system

Phase 3: Assess the level of support from the local School Board & DOET.

- The result is a pre-project evaluation report and some proposals to adapt the implementation plan to the local context and actual capacity of the school and students.

2. Project implementation phase:

The supervision & evaluation of the project efficacy will be carried out in parallel to make timely adjustments and ensure pre-planned outputs.

Phase 1: Monitor and evaluate the effectiveness of the ELSA and national curriculum integration and teacher training program to ensure teachers acquire adequate digital skills, implement the application with confidence, and be able to guide and supervise students' practice at home or outside the classroom.

Methods & evaluation criteria for this stage include three key elements: (1) all of the teachers from treatment group get access to the digital and paper blended teaching and learning program; (2) All of them participate in the training program and complete the multiple choice test after each training session to demonstrate their understanding of the blended program and ELSA application, especially the teacher dashboard; (3) all of the teachers have accounts to get access to the ELSA Speak App for at least first 3 months of the program and are provided with guidance to use dashboard to support and supervise students learning outcome and activities. They should also know how to create electronic content how to derive insights from the data reported on the ELSA dashboard and make timely adjustments on each of their students' learning paths.

Phase 2: Project implementation process in the school year of 2022 – 2023. It is necessary to monitor the actual implementation activities in each school and each classroom to ensure that the EdTech intervention will be implemented consistently between schools and throughout the whole school year.

Steps include:

1. Conduct an assessment of teaching capacity in implementing the new program according to the standards proposed by the Faculty of Educational Technology, the University of Education.
3. Evaluate student speaking and communication levels, including: (1) an exam at the beginning of the school year, conducted by an independent educational institutions with the assistance and cooperation of the project partners, for example, Microsoft and the National Institute of Educational Sciences; (2) an exam at the end of the school year, conducted by the same independent education organization; (3) an assessment of students' interest in the program through a survey and focus group discussions with 4 - 5 groups of students from each treatment class.

Phase 3: Post-project evaluation – expected to conduct during the summer break period from June to July 2023 – to answer critical questions about the impact of the intervention and the potential and interest in scaling up.

GENERAL CONCLUDING REMARKS

Each of the interventions has its own niche in EdTech, but they are all share a common objective of using technology and specific and defined ways assist in teachers' ability to work with technology to improve learning. Features shared by all of the interventions are designs that they seek to measure tangible learning outcomes and also have the capacity to be scalable within reasonable budgetary constraints. High-quality EdTech should not be the preserve of students and families of high socio-economic status, and in countries with generous budgets for education to be able to both invest in EdTech facilities, and to maintain them over a learning lifecycle.

To be sure, in all of the interventions private sector partners are significant players in the realization of the project goals, and this seems likely to be a theme worthy of further exploration and development. This is particularly so with the advent of home-based study and work, the possibility of which was experienced so widely during the global school, office, and factory shutdowns between 2020 and 2022.

We are witnessing a time when the boundaries of work and leisure are blurring, at the same time there is the realization also that learning is for life, it is not something that ends at the conclusion of full-time education and training courses. All of these factors point to a reimagining of education and its potential to grow beyond building-based teacher-led settings. The future will never be one where the guiding, stimulating and nurturing role of teachers will be completely overtaken by technological equivalents, but it is certainly one in which a great deal more learning will have to take place through self-direction under the wisdom and support of teachers as facilitators of learning.

Most parts of the education establishment have yet fully to come to terms with this learning revolution. Well-designed, teacher-led and technology-enabled learning is already beginning to revolutionize the way people regard education, training and lifelong learning; but there is a long way to go.

The TIESEA project, in general, and the four proposed country pilots, in particular, will help to demonstrate how, technology can be about transform learning, whilst also supporting and reinforcing existing exemplary practice – for example in providing for properly differentiated activities for learners of all capabilities.

Above all the TIESEA project team aims to work with governments and education and training departments to design their national EdTech policies in ways that seek to overcome socio-economic disadvantage and provide the means through which all citizens have the opportunities to realize their learning potential and reach their life goals.

Annex 1: Contextualizing background to the TIESEA Project in Cambodia

Learning and Teaching entail an interactive process between three major factors: teachers, students and learning materials. These three factors are inseparable when we talk about the quality of learning and teaching at the level of secondary education. Within, for example, the measurement framework of PISA (Program for International Student Assessment), it can be seen that there are many indicators that cover the above three factors, see OECD (2010)[8]. Based on the necessity of these three factors, we observe that Cambodia has been endeavoring to strengthen and expand these three factors simultaneously, especially under the mandate of the most recent education strategic plan (MoEYS, 2019).

In the past, the Ministry of Education Youth and Sports has modernized in phases, including the equipping of school supplies, especially the establishment of resource schools including buildings for STEM education and experimental equipment.

