

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

Diagnostic Assessment Report – Cambodia Country Report

March 2022



Learning Possibilities

This Report presents preliminary findings and an official ADB
publication will be produced in due time

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

DIAGNOSTIC ASSESSMENT REPORT – CAMBODIA COUNTRY REPORT

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TABLE OF CONTENTS

ABBREVIATIONS	2
EXECUTIVE SUMMARY	4
1. THE EDTECH READINESS ASSESSMENT FRAMEWORK	8
2. APPLYING THE EDTECH READINESS ASSESSMENT FRAMEWORK TO CAMBODIA	10
Infrastructure	10
Government	12
Schools / Teachers	16
Students / Parents.....	19
Providers – Companies and Public-Private Partnerships.....	21
3. KEY FINDINGS AND RECOMMENDED INTERVENTIONS	25
REFERENCES	27
ANNEXES	29
Annex 1: Inventory of Edtech Providers.....	29
Annex 2: Survey findings - Cambodia.....	34
Annex 3: Report on gender gap in EdTech in Cambodia	40

ABBREVIATIONS

ADB	Asian Development Bank
AI	Artificial Intelligence
AR	Augmented Reality
ASEAN	Association of Southeast Asian Nations
CDDE	Center for Digital and Distance Education
CDPF	Capacity Development Partnership Fund
CEO	Chief Executive Officer
CIA	Central Intelligence Agency
DERF	Digital Education Readiness Framework
DIT	Department of Information Technology
DTV	Digital Television
EAC	Electricity Authority of Cambodia
EdTech	Education and Technology
EGRA	Early Grade Reading Assessment
EMIS	Education Management Information System
ESCAP	United Nations Economic and Social Commission for Asia and the Pacific
ESD	Education for Sustainable Development
EU	European Union
EYS	Education, Youth and Sport
GB	Gigabyte
GCED	Global Citizenship Education
GDP	Gross Domestic Product
GMAP	Gender Mainstreaming Action Plan
GNI	Gini Index
GO	Government
HR	Human Resource
ICT	Information and Communications Technology
IDI	ICT Development Index
IF	Infrastructure
IIC	ICT Innovation Center
IoT	Internet of Things
IT	Information Technology
ITU	International Telecommunication Union
JICA	Japanese International Cooperation Agency
KAPE	Kampuchea Action to Promote Education
LAN	Local Area Network

MoEYS	Ministry of Education Youth and Sport
MS	Microsoft
NCF	National Curriculum Framework
NGO	Non-Governmental Organization
NGR	New Generation Schools Reform
NGS	New Generation Schools
NIE	National Institute of Education
NIPTICT	National Institute of Posts Telecommunications and Information Communication Technology
NIS	National Institute for Statistics
NRI	Network Readiness Index
ODA	Official Development Assistance
OER	Open Education Resources
OS	Operating System
PPP	Public-Private Partnerships
PR	Providers
RCEP	Regional Comprehensive Economic Partnership
RGC	Royal Government of Cambodia
RTTC	Regional Teacher Training College
RUPP	Royal University of Phnom Penh
SADIF	Smart Axiata Digital Innovation Fund
USAID	United States Agency for International Development

EXECUTIVE SUMMARY

Based on the five pillars of the ADB EdTech Readiness Framework, this report describes the current situation of education in Cambodia in general, with a specific focus on how EdTech is being implemented to improve the quality of teaching and learning. The five pillars of the framework include infrastructure, government, schools/teachers, parents/students, and EdTech providers. By identifying the existing status of EdTech readiness in Cambodia using this framework, the report seeks to provide evidence against which decision-makers can identify initiatives likely to make a positive contribution to the quality of the education ecosystem and opportunities for public-private partnerships.

Cambodia had a population of 16.83 million people in January 2021 (51.2% of Cambodia's population is female) and 8.86 million internet users in January 2021, giving it a 52.6% internet penetration rate¹. In 2021 Cambodia had 12.00 million social media users (equal to 71.3% of the population). Cambodia is ranked 106th out of 130 economies in the Network Readiness Index (NRI) 2021, with impact (quality of life) as its key strength and governance as its main weakness (trust).

An account of the gender gap in EdTech is included in Annex 3) of this report. In brief its findings are that the Royal Government of Cambodia is committed to gender equality and over the past five years the proportion of women who are in the workforce has increased by 5% to 84%; but female's opportunities in EdTech are largely limited by cultural and family beliefs and values that see EdTech as being a male dominated field. Notwithstanding this, in Upper Secondary Schools the proportion of girls remaining in education is higher (54%) than boys (46%) and girls are increasingly opting for STEM subjects – though they are then more likely to follow science than technology options at university. More women are now becoming self-employed (65% of all SMEs are now owned and run by women) and their skills in using online eCommerce opportunities is a critical success factor here. In general women teachers have lower EdTech skills than men and lower levels of digital literacy. Although in general, across the country, smartphone ownership is high, rural women are the least likely segment of the population to own a cellphone.

Infrastructure

The extent of fixed line connectivity is extremely low in Cambodia, and the country has fast shifted away from this high-cost infrastructure and toward mobile communication, with 21.18 million mobile connections Cambodia also offers the most affordable mobile service in Asia, with an average monthly subscription cost of about \$4. There are six mobile phone providers in Cambodia, and the country ranks 66th in the world in terms of mobile data prices, with an average of \$1.50 for 1 GB of data (Cable.co.uk, 2020). Only 13.3% of Cambodian families have access to a computer, despite the fact that 41.1% of households in the Asia-Pacific area do (ITU, 2019). With a penetration rate of 125.8% among the general population, mobile devices (smartphones) are mostly utilized for internet access. 97.6% of Cambodian households have access to electricity.

The most popular form of media in Cambodia is television, which reaches 96% of the country's population through its 18 television channels. During COVID-19 pandemic, education TV programming broadcasted on National Television of Kampuchea and other cable TV networks throughout the country, such as a newly created TVK2 for educational broadcasting, Decho DTV's channel 22, and 55 new cable TV networks².

¹ Kemp, 2021

² Aide et Action Southeast Asia, 2020

Government

The Rectangular Strategy Phase IV, ICT Master Plan 2020, Telecom/ICT (T-ICT) Development Policy 2020, Law on Telecommunication, and the ICT Strategic Framework are all policies produced by the Royal Government of Cambodia (RGC). Cambodia, on the other hand, is ranked 124th in the UN's E-Government Development Index and 129th in the E-participation index ³ indicating that these policy texts must be translated into practice and practical strategies.

In 2016, MoEYS implemented a curriculum framework, and in 2018, all levels of the school adopted a course syllabus that integrated student-centered concepts and techniques through inquiry-based learning. Computer programming is now part of the new national curriculum for students in grades 4 through 12. Additionally, there are programs that provide content on ICT, such as New Generation Schools, which focus on STEM, ICT, and critical thinking skills, and Caring for Cambodia, which increases workforce readiness and academic skills so that students can work in growth fields, including ICT, both of which collaborate with MoEYS.

The Education Sector Development Plan intends to have a system in place by 2030 that maximizes the use of ICT opportunities and data connectivity for real-time information exchange, analysis, reporting, and feedback for education performance measurement. For stakeholders (school managers and administrators, parents and local communities, MoEYS national and subnational, Ministry of Economic and Finance (MoEF), National Institute for Statistics (NIS), and ODA partners), the EMIS (Education Management Information System) will administer, plan, and monitor. Under EEQP2, this means a shift from a client-server system to a web-enabled and integrated system, as well as decentralization and a new focus on Student Tracking Systems and School Information Systems (SIS), with financial support from the CDPF (Capacity Development Partnership Fund), which is managed and financed under UNICEF's guidance in partnership with the MoEYS, EU, and SIDA.

Schools / Teachers

To develop teachers' capacity and reform teacher training institutions at NIEs, TECs, and RTTCs to ensure the equivalence of training outcomes, especially in STEM and ICT, in-service and pre-service training must include new and modern pedagogical approaches and integrate ICT; to develop teachers' capacity and reform teacher training institutions at NIEs, TECs, and RTTCs must include new and modern pedagogical approaches and integrate ICT; and to develop teachers' capacity and reform In practice, however, ICT skill training for pre-service teachers is limited to basic computing such as Microsoft Office suite, internet browser, and using Windows operating system on a PC, and in-service teachers, with the exception of teachers from the ten New Generation Schools, receive no ICT training.

The National Institute of Education and four Regional Teacher Training Centers, which serve as a centralized pre-service and in-service government training institution, provide a time-based training framework rather than an outcome-based modular framework, but only rudimentary pre-service ICT training is provided, with no or only limited in-service training is provided. According to an ADB poll⁴, about 5% of instructors make PowerPoint slides for teaching purposes on a weekly to daily basis, while 12% create videos on a weekly to daily basis. However, more than 70% of teachers indicated they 'rarely' to 'never' create online assessments/quizzes for pupils. More than 76% of the teachers polled said they don't use email or file-sharing apps like Google Drive, OneDrive, or Dropbox on a regular

³ UN, 2020

⁴ ADB 25 January 2021, Cambodia EdTech Country Situation Analysis.

basis. Not all teachers appear to have frequent access to a computer in order to properly use a file sharing system. To communicate files among themselves or with pupils, most people utilize a social messaging tool like Telegram or a social media platform like Facebook. This indicates either a lack of awareness by the professors of the collaborative power (value) of file sharing systems or a lack of appropriate instruments to use them.