Recently, the Ministry of Education has also begun using in schools another modern device for the facilitation of science and math teaching and learning. The Tablet-on-Wheels (ToW) is a small tablet computer that can be taken from one classroom to another. The Tablet-on-Wheels (ToW) program includes 30 tablets and a Raspberry Pi / RACHEL offline content server that can transmit data or lessons to the tablets via the WiFi network. Each tablet includes many apps that provide content appropriate to the curriculum in different subjects and for many levels, especially the upper secondary level.

In early 2020, as part of Upper Secondary School Education Sector Development Project (USESDP) supported by the Asian Development Bank, the Ministry of Education provided Tablets-on-Wheels kits and projectors to 24 Upper Secondary Resource Schools and invited science teachers to attended training courses on Tablets-on-Wheels and app utilization by a trainer from the Department of Information Technology and a national trainer by subject. After this capacity building, it was anticipated that teachers of science and math would instruct their subjects using the tools in their classroom as needed.

Because of the use of tablets and apps for various subjects, today's classrooms are not the same as in the past, students are more able to seek knowledge on their own, with guidance from teachers. The study of Hagevik and Cherner (2016) on math and science teaching in rural schools showed that current technology and learning with apps enable students to practice Inquiry-Based Learning (IBL).

Apart from the resources provided with Raspberry Pi / RACHEL, various programs and apps such as Photo math or E-School Cambodia can also be installed on the tablets. These apps can be run independently from Raspberry Pi / RACHEL and can also be installed on smartphones. Both Raspberry Pi / RACHEL and these apps are new to students and teachers in Cambodia especially for those areas outside of Phnom Penh. Based on MoEYS study observations, students in Phnom Penh are far more adept at accessing apps than students in rural areas.

[8] https://www.oecd.org/about/secretary-general/presentationofthepisa2010results.htm

Unfortunately, as the result of school closures during the pandemic, teachers who were trained on how to use the tablets have not yet had an opportunity to implement classes on these novel devices. Although some schools did commence the program before the pandemic, it has been practiced only two or three times.

Where schools have started using the Raspberry Pi / RACHEL materials, students and teachers argue that there is currently too little time to access tablets and they are not accessible to every class. They note that, if possible, students and teachers should have Raspberry Pi / RACHEL in their respective classrooms and at home which would allow for its use anytime during lessons and further study at home (MoEYS, Study on Knowledge Attitude and Practice Tablet on Wheel for Teaching and Learning in Upper Secondary Resource Schools).

Annex 2: Indonesia TIESEA project detail

Prior to the pilot intervention, there are some steps to be taken to ensure the success of the project as follows:

1) obtaining permission to do intervention in 4 schools in Naringgul (paperworks, etc.)
2) preparing the procurement of gadgets and tools:
    a. Laptop DiktiEdu: locally developed (designed and produced by ITB Researcher Dr. Adi Indrayanto, with relatively high storage capacity, better battery life, and rugged). The specifications are as attached.
    b. Raspberry Pi for digital library and storages,
    c. Other supporting hardware for a computer laboratory in each school.
3) allocating internet quota for teachers for a year of interaction
4) preparatory meetings with various parties

Preparation activity will involve Country Expert and team, SEAMOLEC team, MOECRT team, and international expert (if possible).

After the procurement, the next stage will be installations (setting up the computer laboratory) and teachers' training for secure storage and any potential required maintenance of the equipment.

Preparation activity will involve the in-country expert and team, SEAMOLEC team, MOECRT team, Microsoft team, ITB Researcher, and international expert (if possible).

Training/Workshop on Integration of STEM approach into science education

The initial workshop will be conducted as an essential knowledge base for teachers in integrating the STEM approach into science education. The workshop will start with an introduction to the *Merdeka Mengajar* platform including the underlying principle of student-centered learning and project-based learning within the *Merdeka Belajar* concept, and digital literacy. After that, the workshop will guide teachers in developing a lesson plan for teaching a module from the STEM curriculum that integrates the active use of EdTech.

Teachers are encouraged to use STEM and digital literacy materials available in *Rumah Belajar* and other materials on the Internet; and integrate digital literacy into the lesson. The lesson plan should reflect one basic competency related to STEM courses, and promote collaboration, creativity, critical thinking, and communication skills on the part of the students. This will be supported by the use of educational technology in the two experimental/treatment schools, but teachers in the two control schools are also expected to be able to promote these 21st century skills without the support of EdTech. The workshop will be conducted for 2 days in SMPN 3 Naringgul and 2 days in each representative school involving the teachers of mathematics and sciences in 8th grade.

Teachers will be equipped with DiktiEdu laptops for their use, access to the digital library in the Raspberry Pi, and internet quota for the online communication and interaction with instructors/resource person and their peers. The training/workshop will be facilitated by *Guru Penggerak*, the Indonesia In-Country Expert, Microsoft, the SEAMOLEC team and *Pusdatin*. Pusdatin will deliver an introduction to MMP and MC; Microsoft will deliver sessions on

Digital Literacy; and sessions on PBL, HOT, and lesson plan development will be delivered by the *Guru Penggerak* and SEAMOLEC team, and an introduction to the use of portable internet by the SEAMOLEC team, the ITB Researcher and the International Expert.