The lack of computers, no or inadequate Internet access, particularly unstable and/or insufficient bandwidth, are all major impediments to EdTech use in schools. There is also a scarcity of qualified personnel to administer EdTech infrastructure and provide support to users in schools. Only 17% of upper secondary schools and 5% of lower secondary schools have computer labs, according to MoEYS (2019). 40% of upper secondary schools have internet connectivity; yet, in most cases, the internet is only used for administrative purposes in the school administration office. Cambodia has put a lot of effort and money into developing and implementing strategies to improve the use of ICT in education. Schools, on the other hand, use a variety of paper-based forms to manually collect data for monitoring and evaluation purposes, such as student enrollment information, grades, and attendance records, for the EMIS system once a year, and then enter that data into the computer at the school administrative office.

More than 95% of respondents to the teacher poll⁵ agree that the ability to share ideas, teaching experiences, and guidance is 'critical' or 'very critical' for a community of practice. The great majority of teachers still utilize the old-fashioned practice of writing letters or calling parents through students or peers (about academic problems, absenteeism, and behavior problems). Schools could use existing social messaging systems that teachers and parents are acquainted with, such as Telegram Group or Facebook Group, to create parents' groups for each class and the entire school as communication channels for instructors and school to reach out to all parents.

Between 20 and 37% of teenagers and adults have copied or relocated a file or folder, used copy and paste tools to replicate inside a document, sent e-mails with attachments, and transferred information between a computer and other devices. However, only about 2.5% have connected and configured new devices, generated an electronic presentation with presentation software, identified, downloaded, installed, and configured software, or written a computer program.

Students / Parents

During the COVID-19 pandemic, the demands of remote learning posed increased obstacles to Cambodia's ICT system. Students access to online education resources and remote learning via a combination of cellphones, PCs, TVs, and radios was found to be highly problematic. MoEYS has endeavored to ensure the well-functioning of remote instruction, offering various e learning options, in collaboration with development partners, such as UNICEF and UNESCO. The aim has been to provide a proactive engagement using a combination of lessons and exercises provided by class teachers in combination with online content provided by the ministry through various platforms such as Facebook pages and Youth and e learning platforms such as the E-School Cambodia mobile app. But the ability to access these online materials has been far from universal.

While students in metropolitan cities like Phnom Penh and Siem Reap have access to Wi-Fi hotspots in cafes and classrooms, most villages in sparsely populated and remote locations lack the digital infrastructure needed to support learning (online). On Telegram and Facebook, there are hundreds of groups and channels dedicated to school disciplines such as math, English, physics, and chemistry, as well as activities such as syllabus, learning content, and exams, where teachers and schools may share

⁵ ADB 25 January 2021, Cambodia EdTech Country Situation Analysis.

resources. Rural locations have less resources in terms of technical skills and affordability, while urban areas have more resources - access to devices, device service.

Providers – Companies and Public-Private Partnerships

UNESCO and the Ministry of Education produced elearning courses for lower secondary/basic education in 2019, and are among Edtech's partners and supporters. The Cambodian Union of Youth Federations collaborated with E-school Cambodia to develop a portal that provides free content to students in grades 1 through 12. JICA has produced online classes in collaboration with the Ministry of Education that will be available on an app named "Think!". SALA, Koombi, Tablet on Wheels (ToW), KAPE, EDEMY, E-School Cambodia, STEM Cambodia, E2STEM, Go Digital ASEAN Initiative, InSTEDDiLab, ArrowDot, SystemExperts, IT STEP Academy are some of the other Edtech providers in Cambodia, and described in full in Annex 2 of this report.

The IR4.0 policy direction is to incorporate the Digital Economy and Society Policy Framework 2035, which focuses on the development of high-speed broadband network infrastructure to support the smart living of 95% of the country's citizens, additional infrastructure regulations, infrastructure sharing, a government data center and cloud, and the promotion of public-private partnerships to address current infrastructure gaps as well as technical assistance. The role of EdTech in public education was brought into the spotlight as the government announced remote-study during the global COVID-19 pandemic.

1. THE EDTECH READINESS ASSESSMENT FRAMEWORK

This study was undertaken to analyze the EdTech readiness of Cambodia in each of the five areas – also called pillars - of the Digital Education Readiness Framework (DERF) framework. The overview of each pillar of DERF contributes to a holistic understanding of the EdTech readiness of Cambodia, and would assist this Project to identify appropriate interventions to be implemented in 2022. This study will allow the ADB to fund EdTech interventions that can contribute to improving the quality of learning and teaching and schools in Cambodia using the affordances of appropriate EdTech. The ADB is the target audience as well as relevant government officials.

The ADB's Education Sector Group has developed the EdTech Readiness Assessment Framework as a tool to assess the current state of EdTech in the general education sector. The framework has five pillars as described below:

- 1. Infrastructure:** This pillar focuses on the current status of the ICT Infrastructure to support education, including its availability, accessibility, quality of services, and affordability. Four key components are assessed, including 1) power/electricity access, 2) telephony and internet connectivity, 3) devices and 4) broadcasting.
- 2. Government:** This pillar assesses the current situation of government policies and action plans that support the utilization of EdTech in enhancing educational outcomes. It relates to 1) policies and funding, 2) ICT integration in the curriculum, 3) education performance measurement, and 4) pre-service teacher training.
- 3. Schools/teachers:** This describes the capacity of school teachers and administrators to optimize the use of EdTech in teaching and learning. There are four key areas studied including 1) teacher capacity building in EdTech (in-service training), 2) equipment & software in schools, 3) governance (school policies, budget, monitoring for quality learning outcomes), as well as 4) community outreach.
- 4. Parents/students:** This pillar describes the home or community environment that enables or facilitates the use of EdTech to improve student learning outcomes. Again, there are four components including: 1) students' digital literacy, 2) home connectivity and availability of devices, 3) online access to curriculum content, and 4) community support.
- 5. Providers:** The last pillar shares insights on current EdTech providers and education public-private partnerships (PPP). It included a review of 1) the current situation of PPP in Cambodia, 2) learning management / eLearning systems and their online contents, and 3) emerging technology developers.

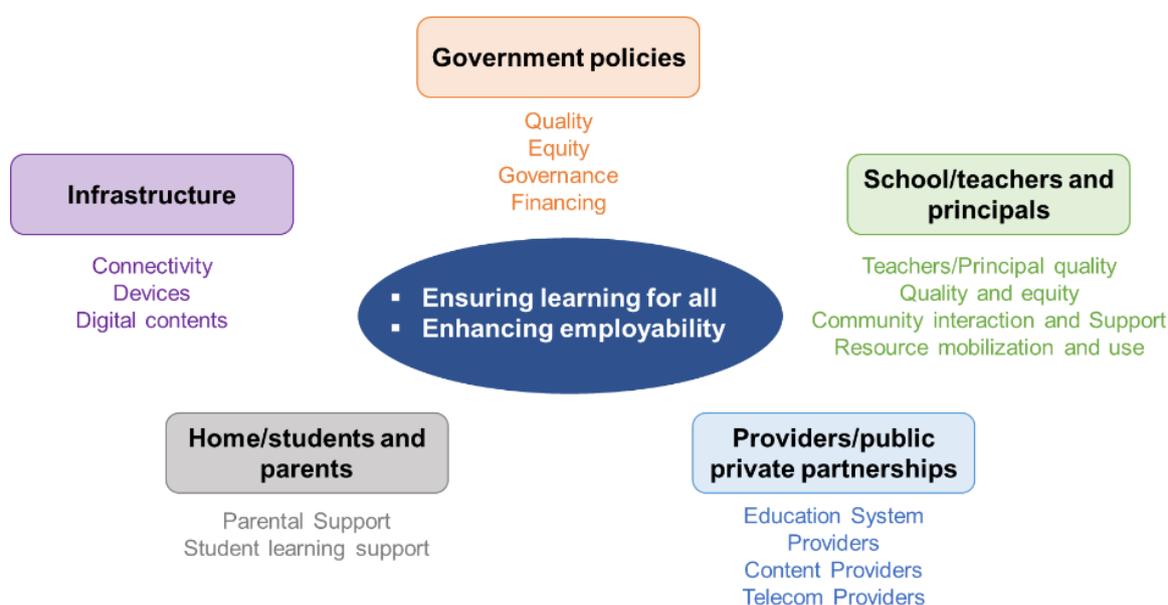


Figure 1: The EdTech Readiness Framework – Five Pillars of the EdTech Assessment for a Country
(Source: ADB)

The key components of the DERF domains and sub-domains are detailed as follows:

Domain / Sub-domain	PILLAR 1 Infrastructure	PILLAR 2 Government	PILLAR 3 Schools/ Teachers	PILLAR 4 Students/ Parents	PILLAR 5 Providers
1	IF1 (power, electricity access)	GO1 (policy / funding)	ST1 (teacher capacity in edtech)	SP1 (digital literacy of students)	PR1 (partners, sponsors)
2	IF 2 (telephony, internet connectivity, user stats)	GO2 (curriculum and content)	ST2 (equipment and software)	SP2 (connectivity and devices at home)	PR2 (e-learning systems)
3	IF3 (devices and hardware)	GO3 (education performance measurement)	ST3 (governance)	SP3 (online access to curriculum content)	PR3 (online content)
4	IF4 (TV/radio broadcasting)	GO4 (training)	ST4 (community outreach)	SP4 (community support)	PR4 (integrators, emerging tech)

Table 1: Key Components in each Domain

2. APPLYING THE EDTECH READINESS ASSESSMENT FRAMEWORK TO CAMBODIA

This country report describes the current situation of education in Cambodia based on the above-mentioned five pillars of the EdTech Readiness Framework.