The initial face-to-face training will be conducted over two days in SMPN 3 which has a big meeting room. It will comprise an introduction to MMP and MC and PBL within STEM approaches. STEM teachers from all four schools will participate in this training. This will be followed by another two day workshop in each school. All teachers in the school will participate. Content will include digital citizenship, the utilisation of the digital library, and lesson plan development.

Materials for the training will be prepared by SEAMOLEC, *Pusdatin*, the *Guru Penggerak*, Microsoft https://docs.microsoft.com/en-gb/learn/educator-center/topics/stem, and the In-Country Expert based on similar training for teachers.

Workshop on Assessment Instrument Development

The workshop will be conducted as an introduction to best practices in assessment both formative and summative for Project-Based Learning in STEM Courses. The workshop product draft includes questionnaires or discussion questions for gathering information from students before the learning activity. It will also consist of exercises that help students reflect on their own learning objectives, as well as pre-tests and post-test to measure learning achievement. The workshop will also explore practical tools for successful task design and implementation with the goal of ensuring all students have success with the learning experiences.

This workshop will be conducted in SMP 3 Naringgul for two days and STEM teachers from all 4 schools will participate in it.

Workshop on Learning Material Development

Developing learning materials involves writing materials, creating learning exercises, and working with content and instructional media experts. Developing learning material is the most time-consuming phase of learning preparation; draft materials may go through multiple revisions, involving several people, before they are ready for in-class use. The learning materials to be developed for this intervention include STEM videos. Development will include the following activities.

- Prepare the video instruction and teaching materials
- Prepare the engagement video quiz
- Develop a simple simulation
- Prepare the learner analytics and data visualization

This workshop will be conducted in each school for three days and all teachers of the school will be invited to participate regardless of whether they are STEM teachers or not. This is intended to generate wider support for the initiative and for the efforts of the STEM teachers.

Online facilitation

Online facilitation sessions are provided for STEM teachers to discuss their integrated lesson plan and STEM teaching preparation, starting one week after each workshop for a maximum of three weeks for a total of 10 synchronous meetings in order to check, review, and validate the development progress of STEM teachers.

a) Participants will work individually or in groups to complete lesson plans under the assistance of instructional design experts (3 online facilitation sessions with the *Guru Penggerak*),

b) Developing assessment instruments (3 online facilitation sessions with the *Guru Penggerak*)

c) Developing learning materials based on lesson plans under the assistance/supervision of an instructional media expert: (3 online facilitation sessions with the *Guru Penggerak*)

d) Integration of learning materials into knowledge sharing platforms with Pusdatin trainers.

e) Preparation for the pilot test: 1-time online facilitation with SEAMOLEC and TIESEA team.

The online facilitation will be conducted using a webinar platform and a Learning Management System for hosting the course content and all the asynchronous activities. Since teachers have mobile phones, teachers will be supported with an internet quota during the project to enable communication and online facilitation by phone.

During the online facilitation sessions, teachers will finalize their integrated lesson plan, prepare and/or develop learning materials for the STEM teaching, and also prepare two sets of exam items for pre-test and post-test. There will be two different categories of lesson plan and teaching preparation: in the experimental schools, the lesson plan and preparation are designed to include the use of educational technology, while in the control groups the lesson plan and preparation are designed to not include the use of educational technology. For the first three months, 2 schools will be serving as control schools and 2 schools as experimental schools, then in the 2nd three months, all schools will use technology for STEM teaching and learning. Blueprint and indicators for student digital literacy, problem-solving ability, critical thinking, communication and collaboration skills, teamwork, and also interdisciplinary learning skills will be drafted for this purpose.

Teachers are expected to work independently and be assisted by a mentor. Assisting/mentoring sessions will be carried out through synchronous online facilitation. The development process involves creating/curating and assembling the learning content based on the developed lesson plan. This step also involves review and validation and any required revisions. This phase may involve the integration of technology and related testing.

Following on from the learning materials development, teachers will be supported to organize their learning materials according to their lesson plans. The integration of learning material into the Digital library / Offline content server[9] will be carried out in an online workshop and involve teachers. The teachers will upload the learning materials, learning guidelines, as well as the assessment tools. In this phase, the learning materials are expected to be ready to be accessed by students through the Dikti Edu[10] laptops.

[9] A Raspberry Pi 4 will be set up as a headless server to function as a low power, always on, digital library or content server. Materials stored on the Raspberry Pi will be accessible through the router (access point) without Internet availability.
[10] 80 locally produced laptops have been donated to the project by the Dikti Edu initiative.

Pilot testing

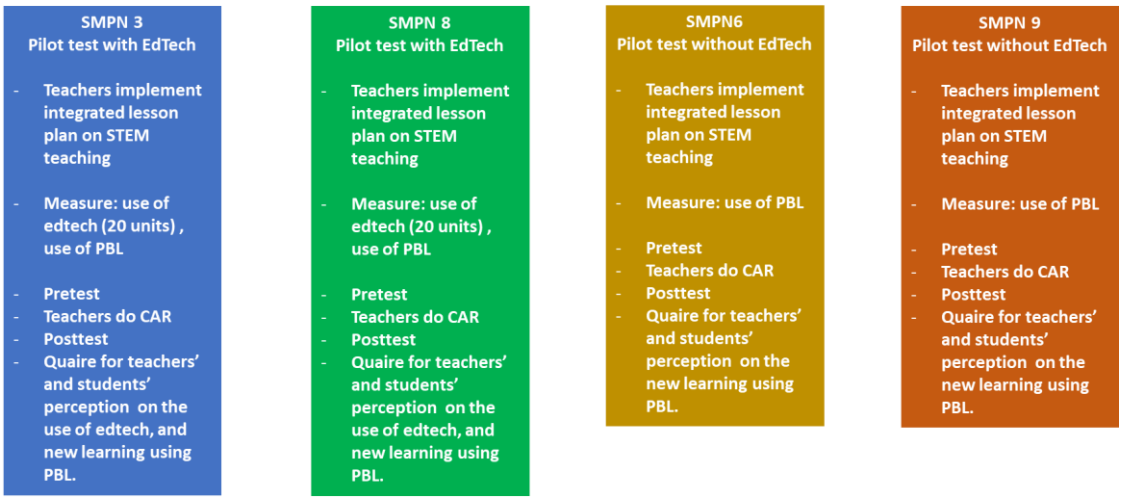
Pilot testing involves confirming the availability of required learning materials and associated applications/tools and preparing students to use any required tools or technology to perform participant engagement.

Pilot testing involves 1 learning group with 2 – 3 teachers in each school. In the experimental group, all teachers and students will be equipped with laptops – 20 units per school. While for the control groups, teachers and students conduct their teaching and learning without laptops.

SMPN 8 and SMPN 6 have been provided with Chromebook through the MOECRT Project with limited/restricted access for teachers and students. Nevertheless, they will still be allocated the regular laptop, as to provide wider access for teachers and students to learning resources.

The pilot test will be carried out as classroom action research for teachers using a pre-test post-test design to obtain the gain score. Thus, they will be able to experience the pilot test as a research activity and they will be able to write articles on the experience.

The pilot test will only be implemented for STEM courses at 8th grade: Science and Math.



The pilot test will be conducted in two phases:

a. First phase for three months, teachers will discuss two selected STEM topics. SMPN 3 and SMPN 8 will be the experimental schools, while SMPN 6 and SMPN 9 will be the control schools.

b. Second phase for three months, teachers will discuss two other selected STEM topics. This time, SMPN 3 and SMPN 8 will continue to be the experimental schools, while SMPN 6 and SMPN 9 will change to be involved in the experiment as well. This will allow teachers at the second two schools to be able to reflect on their experience of teaching STEM topics with and without the aid of EdTech.

Detail schedule of intervention is as below:

First term (August - October 2022): Teachers Professional Development

Time	Objectives	Material	Activity
August 2022			
Week-1	- Teachers are introduced to Merdeka Mengajar Platform and the Merdeka Curriculum	- Introduction of Curriculum Merdeka and Pelajar Pancasila Profile - Hands on experience on Merdeka Belajar Platform	2 days of face-to-face workshop facilitated by Pusdatin
	- Teachers are able to design educational technology integrated learning for their STEM courses - teachers are able to utilize education technology in their teaching for STEM courses	- Integration of the STEM approach into science education - Introduction to Project Based Learning (PBL) & Designing Project Ideas - Introduction to tools for project-based learning (e.g. MS. Notes, MS. Whiteboard, MS. List)	2 days of face-to-face workshop by instructional design experts, Microsoft Expert.
Week-2	Teachers are able to design learning activities for their STEM courses based on a pre-determined topic.	Lesson plan development refers to structuring of a lesson to achieve specific instructional goals. The lesson plan development includes the following questions: 1. **General theme or topic**: In general, what knowledge and skill areas will be the focus of the learning activity? 2. **Goals and objectives:** What do we want students to learn during the learning activity? (What will they leave knowing more about or what new skills will they have acquired?) 3. **Essential questions**: What central questions do we want students answering as the learning activity unfolds? 4. **Summary of participant activities**: How will students accomplish curriculum objectives and answer the questions in numbers 2 and 3 above? (e.g. steps of PBL activities.) 5. **Resources**: What resources might the teacher use to help students accomplish curriculum objectives? (e.g.	Participants work individually or in groups