Infrastructure

IF1 (power, electricity access)	The national electricity infrastructure and issues/challenges that schools and learners may have regarding access to electricity.
IF2 (telephony, internet connectivity, user stats)	Telecommunication access and internet connectivity - issues, challenges availability, etc.
IF3 (devices and hardware)	The national level availability of ICT devices that are related to edtech - availability, costs, maintenance, providers.
IF4 (TV/radio broadcasting)	Broadcasting methods, content creation and transmission, how it supports curriculum delivery and attainment of learning outcomes.

During a pandemic, having access to the internet and other communication channels has become increasingly important for maintaining access to education. Despite widespread mobile internet coverage across the country, fixed broadband connectivity has remained limited.

IF1 / IF2 (Power, telephony and the internet)

According to World Bank report published in early 2018 stated that 97.6% of Cambodia households have access to at least one source of electricity 71.5% from the grid and 26.1% off the grid, such as solar home system and rechargeable batteries⁶. By December 2018 the Electricity Authority of Cambodia (EAC) said it was supplying electricity to 12,305 villages (87% of all the villages in Cambodia) with distribution networks due to be constructed soon for a further 1,767 villages (12.5%).

Cambodia suffers from a significant energy shortage, making electricity in Cambodia the most expensive in the region, as high as \$0.15 per kilowatt hour (kWh). In neighboring Viet Nam, customers pay only \$0.07 per kWh, and the cost in Thailand averages \$0.10 per kWh⁷.

Cambodia was placed 128th out of 166 nations in the International Telecommunication Union's (ITU) ICT Advancement Index (IDI), which measures the country's technological development (ITU, 2017). Cambodia's internet penetration rate was 58%, significantly lower than the Southeast Asia average (66%) and neighboring nations such as Viet Nam (70%) and Thailand (60%). In comparison to 2019, the number of Internet users in Cambodia increased by 1.3 million (+15%) in January 2020, to a total of 9.7 million. When compared to the global growth rate of +7%, the annual growth rate is double.

Cambodia offers the most affordable mobile service in Asia, with a monthly subscription fee of under \$4 on average. This helps to make up for the fact that fixed-line connectivity is severely limited. Unlike many countries, which have traditionally started with fixed line connectivity and only recently moved to mobile internet connections, mobile networks have leapfrogged many nations in their dominance of wireless broadband connectivity via mobile telephony, owing to the historically availability of fixed line connectivity.

According to a report issued by the Statista Research Department in March 2021, 71.3% of Cambodians were active social media users. This was a considerable increase over 2016, when 27% of Cambodia's

⁶ World Bank, 2018

⁷ Beam Exchange, 2018, Globalpetrolprices.com, 2020

population was active on social media. Cambodia appears to have followed the trend of Asia Pacific as a whole, in which the region has become increasingly linked and, as a result, has a greater social media presence⁸.

In May 2020 Cambodia recorded 14.8 million mobile internet subscribers, accounting for 90% of the population.

Other supporting infrastructures for digital transformations, such as fixed-broadband subscriptions, LTE/WiMAX coverage, mobile-cellular costs, houses with computers, households with internet access, and international internet capacity per internet user, continue to be constrained. Recognizing the importance of digital connectivity for Cambodia's readiness for the transformation, the government supported the development of backbone fiber optic cables that increased to 37,441 km in 2017 and two undersea optic cable networks as mentioned in the Rectangular Strategy Phase IV. In 2019, Huawei Technologies announced a plan for installing an undersea fiber optic cable that would connect Hong Kong and Sihanoukville. More importantly, Cambodia stands to be amongst the first ASEAN countries to launch the 5G network.

IF3 (Devices and hardware)

The absence of computers in households is impeding digital transformation through the integration of technology into all aspects of society. Only 13.3% of Cambodian families have access to a computer, compared to 41.1% of homes across Asia and the Pacific⁹. Mobile technology is useful for entertainment and communication as a responsive technology, while desktops and laptops are remaining the most popular devices for learning and working. Lack of computers impedes not only overall online education, but also citizen and company participation in the digital economy, as well as their capacity to access e-government services, promote e-participation, and increase lifelong learning. Mobile device (smartphone) penetration rate among the general population in Cambodia is 120% as of January 2020¹⁰. Given that almost half of the Cambodia population is younger than 24 years old, the proportion of mobile device ownership among adult population must be much higher. Further, based on anecdotal evidence from school principals and teachers, the proportion of schoolteachers that have access to mobile devices is even higher (likely above 90%)¹¹.

IF4 (TV/radio/ broadcasting)

Cambodia has 18 television stations, according to the Ministry of Information. One state-owned television station has a viewership of less than 1%. However, the television industry is the most concentrated, with the top four owners accounting for 78% of total viewership¹². The most popular media type in Cambodia is television, which reaches 96% of the population. It's also a vital source of news, with 57% of Cambodians claiming to watch TV to get their news.

With the emergence of the Internet, radio has lost popularity and is currently only placed third in terms of media sector after television and the internet, with a 35% audience. While the radio market is moderately concentrated (4 most popular radio stations account for 43% of total listenership), it is also Cambodia's most fragmented media sector. Cambodia has 175 radio stations, according to the Ministry of Information. Nine radio stations are nearly comparable in strength, reaching between 3% and 6% of Cambodian listeners and exerting the same influence on public opinion formation, especially since it is primarily used for amusement rather than listening to educational and political programming¹³.

⁸ Statista Research Department, March 29, 2021.

⁹ Datareportal, 2020

¹⁰ ADB 25 January 2021, Cambodia EdTech Country Situation Analysis.

¹¹ ADB 25 January 2021, Cambodia EdTech Country Situation Analysis.

¹² UNDP, 2014

¹³ UNDP, 2014

In the wake of the COVID-19 pandemic, The Minister of Information and the Ministry of Education, Youth and Sport (MoEYS) are working together to broadcast distance learning and online learning programs on National Television of Kampuchea (TVK) and Ministry of Information's mobile app. This aim is to ensure equitable learning for all Cambodian students. Cambodian DTV Network Limited has given the MoEYS access to 10 satellite DTV dishes for this.

This education TV programming has begun to broadcast on National Television of Kampuchea and other cable TV networks throughout the country, such as a newly created TVK2 for educational broadcasting, Decho DTV's channel 22, and 55 new cable TV networks. This programming will support learning for students in kindergarten, primary and secondary school. Students from grade 9 to grade 12, who are preparing for upcoming national examinations, are being provided with three hours of programming each day.

In an effort to promote more inclusive educational programming, the Ministry of Education, Youth, and Sport began broadcasting in three of Cambodia's most widely spoken ethnic minority languages — Tumpoun, Kreung, and Phnong – in April 2020. While the radio broadcasts are a positive step toward include ethnic minority children in the Ministry's focus on more flexible learning methodologies, there is one major source of concern: many of the target households do not own radios¹⁴.

Government

GO1 (Policy /funding)	ICT related policies, plans and funding at the national level - implementation, limitations, challenges, etc.
GO2 (Curriculum and content)	The state of integration of edtech in the national curriculum to support learning outcomes (limitations and gaps).
GO3 (Education performance measurement)	ICT used to collect and analyze key system performance data (systems, processes, issues, challenges, gaps).
GO4 (Training)	ICT pedagogy integration in pre-service teacher education

The Royal Government of Cambodia has collaborated with various stakeholders to develop supporting policies and frameworks, including the Rectangular Strategy Phase IV, ICT Master Plan 2020, Telecom/ICT (T-ICT) Development Policy 2020, the Law on Telecommunication, and the ICT Strategic Framework, among other initiatives and programs, to prepare the country for a digital future. The Rectangular Strategy Phase IV, which serves as a roadmap for growth, emphasizes the necessity of preparing Cambodia for a digital economy and the Fourth Industrial Revolution as part of its efforts to diversify its economy.