		current problem around, discussions, learning materials) 6. **Assessment activities**: How will we determine if students a) have reached curriculum objectives identified in number 2 above; and b) can answer the questions in number 3. 7. **Evaluation** of the learning and the learning process: How will we evaluate the quality and usefulness of the learning activity as well as its implementation?	
Week-3		Review on lesson plan development	Online facilitation through Video Conference by instructional design experts
Week-4		Finalization on lesson plan development	Online facilitation through Video Conference by instructional design experts
September 2022			
Week-1	- Teachers are able to apply the developmental learning assessment principles in their own contexts - Teachers are able to use several developmental assessment tools and methods	Assessment Instrument Development. - Student deliverables and formative assessment - Summative assessment development - Student interaction with assessment tools - Evaluation instrument development to measure longer-term learning outcomes	2 days of face-to-face workshop facilitated by TIESEA team
Week-2		Assessment Development - Questionnaires or discussion questions for gathering information from students before the learning activity - Exercises that help students reflect about their own learning objectives - Pre-tests or activities to determine what students already know; or what students want to learn - Post-test or activities to measure student learning achievement.	Participants work individually or in groups

Week-3		Review of assessment instrument development	Online facilitation through Video Conference by instructional assessment experts
Week-4		Content and construct validation to determine the feasibility of an instrument draft	Online facilitation through Video Conference by instructional assessment experts
October 2022			
Week-1	Teachers are able to produce learning materials to support their STEM course	Learning Material Development - Prepare the video instruction and teaching materials - Prepare the engagement video quiz - Develop a simple simulation - Prepare the learner analytics and data visualization	3 days of face-to-face workshop facilitated by TIESEA team
Week-2		Developing learning materials based on lesson plan	Participants work individually or in groups
Week-3		Review on learning material development	Online facilitation through Video Conference by instructional media expert
Week-4		Learning material revision based on the results of the review	Participants work individually or in groups

Second Term (November - December 2022): Finalization and Preparation for Pilot Test

Time	Objective	Material	Activity
November 2022			
Week-1		Finalization of learning material development	Online facilitation through Video Conference by instructional media expert
Week-2	Learning materials are ready and able to be accessed by students	Integrating learning materials into Digital library/Offline content server and, optionally, MMP/*Rumah Belajar*	2 days of face-to-face workshop facilitated by Pusdatin
Week-3		Confirming the availability of required learning materials in Digital Library/ MMP/*Rumah Belajar*	remote monitoring carried out by mentor

Time	Objective	Material	Activity
Week-4		Preparing students to use any required tools or technology	Independent workshop conducted by teachers
December 2022			
Week-1	To ensure the availability of the required learning materials and associated devices/applications ready to be accessed	Preparation for pilot test	Teachers work individually or in group
Week-2			
Week-3			

1. Pilot Test Implementation

First Phase (January - March 2023)

Objective	Activity				Location	
	January 2023				Control	Experiment
Teachers pilot test their plan for teaching STEM using technology	Week-1	Week-2	Week-3	Week-4		
	Implementation of Project based Learning on STEM Course for Topic 1				SMPN 6 SMPN 9	SMPN 3 SMPN 8
	February 2023					
	Week-1	Week-2	Week-3	Week-4		
	Implementation of Project based Learning on STEM Course for Topic 2				SMPN 6 SMPN 9	SMPN 3 SMPN 8
	March 2023					
	Week-1	Week-2	Week-3	Week-4		
	Reflection and Evaluation		Report Writing		SMPN 6 SMPN 9	SMPN 3 SMPN 8

Second Phase (April - June 2023)

Objective	Activity				Location	
	April 2023				Control	Experiment
Teachers pilot test their plan for teaching STEM using technology	Week-1	Week-2	Week-3	Week-4		
	Implementation of Project based Learning on STEM Course for Topic 3					SMPN 3 SMPN 8 SMPN 6 SMPN 9
	May 2023					
	Week-1	Week-2	Week-3	Week-4		
	Implementation of Project based Learning on STEM Course for Topic 4					
	June 2023					

	Week-1	Week-2	Week-3	Week-4		
	Reflection and Evaluation		Report Writing			

Technology and Facilities needed

a. Laptops

   i. Laptop DiktiEdu 20 units for each school. This laptop is specially designed by ITB research teams with specification agreed with MOECRT.

   ii. For the experimental schools: the Laptop is provided prior to pilot testing.

   iii. For the control schools: the Laptop is provided prior to the second phase of pilot testing

   iv. OS Windows and Office: furnished by Vendor and Microsoft.

   v. Use of laptops in class is beneficial for teachers and students:

   - Foster online collaboration with other students
   - Provide learning materials and additional information to students
   - Promotes better organization: laptops help students keep track of their assignments
   - Allows students to receive and view assignments and submit their work digitally instead of being required to print it out
   - Improve the review process: teachers can edit student work and return it digitally to provide more detailed feedback
   - Improve students' computer skills
   - Make learning more interesting for tech-savvy students

b. Raspberry Pi as a content server: one per school
The Raspberry Pi will be used to store digital teaching materials as a digital library and allow students and teachers to access and perform activities. This Raspberry Pi is equipped with aluminum case and SD card for the content storage.

c. Access Point: one per school
Access point will be used to extend the Raspberry Pi network to be connected with devices.

d. UPS
An Uninterruptible Power Supply (UPS) will provide backup power when the regular power source fails, or voltage drops to an unacceptable level. This UPS will be used as be used as a battery backup for Raspberry Pi, WiFi Router, and Laptops charging cart.

e. LCD projector: one per school

Projectors enable video content, images and visually appealing presentations to take the place of traditional whiteboards, offering more learning options.

f. Computer speakers: one pair per school
Speaker enhances the learning environment, as it supports sound equalization.

g. Laptop charging cart: one per school

Laptop charging carts to ensure the safety of laptops in schools.

h. Electricity equipment such as cabling and other small tools for power set up, will be important equipment to set up that hardware in a classroom. Light lighting conditions is also important to encourage a comfortable and vibrant environment that surges the student's concentration and motivation levels.

Reporting

For the purpose of reporting, there are several kinds of data set needed as follows:

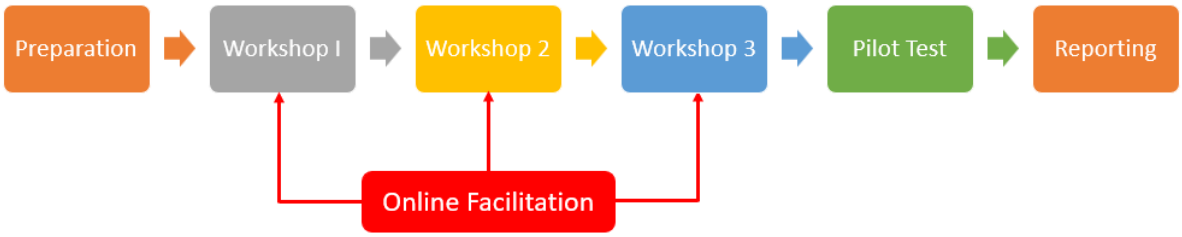
1) teachers' perception on the teaching of STEM using and not using educational technology
2) students' perception on the teaching of STEM using and not using educational technology
3) gain score from pre- and post-tests

Questionnaire for teachers' perception and students perception will be devised by the team, while test items will be prepared by teachers.

Furthermore, challenges faced during the development and pilot testing phase are identified, and will inform recommendations for further program improvement.

Mechanics of Implementation

1. Formal letter from TIESEA and endorsement letter from DG Teachers & Personnel to the Kepala Dinas Pendidikan Kabupaten Cianjur
2. Endorsement from Kepala Dinas Pendidikan Kabupaten Cianjur to schools
3. Assignment of teachers by the Principals of schools
4. Starting of the intervention:



5. Monitoring and Evaluation
6. Reporting.

Annex 3: Philippines TIESEA / TESDA pilot program in detail

TESDA TOP PROGRAM

Restrictions imposed by the COVID-19 pandemic resulted in many Filipinos turning to Information and Communication Technology (ICT) for both education and work. As a result, the TESDA Online Program (TOP) has been highly popular and successful during the period limited only by the need for students to have reliable online connectivity. Through its collaboration with TIESEA, TESDA is now looking to extend the reach of TOP to areas where Internet connectivity is less solid.

The TIESEA Pilot Project includes the provision of EdTech hardware packages to be given to project sites consisting of a high-end laptop, Wi-Fi router, and a Raspberry Pi for TESDA training institutions and tablet computers for learners. The objective of the proposed pilot is to test the viability of using EdTech, together with the latest educational strategies and practices, to support TVET implementation in hard-to-reach areas where internet connection is weak or non-existent. The project envisions utilizing a blended learning approach whereby TOP can be accessed by students online where connectivity is available, or offline through a content server installed in training institutions located in low network areas. The project will target four (4) sites to run eight (8) batches of the TESDA module, 'Photovoltaic Systems Installation NC II'.

The Pilot Project has an estimated budget of almost USD 100,000 with contributions from the ADB amounting to approximately USD 66,000 (covering both equipment and operational costs) and a shared contribution from TESDA for the direct and indirect costs of training and assessment of 200 learners together with technical and administrative expenses, to a total of around USD 27,700. The pilot is proposed to be implemented from July 2022 to July 2023.

If successful, the pilot Project is expected to be scaled up to enable TESDA to support students across all regions of the Philippines and may be adopted by other TVET providers.

Implementation Mechanics

Selection of Participating TTIs

Four (4) project sites shall be selected. The test areas shall be in semi-urban (where internet connection is reliable) and rural areas (where internet access is weak/unreliable or absent).