Cambodia's ICT Master Plan 2020, which was adopted in 2014, aims to create an "Intelligent and Comfortable Nation" by (1) empowering citizens, (2) assuring connection, (3) increasing capacity, and (4) improving e-services¹⁵. The government adopted the Telecom/ICT Development 2020 Policy in 2016, with three key objectives as shown in Figure 12. The government passed an e-commerce law in 2019 to support the expansion of e-commerce and trade in Cambodia while maintaining legal standards¹⁶. This move was also a response to recommendations from both international and national institutions that raised the concern over consumers' protection as a barrier to the development of the e-commerce sector in Cambodia. Moreover, in the same year, the National Assembly also approved the proposal to form a digital economy committee to compile and draft digital economy frameworks for the government to approve. After ratifying the ASEAN e-commerce pact and signing the Regional

¹⁴ Aide et Action Southeast Asia, 2020

¹⁵ KOICA, 2014

¹⁶ The Phnom Penh Post, 2019

Comprehensive Economic Partnership (RCEP), Cambodia launched the E-Commerce Strategy in support of developing the sector and provide more enablers for the transformation into a digital economy. These are all happening while the draft Competition Law and draft Cybercrime Law are under review.

IR4.0 policy direction is to incorporate the Digital Economy and Society Policy Framework 2035, which focuses on the development of high-speed broadband network infrastructure, to support the smart living of 95% of its citizens, additional regulations on infrastructure, promote infrastructure sharing, have a government data centre and cloud, and the promotion of public-private partnerships to respond to the current infrastructure gaps.

The Policy on Telecom/ICT Development 2020, together with supporting policies, created a number of enabling measures to drive more interests and actions towards the realization of a digital economy. The National Institute of Posts Telecommunications and Information Communication Technology (NIPTICT) was created in 2014 to further promote education, training, research, and development of posts, telecommunications, and ICT technology. Moreover, the government also established acceleration centers, such as the ICT Innovation Center (IIC), and the National R&D Funds, while continuing to cooperate with other partners in organizing programs such as the annual STEM Festival, STEM Academy Bus Program, SmartEdu Scholarship Program, and the SmartEdu University Student Development Program¹⁷.

GO1 (policy/funding)

EdTech encouragement is reflected through various policies within Cambodia's education sector plan as well as its sustainable development strategy. The education system, K-12, is divided into basic education and upper-level education. In Cambodia's Strategic plan, there is a subsector named Secondary and Technical Education. The formed sub sector named 'Secondary and Technical Education', mentioned that within five years, their work will concentrate on English and other foreign languages as required by every school, along with EdTech.

Meanwhile, the subsector's long-term goal is to increase the number of upper secondary school students who use EdTech to support teaching and learning in at least 25% of lessons by 2023. Furthermore, the government emphasized the need of increasing the quality and relevance of education at both the national and local levels by "developing a national strategy to construct ICT infrastructure and connectivity in all schools, as well as the production of digital learning materials"¹⁸.

The education 2030 agenda also stresses the importance of 'ensuring that all young people and adults have achieved functional skills at a level that is equivalent to basic education'. To that extent, the Cambodia government expects that facilitators should equip themselves with the mandatory e-sources demonstrating that ICT facilities. Relevant actions also include government's outreach for external educational resources. Inviting stakeholders including NGO as well as some private investors to the process of delivering some ICT educational services including skills training, literacy, higher education and ICT critical aspects among all the resources that the government is seeking. In terms of the overall implementation, Cambodia Master Plan 2020 acknowledges the progress that the country has achieved during the past years. In the government's aspect, the infrastructure and the environment such as policies, rules and regulations are sufficiently to be applied for eLearning. The level of awareness in economic population is planned to exceed the average of ASEAN countries.

Despite its strong governmental commitment to digitization, Cambodia lags behind its neighbors, ranking 124th in the UN's E-Government Development Index and 129th in the E-participation index, compared to Thailand's 57th and 51st, respectively¹⁹. Cambodia's precarious condition at least in part, is caused by the lack of translation of policy documents into reality and practical initiatives. Government

¹⁷ Heng, 2018

¹⁸ MoEYS, 2019

¹⁹ UN, 2020

agencies and ministries, such as the Ministry of Education and Youth Services (MoEYS), have policy aspiration that exceed the capacity of the civil servants to carry them through. The lack of defined concept papers and thorough project plans relating to the educational framework is an example of this phenomenon. For example, the deadlines for the completion and launch of the national curriculum framework (NCF) for ICT and other topics, which details grade-specific learning targets, are unclear. Furthermore, despite all the drive to push for a digital transformation in the education sector, there is currently no dedicated budget line for EdTech expenditure designated for usage in schools and sub national level.

GO2 (curriculum and content)

The Ministry of Education, Youth, and Sport (MoEYS) developed a curriculum framework in 2016 and a course syllabus for all levels in 2018. Based upon inquiry-based learning, the curriculum focuses on student-centred concepts and techniques. The requirement for ICT classes is one product of this curriculum reform. As a result, the Computer Programming lesson has now been incorporated into the new national curriculum for students in grades 4 through to grade 12 using real-world devices such as the robot kit. However, this new ICT curriculum has yet to be approved and implemented, and there is a shortage of suitably-trained ICT teachers.

From field studies completed and interviews with principals and teachers, ICT classes are taught at grade 11 and grade 12 only. Furthermore, ICT classes can be delivered only when there is ICT major teacher posted in the school and there must be a computer lab available at the school. According to MoEYS statistics, as of 2019, only 17% of upper secondary schools are equipped with computer lab. That means, less than 20% of grade 11 and grade 12 school students get access to ICT classes. When discussing digital technology, students and teachers are mainly referring to ICT as a subject with computer and computer lab. While technology-mediated learning is often seen to be effective when incorporated into content specific areas such as Math, Physics and Chemistry etc., there is currently no consistent ICT integration into those subjects.

Meanwhile, Cambodia enacted a New Generation Schools (NGS) reform from 2015 with the goal of increasing the quality and relevance of education in order to better prepare Cambodian adolescents for the workforce of the twenty-first century. The reform intends to improve students' cognitive abilities, with a particular emphasis on STEM, ICT, and critical thinking skills, as well as inter- and intrapersonal capabilities. The NGS had over 7,000 pupils in both elementary and secondary school as of the 2020-21 academic year. New Generation Schools are unusual in that they function in a similar way to charter schools in the United States, with school-based administrators and staff exercising significant control over school management, resources, curriculum, and instruction. The NGS are designed to be motor force that will enhance the capabilities of schools in their immediate vicinity to improve the education quality, through improved access to learning resources. In themselves, the NGSs will serve to become beacons of excellence.

GO3 (education performance measurement)

Cambodia stated in its Education Development Sector Plan that by 2030, the country will have developed a system that maximizes the use of ICT opportunities and data connectivity for real-time information sharing, analysis, and reporting, as well as a feedback mechanism to ensure that the voices of the people are heard in order to best plan for education. It is apparent that Cambodia has already prioritized the expansion of its educational system in its agenda.

One of four major areas within the ministry of education emphasised the significance of utilizing ICT to strengthen Cambodia's information management system. ICT was introduced as a tool for keeping track of teachers' records and students' accomplishments. It also serves as a platform for bridging the gap

between the government and local schools. Other features include the ability for teachers to submit and edit lesson plans, as well as testing and evaluation.

Additionally, the EMIS master plan from 2014-2018 includes more details about how to better prepare, implement and evaluate the whole process. As described in the master plan, the EMIS will serve as a role to manage, plan, monitor and manage for the following stakeholders including: school managers and administrators, parents and local communities, Ministry of Education, Youth and Sport- Central, Provincial, District and other management, Ministry of Economic and Finance (MoEF), National Institute for Statistics (NIS), ODA partners. There is a plan make a shift from a client server system to a web-enabled and integrated system. It is planned to make EMIS decentralization with a new focus on Student Tracking Systems and School Information Systems (SIS).

Additionally, Cambodia is gaining financial support from the CDPF (Capacity Development Partnership Fund) to support the country's educational goal since 2011. CDPF is managed and financed under UNICEF's management and guidance in partnership with MoEYS, EU and SIDA.

The program determined that EMIS receives the majority of the CDPF fund to pursue its cause, out of all the investments. Furthermore, Cambodia has collaborated with other countries in order to promote ICT in its information system. Cambodia's ICT master plan, according to a document from the Korea International Cooperation Agency, lists all of the eEducation services that the government should implement.

The objectives to promote Cambodia's eEducation is divided into two segments, according to the master plan. The information management system is referenced in one section. Personal information (students, teachers, staff), student records, and activities are all digitalized as written. Certificates, including student records from educational institutions, will be able to be issued anywhere in Cambodia based on the digitized information. All public schools will have their own website with information about the school, curriculum, and teachers, as well as facilitate two-way communication between schools and parents. Additionally, it is planned to build a library information network in Cambodia.