The Pilot Project Team shall conduct an inspection of possible project sites and institutions which shall host the implementation based on the following:

- Class 1 and 2 – Semi-Urban (using the online TOP and the TOP App)

  Training Delivery: Institution-Based
  Internet Connectivity: With at least 5mbps internet access

- Class 3 and 4 – Rural (Using MoodleBox on an Raspberry Pi as local server)

  Training Delivery: Institution-based

Internet Connectivity: No internet access

Specific selection criteria shall be the following:

1. Has a registered training program for PhotoVoltaic Systems Installation NC II
2. Has approved scholarship vouchers (TWSP) implementable within the period of study
3. The trainer of the program has participated in the Trainer's Training for Online and Blended Learning using the TOP

Provision of EdTech hardware package

Prior to the implementation of the training programs, the EdTech hardware Package shall be delivered to the TTIs after being set up by the eTESDA unit. Orientation and instructions shall be provided to the trainer on the use of the gadgets and equipment to allow the trainer to familiarize him/herself with them. The equipment shall be donated to the TTI project sites after the project completion.

Items	Specifications	Quantity	Description of Use
High-end Laptop	Intel Core i7, 11th Gen 512GB SSD Windows 10 or 11 Full HD Resolution	1	• To be used by trainers to develop eLearning materials to enhance TOP courses • Embedded in its Policy guidelines for Blended Learning is the enhancement of the eLearning materials which will include trainer-developed videos that will contextualize learning activities with actual equipment in the TTI workshop. • The laptop will also be used by the trainer to monitor accomplishments of learners, communicate with learners through forum discussions and chats; and to post learner schedules for learner practice and demonstration of skills. • Since the local content server does not have a monitor, the laptop will also be used for maintaining/updating the server and for providing eTESDA learner completion reports for purposes of consolidation in a central database.
Mobile Tablets	4GB RAM; 64GB ROM; Android 10 or 11; Octa-Core, 2GHz4; 1920 x 1200 resolution; 10.5 inch display; WiFi and LTE ready with dual SIM slot; 3.5mm Stereo Earjack; and 7040 mAh Battery Capacity;	25	• To be used by TVET learners • Mobile tablets are preferred over smart phones to ensure that demonstration videos of technical skills are appropriately seen by learners. Competency-based TVET necessitates that skills are demonstrated. Smaller-screens may not provide and show clearly the demonstration of skills especially for qualifications that have complicated and have technical elements.

WiFi Router	Dual band 2.4 GHz band: 2400 - 2483.5 MHz 5 GHz band: 5150 - 5250 MHz, 5724 - 5850 MHz	1	• To be used by TTIs
Raspberry pi Kit	Raspberry Pi 4 Model B 4GB with power supply and Argon 1 M.2 enclosure.	1	• To be used by TTI trainers in the conduct of training in rural settings
SSD Drives	128GB SSD drive to be installed in an Argon 1 M.2 enclosure	1	• To install operating system and eLearning materials

The eTESDA team shall be provided with one (1) set of the EdTech hardware package to test the viability of EdTech solutions using the TOP before deployment. As the division in-charge of the pilot testing, it is necessary to have the same set of equipment to ensure replication of the delivery. In addition, due to the nature of TVET qualifications that vary from knowledge-based to highly technical, eLearning courses also have varying elements depending on the instructional design. Some courses may have more modules, videos and instructional activities, as the qualification requires which would also have an effect on the storage capacity required. In addition, as part of the continuous improvement of the project, the eTESDA would need to test solutions/interventions to address issues or problems encountered mid-way through the project.

As a laboratory of educational technologies, eTESDA started an experiment on developing a local server using a Raspberry Pi and MoodleBox software. The Raspberry Pi used was purchased from the personal resources of eTESDA personnel. Proving its potential, several elearning courses were hosted making use of USB drives and old HDD. To test the viability of the project by simultaneously connecting gadgets, cell phones and tablets personally owned by several staff were used. The capacity of the local server to support 25 simultaneously connected tablets is yet to be tested. Moreover, strategies such as chunking of contents and optimizing of videos and other eLearning assets are yet to be tested due to the absence of a complete package. Hence, there is need for the eTESDA unit to utilize an EdTech hardware resource that mirrors that to be used in the pilot.

Orientation/Training of Trainers and LMS Administrators

Orientation of TTI instructors and LMS Administrators will include:

1. A workshop conducted to orientate the TTI instructors to the objectives of the Pilot Project, and to make them aware of the experimental design and their primary monitoring and evaluation responsibilities.
2. LMS Administrators will be trained in how to add content as required to the Raspberry Pi content server, and how to access the required metrics (test/quiz results, student attendance records etc) from the local content server for uploading to the central TESDA database.

Preparation of Training and Monitoring Tools

During the training and orientation of trainers stated above, the following training and monitoring tools shall be prepared to more or less standardize training implementation, monitoring, and assessment:

1. LMS and course materials
2. Study Guides
3. Training Activity Matrix
4. Progress Charts
5. Workshop layouts
6. Institutional assessment tools

Annex 4: Communicative language teaching in Viet Nam and the role of EdTech

An important feature of the pilot intervention in Viet Nam is the nature of the professional development and support that will be provided to the teachers. that there will be a shift in teaching and learning strategies in both control and pilot schools. The shift will be facilitated by the trainers from Microsoft who will train and encourage the teachers to adopt more student-centered approaches to classroom practice and use the modern "Communicative Language Teaching" methodology in contrast to the predominant traditional mode of the so-called "Grammar-Translation Method", based on learning grammar rules, developing vocabulary and translation to and from the native mother tongue into the target language. In an of itself, adopting a CLT approach improves speaking and listening skills as the target language is used more frequently and fluently in classroom settings, the TIESEA intervention in Viet Nam, using the ELSA Speak app, aims to assess the added value of the technology when using CLT methodologies.

There are many aspects of the teaching process that distinguish the CLT, in contrast to the GTM approach to language learning and teaching. The first one is mother tongue: in traditional GTM students are mother tongue, with cross-translation into the target language. It means that the teacher facilitates students in teaching learning process of target language by using the native language. By contrast CLT actually uses the native language in teaching learning process and uses role play and conversation to improve the verbal/oral communicative skills of the students. Furthermore, the teacher instructs the students to acquire the vocabulary through real world contexts for example using blogs, newspaper articles and pictures. This encourages the students to speak freely, whereas following GTM methods there is often an embarrassment and reluctance of the students to speak in the target language. This means that the learners hesitate in their speech, are nervous about mis-pronunciation and do not fully develop a suitable verbal repertoire. CLT encourages the students to communicate with target language without focusing on grammar. In so doing, the teachers concentrate upon the students' willingness to communicate with the target language and then, afterwards, check or revise the students' grammar after producing the language, for example in sentence or text.

The practice is aimed at helping students to enjoy the lesson. When the communicative approach is working well and the teacher is confident in its application, it is evident that students do not hesitate and are not shy to produce the language; the learning context is similar to when learners acquire the first language or mother tongue. In a typical mixed-ability communicative language classroom there is often not enough time for teachers to hear, listen to and give feedback to individual learners on the quality of speech and language reproduction, and it is in this context that EdTech has a strong role to play. When users have their own devices they can speak, practice and replay their language pronunciation attempts many times – both in-class and during home learning.

Overleaf is a summary of the features, similarities and contrasts of the CLT compared with the traditional grammar-based approach and finally, there is an introduction to the ELSA app.

Table. 1 The comparison between GTM and CLT

Principle	Grammar Translation Method (GTM)	Communicative Language Teaching (CLT)
Characteristic of Teaching Learning Process.	1. Students are taught to translate from native language to the target language. 2. Students learn grammar deductively. 3. Learners memorize native language equivalents for the target language vocabulary.	1. Everything is mostly done with communicative intent. 2. Students use the language through communicative activities such as game and role-plays. 3. Communication is purposeful. 4. Using authentic materials. 5. Activities are often carried out by students in small group. 6. Grammar is taught inductively.
Nature of Interaction.	1. The interaction is mostly from the teachers to the students. 2. Little students' initiation. 3. Little student-student interaction.	1. Teacher is a facilitator. 2. Teacher sometimes becomes co-communicator. 3. Students interact with one another.
Handling the students' feeling and emotion.	1. There is no principle related to this area.	1. Motivate the students. 2. Teacher gives the opportunity to the students to express their individuality. 3. Students' security is enhanced by cooperative interaction.
The role of native language of students.	1. The meaning of the target language is made clear by translating into the learners' native language. 2. The native language is mostly used in teaching learning process.	1. Students' native language is permitted. 2. Most of the activities are explained by using target language and native language only for certain thing.
The language skills that are emphasized.	1. Vocabulary and grammar are emphasized. 2. Reading and writing are the primary skills.	1. The functions are reintroduced and the more complex forms are learned. 2. Students work on all four skills (listening, reading, writing and speaking) from the beginning.
The way of teachers' response to students' error.	1. Correct answer is extremely significant. 2. If students makes an error the teacher will supply them with the correct answer.	1. Error of form is tolerated during the fluency-based activities. 2. The teacher may note the learners' error and return to the learners with accuracy-based activities.

ELSA stands for English Language Speech Assistant. It's an app that helps with English pronunciation. The CEO of ELSA Speak, Vu Van, decided to create this app after she studied in the United States and found that people had difficulty understanding her because of her accent. With the help of artificial intelligence and videos from native English speakers, this app tries to help you learn a neutral American accent.

This introductory video give a good overall introduction to the ELSA app.

https://youtu.be/5SDqVjYncXY

ELSA Speak does not focus on English language basics, such as vocabulary and grammar. It is a tool to help improve pronunciation and listening only. It is a useful app for intermediate to advanced speakers who already have a good understanding of the language. All of the videos and practice exercises are in English, so beginners will have a more challenging experience.