GO4 (training)

Overall, the national policy has emphasized the role of information and communication technology (ICT) in teacher education. The strategy for improving basic education is clearly stated in Cambodia's Education 2030 Roadmap, which states: 'improve pre-service teacher education curriculum, both in-service and pre-service, to include new and modern pedagogical approaches and integrate ICTs, Global Citizenship Education (GCED), and Education for Sustainable Development' (ESD).

There is a policy in the Education Strategic Plan 2019-2023 to build teachers' capability and reform teacher training institutions by examining teacher training programs at NIEs, TECs, and RTTCs to ensure equivalency of training outcomes, particularly in STEM, ICT, and foreign languages. Furthermore, teacher trainers' capacity in subject-based knowledge, instructional methodologies, and ICT needs to be increased. In brief, the capacity of both teacher trainees and teacher trainers in ICT is currently at a somewhat low level.

In practice, however, ICT skill training provided to pre-service teachers is limited to simple computer usage such as competency with the Microsoft Office suite, internet browser, and utilizing Windows operating system on a PC. There are no guidelines for pre-service teacher trainees to create and develop digital age learning experiences so that they can produce high-quality digital content that will lead to higher learning outcomes for students. Furthermore, with the exception of instructors from the ten New Generation Schools, school principals and teachers report that no ICT training is provided to in-service teachers.

However, there are a few, but largely unsystematic, training courses for in-service teachers available. For example, as part of the systems to upgrade teachers' skills and capacity to deliver the new ICT curriculum, teachers in selected public schools have been trained to teach grade 12 students about the career paths in the information, communications, and technology (ICT) sector. The training was carried out by the Department of Information Technology (DIT) of the Ministry of Education, Youth and Sport (MoEYS).

The Ministry of Education and Youth Services (MoEYS) set a target of 8,220 youths receiving short-term vocational, digital, and technical skills training by 2023, up from 1,644 in 2018²⁰. Additionally, in order to prepare students for 21st-century jobs, the strategic plan aims to provide them with ICT knowledge and abilities. Rules on teacher usage of ICT in language subjects for grades 4 and 6 are being developed. The New Generation Schools Reform (NGR) was launched as one of 15 programs under Cambodia's National Education Strategic Plan (2014-2018), and it has received accolades from both local and international observers. One of NGR's missions is to promote ICT literacy among students and teachers, and the organization even offers kids a two-hour weekly coding workshop²¹.

In 2015, MoEYS started to integrate new ICT-related subjects in the curriculum from grade 4 to grade 12 to further enhance the efforts²². However, it has become evident that the "Information and Communication Technology for grade 11 and grade 12" textbooks were based on free and open-source software programs (OERs), such as Ubuntu Linux operating system and the OpenOffice applications; this is problematic in a market dominated by the Microsoft systems and programs²³. The ICT curriculum at the university level is not standardized, leaving each university the freedom to develop their version and standard. Although English-based learning materials for ICT learning are abundantly available, Cambodian youths are still met with challenges due to their low level of English proficiency. Despite the initiatives and endeavors to introduce basic ICT skills in teacher training, teachers' digital literacy remains mostly at the beginner's level.

Technical and Vocational Education and Training (TVET) offers additional training and capacity-building opportunities (TVET). According to TVETMIS, there are 38 public, 44 private, and 21 NGO-run TVET institutions²⁴. However, due to problems such as obsolete training methods and equipment, a shortage of trained trainers with direct industry experience, a lack of value attribution to TVET, restricted acceptance of TVET degrees, and a lack of soft skills among TVET graduates, the TVET system is reported still to be inadequate²⁵.

Schools / Teachers

ST1 (teacher capacity in edtech)	Teachers' digital literacy and the description of training support provided to teachers in improving their digital literacy skills at the school level (gaps/issues).
ST2 (equipment and software)	Types of technology support provided by school to admin staff, teachers and students (issues/challenges/concerns/gaps).
ST3 (governance)	The policies, budget and monitoring process and/or tools (differences/gaps across schools)
ST4 (community outreach)	How schools/teachers use ICT to communicate with parents/students/community: tools they use, issues they discuss (differences/gaps).

²⁰ MoEYS, 2019

²¹ Donaher & Wu, 2020

²² Heng, 2018

²³ UNDP, 2020

²⁴ Ministry of Labour and Vocational Training, 2018

²⁵ ADB, 2018

ST1 Teacher Capacity in EdTech

In Cambodia, government determines those institutions that are solely responsible for teacher pre-service and in-service training. The centralized nature of pre-service and in-service training institutions for certifying school teachers (controlled by the government via the National Institute of Education and four Regional Teacher Training Centers) does not allow for competition, resulting in a lack of pressure to maintain and improve the quality of the training courses they deliver, particularly in ICT-related subjects. In addition, rather than using an outcome-based modular architecture, teacher training uses a traditional time-based training framework.

Teachers report that they do not have regular access to any in-service ICT related training. During their pre-service teacher training, some of them received ICT-related training, which often included the MS Office suite, on using an internet browser, or the use of the Windows operating system on a PC. Teachers' EdTech capacity development, for example, digital pedagogy (i.e. teaching and learning with digital tools and resources), software training, equipment user training; but this capacity development is hampered by a lack of financing. During the COVID-19 pandemic for example, it was very evident that an urgent need exists to train teachers on how to use gadgets and software to conduct online instruction. Instructors, particularly older teachers, do not typically grasp how a computer works, its complete functionality, because no, or very little, ICT-related training has been provided in schools.

Even amongst those relatively few teachers that are skilled in the use of EdTech, according to the teacher survey, conducted immediately prior to the beginning of the TIESEA project (see Annex 2), approximately 5% of the teachers polled generate PowerPoint slides for instructional reasons on a weekly to daily basis. More than 70% of those polled stated they only 'rarely' or 'never' create online evaluations or quizzes for pupils.

More than 76% of the sample of teachers that were questioned did not use email or file sharing tools (e.g., Google Drive, OneDrive, Dropbox) regularly. Instead, the respondents tend to use social messaging app such as Telegram or social media app such as Facebook to share files among themselves or with students. This was well evidenced during the qualitative interviews with teachers – as teachers mostly use Telegram or Facebook Messenger app as the way to send files. Also, not all teachers seem to have access to a personal computer regularly to be able to effectively use a file sharing system. This signals a lack of understanding of the collaborative power (value) of the file sharing systems by the teachers or a lack of suitable devices to use them²⁶.

Email and online file sharing responses appear to be linked. This is because most online file sharing services require users to register an account using their email address or phone number. Some carriers may refuse to take a local phone number, although most providers will accept an email address. As a result, without an email address, one may be unable to fully utilize a major file sharing service (Google Drive, OneDrive, Dropbox, and so on), which also functions better on a computer than on a mobile phone.

ST2 (equipment and software)

The major barriers to EdTech use in schools include:

- Lack of computers.
- No or poor Internet access, particularly unreliable and/or insufficient bandwidth.
- Absence of or unreliable LAN infrastructure in schools.
- Lack of competent staff to manage the EdTech infrastructure and support users in schools.

There is lack of valid statistical data measuring the quality of the EdTech use in schools on a national level, e.g., how many schools have LAN, how many computers are connected and operational, what is

²⁶ ADB 25 January 2021, Cambodia EdTech Country Situation Analysis.

the bandwidth per student, etc. teachers report that, very frequently, they use their own internet data package to access the internet at school. Few schools have a LAN or WiFi network connecting all computers in the school, which significantly reduces the capacity to use what connectivity exists by teachers and students.

For example, according to MoEYS, in 2019 only 17% of upper secondary schools and 5% of lower secondary schools have access to computer lab. While the data show 40% of upper secondary schools have access to the internet, in most of the cases, the internet is solely used in the school administration office for administrative purpose only.

There is also a disparity between the three types of high schools: New Generation Schools (NGS), Secondary Resource Schools (SRS), and traditional high schools. In New Generation Schools, computer labs, broadband internet connectivity, and laptop computers are provided to each teacher in the school, along with instruction on how to utilize the equipment. Secondary Resource Schools have one or two computer laboratories, as well as internet access and specialist ICT teachers. In a typical high school, however, there is no computer lab, no ICT major teacher, and no internet access.

Generally, teachers and principals are frustrated at the lack of timely technical support they need to effectively use EdTech. In their opinion, this is a consequence of the fact that there is no dedicated funding at school for EdTech development: both for user support and technical maintenance of EdTech infrastructure. ICT major teachers need to play a significant role in providing technical support for other teachers in their school with no additional remuneration or reward²⁷.

ST3 (governance)

Cambodia has invested significant time and resources into creating and implementing plans to increase the effective use of ICT in education. These plans and actions form an important part to the governance of ICT; however, more long-term efforts are needed to develop the infrastructure and information base to incorporate ICT to the desired level.

Due to a shortage of digital data collecting technologies at the school level, school principals must execute manual, paper-based data collection chores. Schools collect data manually for monitoring and assessment reasons, such as student registration information, grades, and attendance records, using a variety of paper-based forms. There is currently no universally accessible real-time Education Management Information System (EMIS). At present the EMIS department gathers data on an annual basis and publishes informational charts and summaries to assist in long-term planning, but the system does not support direct data entry from most schools and manual paper-based systems predominate.

ST4 (community outreach)

Those teachers who are keen and digitally literate favor places where they may share ideas, content, and experience, using social media. Teachers' Telegram (and Facebook) groups are very popular and they proved to be a lifeline for learning continuity during the COVID-19 pandemic-induced school closures. Many teachers are using social messaging applications to share content on a regular basis.

Notwithstanding the teachers who are active on social media, the great majority of teachers still use traditional method of sending letters to parents through students or classmates. Some have reported making phone calls to parents when the letter sending method fails. Most of the correspondences from teachers to parents are concentrated around student's academic problems, absenteeism, and behavior problems²⁸.

²⁷ ADB 25 January 2021, Cambodia EdTech Country Situation Analysis.

²⁸ ADB 25 January 2021, Cambodia EdTech Country Situation Analysis.

During the COVID-19 pandemic, teachers have been working with the community and providing students help in accessing digital education resources at their homes²⁹.

Students / Parents

SP1 (digital literacy of students)	Students' digital literacy and the support they receive from parents/guardians (issues/gaps).
SP2 (connectivity and devices at home)	Students access to devices and internet connection and the support they receive from parents/guardians (issues/gaps).
SP3 (online access to curriculum content)	Availability and types content that assists students in reaching learning outcomes (as outlined in the national curriculum)
SP4 (community support)	The how local community supports students with access to devices, internet, elearning content and technical support (challenges, gaps).

This chapter considers the quality of home or community environment in terms of facilitating (or enabling) the achievement of student learning outcomes. These include digital literacy of students (and parents), connectivity and devices at home, online access to curriculum content, and community support.

SP1 (digital literacy of students)

In Cambodia, youth, in general, have poor digital literacy and ICT abilities³⁰. In the 2017 ITU ICT Development Index, Cambodia was placed 128th out of 175 economies. It was ranked 150 in the last quartile on the talents sub-index. It was placed 112th out of 141 nations for digital skills among the active population in the Global Competitiveness Report 2019, with a comparatively low score of 42.8. The Cambodian government, on the other hand, recognizes the need of exposing its learners to the digital world and has announced initiatives to promote digital literacy. International organizations and well-known businesses, are currently involved in improving this situation – Annex 1 provides some examples of the initiatives from international NGOs and national players in Cambodia.

Basic ICT literacy abilities can be assessed by the percentage of youth (aged 15 to 24 years) and adults (aged 15 years and older) who have engaged in particular computer-related activities during each period, according to the UNESCO digital literacy framework. Using this framework for evaluation, it was found that just 27.8% of Cambodian teenagers and adults have copied or moved a file or folder, 26.8% have duplicated within a document using copy and paste tools, 37.6% have sent e-mails with associated files, and 20.6% have transferred files between a computer and other devices. Almost a quarter of the people polled said they had completed these operational responsibilities satisfactorily. Additionally, Cambodians perform poorly in a number of areas. Only 1.5% of children and adults, for example, have connected and installed new devices, 2.5% have developed an electronic presentation using presentation software, 0.6% have discovered, downloaded, installed, and configured software, and 0.1% have written a computer program. Most of students have no knowledge about their safety online and most of teachers do not teach their students regarding safety measures online.

Digital literacy level is unevenly spread across regions. Students in more advanced areas tend to have better ICT skills and more access to support programs. During the COVID-19 pandemic, many students still do not have adequate digital skills, or access, to receive classes online. Out-of-school youth and those with disabilities were particularly disadvantaged during the spread of the disease. These

²⁹ MoEYS, 2020

³⁰ Digital eReadiness Survey conducted as part of ADB, USESDP, 2020

vulnerable groups were subject to more social exclusion as they lacked the skills and capacity to find alternatives to face-to-face activities, such as working in the informal economy and accessing online support services. In general, as well as having uneven access to digitally-enhanced learning, many of the most vulnerable students are at risk of being subject to misinformation and cyber bullying.

SP2 (connectivity and devices at home)

Cambodia is ranked 71st out of 141 economies in terms of ICT adoption. Despite significant progress in terms of device and internet access, Cambodia's entire digital infrastructure remains inadequate. During the COVID-19 pandemic, the demands of remote learning posed increased obstacles to Cambodia's EdTech infrastructure.

Students gain access to online education resources and remote learning via a combination of cellphones, PCs, TVs, and radios. In recent years, the use of mobile phones has increased dramatically. In 2017, 85% of homes have mobile phones, according to the International Telecommunication Union. In 2018, there were 119.492 mobile-cellular subscriptions per 100 people, up 169% from 44.4741 in 2009. This number exceeds the population of the country. The internet is accessible on a large number of mobile phones.

Around half of households have access to radios and TVs; in 2017, 42.6% and 66.6% of households reported have radios and TVs at home. Only 1.1% of households possessed fixed-line telephones.

While mobile devices in Cambodia are developing rapidly in recent years, the penetration of computers remains low. Only 13.3% of households have computers in 2019, and 27.8% of individuals are using a computer in 2017. The deficiency of computers caused many problems during remote instructions.

Internet accessibility is rising rapidly in Cambodia. By 2018, 40% of households enjoyed internet, compared to only 0.6% in 2009. Mobile-broadband subscriptions, which are mobile subscriptions that advertise data speeds of 256 kbit/s or greater, achieved 82.8 out of 100 people, ranking 56 out of 141 economies. Fixed-broadband internet subscriptions per 100 inhabitants (1%) and fiber internet subscriptions per 100 inhabitants (0.5%) are quite low. The Telecommunication Regulator of Cambodia (TRC) reported that 13.8 million people out of 16 million had mobile or fixed internet subscriptions as of January 2019.

Although minimum digital infrastructure is in place, its speed, quality, and capacity are poor. The internet quality is severely constrained by poor infrastructure and electricity supply. More advanced internet infrastructure, such as extensive landline networks and universal 4G coverage, is still absent. Fixed line Internet services are still quite expensive, though gradual improvements are taking place. In 2018, a typical 4GB mobile data connection costs 5\$ per month, and fixed-line connections cost at least 12\$ per month (10.4% of GNI per Capita)³¹.

SP3 (online access to curriculum content)

As a consequence of the school closures during the COVID-19 pandemic, Cambodia's education system faces significant issues. The Ministry of Education, Youth and Sport, as well as other related ministries, have worked hard to ensure that remote instructions run well, providing a variety of e-learning possibilities, but their work has been significantly constrained by weaknesses in the infrastructure. Many international organizations, including as UNICEF and UNESCO are taking a proactive approach. The Cambodian government also realizes the importance of digital literacy to equip its younger generation with sufficient abilities to adapt to the fast-changing world. However, during the COVID-19 pandemic, many disadvantaged students living in remote areas with poor economic conditions, have not been able to properly access online educational resources. MoEYS also lacks well-articulated plans to evaluate the use and effectiveness of the current remote learning system.

³¹ ADB 25 January 2021, Cambodia EdTech Country Situation Analysis.

When questioned, students say they prefer online learning and video platforms, social messaging apps and file sharing options, rather than directly watch lessons on TV channels. Below are the reasons provided by students for 'NOT watching TV lessons':

- inability to watch the TV lessons at the exact designated airing times
- lack of interest in watching the entire lesson (mostly 50 minutes)
- not being able to pause, replay or skip certain parts (of a video lesson)
- prefers to watch lessons at their own pace and their preferred time

Students use a combination of courses and exercises offered by their teachers, as well as online content provided by the ministry through various platforms including as Facebook pages and the E-School Cambodia smartphone app. Electronic copies of school textbooks, on the other hand, are not available. Teachers often take screenshots of textbooks and provide them to students via social messaging apps like Telegram and Facebook Messenger.

SP4 (community support)

While students in big cities like Phnom Penh and Siem Reap have access to Wi-Fi hotspots in cafes and classrooms, most villages in sparsely populated and remote locations lack the digital infrastructure needed to support learning (online). This is owing to inadequate digital literacy among the general public and a lack of funds to establish local community hotspots.

In general students across the country use Telegram and Facebook to access and share content. There are hundreds of groups and channels on Telegram and Facebook on school subjects such as Math, English, Physics Chemistry or activities that including additional learning content.

Most of high school classes have a Telegram or Facebook messenger group set up among teacher and students. Teachers often share links to various content sources including from Telegram and Facebook groups to their students.

In urban areas, students have the opportunity of purchasing digital devices from nearby shops. Digital devices are also available in rural areas at the district level. Most of the rural students purchased their smartphone from the district markets. On the other hand, for purchasing computers, most of the students from rural areas visited urban centers.

Repair shops for ICT equipment are dispersed throughout poorly populated and isolated places. Technical assistance and repair services are usually only available at district markets, which are tens of kilometers away for some students. The service centers in question are frequently unavailable.

Affordability is the biggest challenge for students to access technical support, while unpaid technical support from peers, elders, parents and teachers usually is not enough to fulfill their needs.

Providers – Companies and Public-Private Partnerships

PR1 (partners, sponsors)	Partners and sponsors on Edtech: administrators, sponsors, funders, projects supported and/or funded, project locations, amounts, key focus areas.
PR2 (elearning systems)	Types of elearning management systems and educational apps: users, costs, use cases, limitations (compatibility, accessibility).
PR3 (online content)	Available digital content, sources and language, upload/storage methods, distribution, limitations.
PR4 (integrators, emerging tech)	System integrators, existing technologies that support elearning (email, communication apps, social media), and emerging technologies (AI, AR/VR).

This chapter provides insights about the suppliers of EdTech systems, partnerships and providers in the education sector. A full inventory of EdTech partners and suppliers is presented in Annex 1.

PR1 (partners, sponsors)

There are great many interventions in the EdTech field by international NGOs as well as local groups: philanthropic organisations, commercial corporate social responsibility initiatives e.g. USAID, ADB, EU, UNESCO, UNICEF.

UNESCO, along with the Ministry of Education, developed elearning courses for lower secondary/basic education in 2019. The Basic Education Equivalency Program aims to provide the young people to further their education while still maintaining their professional pursuits. The content is meant to be equivalent to grade 9 curricula. There are 11 eLearning courses across 10 centers in the country. The centers give students access to internet, and place to take the courses at their own speed. The program is utilizing Moodle to mediate the content.

Cambodian Union of Youth Federations partnered with E-school Cambodia to create a platform that offers content for free to students grade 1-12. It allows students to continue with their studies, especially in preparation for grade 9 and grade 12 examinations. There is also an app that makes the content accessible through a mobile device. While contact with teachers through the app is limited, some students have still been able to find contact through Skype.

UNICEF is working with the MoEYS to deliver online education. They have developed a multilingual radio program, particularly aimed at early childhood education. Older students are being offered video lessons and are being posted on different outlets, such as Facebook. It is reported by UNICEF that “elearning lesson videos are being watched on all channels”

ADB has worked on various projects in Cambodia to develop the education sector, such as enhancing the quality of education, focusing on the upper secondary education, and access to eLearning materials. It emphasizes that the availability of eLearning sources is important to maintain ICT in education. The system of implementation must be reevaluated in order to efficiently provide eLearning materials in education curriculum and systems, as it has stated in its review to inform the project. In its first and second Upper Secondary Education Sector Development programs, ADB, provided Technical as well as financial assistance, including provision of ICT labs and equipment to select Secondary Resource Schools, these serve as hubs for the benefit of all schools in the surrounding areas.

One billion is a non-profit organisation that provides educational materials in the form of digital hardware to rural communities where a traditional education is difficult, as well as general implementation into schools. It produces its own learning software it calls “Onecourse”. It focuses on providing content for literacy and math. It works with the Cambodian Children’s Fund.

The Japanese International Cooperation Agency (JICA), in coordination of the Ministry of Education, has developed online lessons that will be available on an app called “Think! Think!”. It is aimed at students in primary education, grades 1-6. It can help these students practice their critical thinking and math skills. There is over 15,000 puzzles and games for children to play and learn. Since there is challenge of children learning from apps, “Think! Think!” will also air the lessons it has on TV, and there are usually over 20,000 children that watch the broadcast. The app was created by WonderLabs Inc., a Japanese company. It has over 100,000 downloads on the Google Play Store.

PR2 (E-learning systems)

In Cambodia, the market for e-learning technologies is still in its infancy. Schools, universities, and government had shown only a small interest in implementing e-learning systems prior to the COVID-19 pandemic. Despite the increased interest, the landscape of suppliers has remained relatively stable. In fact, there are no open-source system suppliers or partners in the country that are officially recognized.

Moodle has about 12,903 registered sites in Cambodia. The MoEYS, partnered with UNESCO, developed elearning courses for lower secondary/basic education. There is no reliable data on users and costs of elearning systems in Cambodia, as there are no reported case studies or projects.

ClassDojo is an elearning management application for teachers to provide easy communication with students and parents. It is similar to how a social media application functions in that the teacher can share pictures, videos, and announcements directly to parents. Parents can see their child's schoolwork through the child's personal portfolio. It is one of the top five grossing apps on the Google Play Store. It has over 10 million downloads.

Trey Visay (Compass) is an e-counseling mobile app for grades 9-12. It provides support for things like evaluating major and career, suggesting schools, vocational skills, and education career videos. It is available on both Android and Apple devices. On the Google Play Store, it has more than 10,000 downloads. It is not clear how many downloads there are on iOS. Students create an account they can log into, and then can access strengths and weakness when searching for schools that best fit their needs and future goals.

POSCAR Cambodia offers different products and services, such as a school management system (through WikiSchool), smart card, attendance, online library management (WikiLibrary), document storage (WikiSpace), WikiLMS, and Education TV. WikiSchool also offers a mobile app and has over 10,000 downloads on the Google Play Store with a 4.0-star average rating. The WikiSchool uses content created by the Ministry of Education. The attendance system can be managed with smart card, or facial recognition technology. POSCAR seeks to provide its services to schools to help integrate technology into education.

PR3 (online content)

E-school Cambodia is offering students grade 1-12 an application for free, with content that includes different subjects like Math, Physics, Chemistry, and Biology. It can be used to help students that need to prepare for their grade 9 and grade 12 examination. This is in partnership with the Cambodian Union of Youths Federation. It has over 100,000 downloads so far. The difficulty with the app is that students aren't sure where to go to ask questions, and teachers or tutors are not directly available to contact through the app.

Future School is an online platform that offers grades 1-12 curriculum Math and English can cost up to \$USD 351 annually. Cambodia's curriculum is Mathematics and Literacy. Literacy is offered up to year 10. The company offers 30 days free of the online classes, to offer users a trial period to see if they find it valuable to their learning. It is not clear how many students have utilized the platform.

On the Google Play Store, there are various apps that have been widely used and downloaded under the category for education.

- Duolingo remains to be one of the most popular ones and has over 100 million downloads. It allows users to learn different foreign languages.
- Udemy is another popular app that offers different courses by instructors. It offers free and paid courses and has been downloaded over 10 million times.
- Babbel is another language learning app that is in the top five highest grossing apps with 10 million downloads.

The iOS store is also available for app downloads and use and has some variation in popular apps compared to the Google Play Store. Math Learner is a top five grossing app on the iOS store. This app is an interactive learning tool that turns math into games, and it boasts having millions of users.

OneSala is another top five grossing app. It is a platform that educators, institutions, or centers can use to post and manage their content. Google Classroom is popular amongst iOS users in term of being one of the top five free apps, but its average rating is only 1.5 stars.

PR4 (integrators, emerging tech)

The IT sector is considered to be the highest in demand for skills related to goods and services, however, the sector is in significant need of advanced operators capable of software development. The government recognizes the importance of having a thriving tech sector in the country. They have been creating various joint initiatives to kick start incubators and tech hubs to identify and nurture 'home-grown' talent such as establishing Techo Startup Center whose core mission is to build emerging tech startups borne out of innovation that can be launched and scaled up.

While there are emerging technology providers trying to enter Cambodia EdTech market such as Augmented Reality (AR) suit of mobile apps by 360ed from Myanmar, according to key informants, there were also a few startups in the country which tried to utilize the Augmented Reality/Virtual Reality (AR/VR) technologies into their educational apps but failed due to high cost of producing such high-tech content.

There is no dedicated education technology system integrator. Normally, an educational institution (mostly private institution) hires a general system integrator to full fill their technology needs.

3. KEY FINDINGS AND RECOMMENDED INTERVENTIONS

The findings from the Cambodia eReadiness survey can be summarised as follows:

Cambodia has one of the most affordable mobile services in Asia - average of just **\$4 monthly subscription** cost - six mobile phone operators. Over **90%** schoolteachers are likely to have access to mobile devices. **97.6%** of Cambodia households have access to at least one source of electricity **71.5%** from the grid and **26.1%** off the grid, such as solar home system and rechargeable batteries. There are 18 TV stations throughout the country, TV is the most popular media type in Cambodia, reaching **96%** of the Cambodian audience. During COVID-19 pandemic, education TV programming broadcasted on National Television of Kampuchea and other cable TV networks throughout the country, such as a newly created TVK2 for educational broadcasting, Decho DTV's channel 22, and 55 new cable TV networks.

The Rectangular Strategy Phase IV, ICT Master Plan 2020, Telecom/ICT (T-ICT) Development Policy 2020, Law on Telecommunication, and the ICT Strategic Framework contain strong ambition for integration and use of ICT in education. Computer Programming is integrated into the new national curriculum for students from Grade 4 to Grade 12 but, the new ICT curriculum is not yet approved nor put into practice yet. ICT classes require a specialist ICT teacher and computer lab – only 17% upper secondary schools have computer labs. Only limited ICT training is available for most teachers, only on basic office skills, not in pedagogy. Not all teachers seem to have access to a personal computer regularly to be able to effectively use file sharing systems. Major barriers to EdTech use in schools include: Lack of computers, No or poor Internet access, particularly unreliable and/or insufficient bandwidth, Absence of or unreliable LAN or WiFi infrastructure in schools.

Cambodia has invested significant time and resources into creating and implementing plans to increase the effective use of ICT in education. Schools use several paper-based forms to manually collect data for monitoring and evaluation purposes such as student enrollment information, grades and attendance records etc. for the EMIS system once a year; then key in that information into the computer at the school administrative office.

The great majority of teachers still use traditional method of sending letters or making phone calls to parents through students or classmates (about academic problems, absenteeism, and behavior problems).

Possible interventions by TIESEA project

The major issue in Cambodia for schools' effective use of EdTech is the poor and ineffective internet connectivity, and the lack of devices in schools. To combat this the Department of IT at the Ministry of Education Youth and Sport, as part of the USESDP project, has been installing tablet on wheels suites (ToW) to the 50 Upper Secondary Schools that have been designated as Resource Schools. These suites consist of 30 tablet devices linked through a local WiFi network to a local server device which is rich in learning resources, based on OERs, related to the STEM subjects. The devices are only available and accessible under teacher supervision and during school hours. Nonetheless, preliminary qualitative research studies³² have revealed increased motivation amongst students for STEM learning, and improved opportunities for lesson enhancement for teachers.

³² A qualitative research project was conducted, using interviews couple with teacher and student focus group discussions, by the Education Research Council of the MoEYS; the results were shared in the USESDP 1 quarterly report of Q3, 2021 to ADB

Working with local commercial partners, principally, the local EdTech company KOOMPI, in Cambodia the project team wishes to test the idea that more open access, including from home, to the tablets and the electronic learning resources would further enhance the impact of this EdTech intervention. Having identified a small island community to the North Phnom Penh, where the geographical boundaries are constrained, the project team wishes to assist in the creation a community-based 'mesh' WiFi network across the community, powered by solar cells on street lighting towers. This will enable students, and their families, to benefit from connectivity 24/7. Already KOOMPI has the budget and the plans to install this mesh network in the island community which will enable to TIESEA project intervention to test the effect of home access to digital resources has on STEM learning. As for the devices, students themselves would be custodians of the tablet machines. This intervention will test the impact on attainment of such wide and open access to learning resources in a rural community; it will also test the practical aspects of students taking responsibility for their own learning devices – so, issues related to trust, reliability and the durability of the machines, will also be tested.

The impact on attainment will be compared with demographically matched schools, that are part of the DIT project's ToW suites in USS Resource Schools and are located elsewhere in Cambodia in similar communities.

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ANNEXES

Annex 1: Inventory of Edtech Providers

PR1 Partners/Sponsors

Go Digital ASEAN Initiative

The Go Digital ASEAN initiative focuses on closing the digital gap across ASEAN in support of the vision set out by the ASEAN Coordinating Committee on micro, small and medium enterprises (MSMEs). Implemented by The Asia Foundation, with support from Google.org, Google's philanthropic arm, the initiative will train 200,000 people from rural regions and underserved communities – including entrepreneurs, underemployed youth and women.

Working with local partners in Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Viet Nam, the US\$3.3 million grant will broaden participation in the digital economy to include groups that have the most to gain from 21st century skills, such as digital literacy and online safety awareness. In Cambodia, Go Digital ASEAN will focus on to train small business owners on digital skills such as effective marketing on social media, registering businesses on Google Maps and online safety.

The selected implementing partners, Development Innovations, inSTEDD iLab Southeast Asia, and STAR Kampuchea, will develop digital literacy training modules for 15,000 MSMEs owners across the Phnom Penh municipality, Svay Rieng, Kampong Cham, Kampong Speu, Takeo, Siem Reap, and Battambang provinces.³³ Website address: <https://asiafoundation.org/emerging-issues/go-digital-asean/>

ADB – Upper Secondary Education Support Project - Tablet on Wheels initiative

In early 2020, as part of upper secondary school education sector development supported by the Asian Development Bank, the Ministry of Education provided tablets on wheel to Upper Secondary Resource Schools and invited science teachers to attended training courses on tablets on wheels and app utilization by a trainer from Department of Information Technology and a national trainer by subject. The ToW program includes 30 tablets and a storage unit that can transmit data or lessons to the tablets on wheels via the WiFi network from Rachel. Each tablet includes many apps that contain the curriculum in different subject, with a focus on STEM subjects and for many levels, particularly for the upper secondary level, with the aim of improved quality of teaching and learning, student achievement in STEM in national tests, and students opting for STEM courses at higher education.

E2STEM

E2STEM has a public-private partnership between the Ministry of Education, Youth and Sport, in Cambodia (since 2017). A Techno-New Generation School bringing the best modern practices in the teaching of Science, Technology, Engineering and Mathematics (STEM), English and elearning into Cambodian education. E2STEM aims to train 1,000 internationally-recognized STEM graduates by 2028, who will be independent learners and thinkers and be the future scientists and technologists of Cambodia. Website address: <http://e2stem.org.kh/>

Kampuchea Action to Promote Education (KAPE)

Kampuchea Action to Promote Education (KAPE) is the largest local NGO in the education sector in Cambodia. A nonprofit organisation, established in 1999, KAPE is implementing projects and research

³³ <https://www.khmertimeskh.com/50737853/go-digital-asean-initiative-to-empower-msmes/>

at all levels of the education sector in Cambodia, with beneficiaries in primary schools, secondary schools and tertiary programs. KAPE has a long-term partnership and close cooperation with the Ministry of Education, Youth and Sport (MoEYS), international organisations and local education partners. The following are the student-focused interventions that KAPE has worked on to bring technology into Cambodian public schools.

Putting ICT to Work for Cambodian Children and Youth: KAPE developed a toolkit of best-of-breed learning software and Information and Communications Technology (ICT) solutions which engage and stimulate young minds and enable improved learning outcomes. Working closely with the Ministry of Education, Youth and Sports (MoEYS), KAPE ensures that these learning solutions support the current curricula and that students learn according to their individual needs and abilities.

Promoting Self-Learning: *Aan Khmer* (or “Read Khmer”) is a self-learning program with 30 units closely linked to the Ministry’s Reading Benchmarks for Grades 1 and 2. Students can progress to the next unit once they have successfully completed all tasks in the current unit. The software allows both teachers and students to track student progress.

Ensuring Quality Data: *Tangerine* software greatly improves Early Grade Reading Assessment (EGRA) test validity and reliability through automated compilation of test results. The test contains five sections including: (i) Listening Comprehension, (ii) Letter Recognition, (iii) Nonsense Word Decoding, (iv) Reading Fluency, and (v) Reading Comprehension. (*Developed by RTI-USAID and adapted to Khmer by KAPE*)

Identifying Learning Barriers: TEST software provides electronic testing for children in Grades 1 and 2 based on standardized formative tests supporting the Ministry’s Reading Benchmark Booklets for Grades 1 and 2.

Identifying Barriers to Learning: *Literatu* is an award-winning software which enables teachers to develop electronic formative tests based on lists of learning competencies identified as part of the national curriculum. The program graphically indicates the areas where students are struggling and where they are excelling. (*Developed by Literatu and adapted to Khmer by KAPE*)

Engaging Learners: *3-D Classroom* software provides excellent three-dimensional graphics which allow teachers to combine interactive visualizations with words and pedagogy, making complex subjects more interesting and easier to understand. Voiceover features enable teachers to combine graphics with narrated explanations in Khmer. (*Developed by Sensavis and adapted to the Cambodian curriculum by KAPE*)

Computer labs and teacher training: Past projects have seen KAPE install computer labs into over well over 100 schools, and provide training to computer teachers to deliver the lessons, using open-source programmes (OER) in Khmer language. Website address: <http://www.kapekh.org/>

PR2 eLearning Systems

ArrowDot

Arrowdot is an ICT award-winning (Cambodia ICT Awards 2021) Automation Company working on Industrial Control System, IOT System, and Electronics Product Development since 2012. Their engineers design, fabricate, and install both hardware and software for client systems. Website address: <https://www.facebook.com/ArrowdotTech>

EDEMY

Edemy develops online learning tools for their eLearning Platform and Tesdopi app. Tesdopi តេស៊ូប៊ី is an assess-and-improve tool to help high school students excel in math and science subjects. Students can test their competencies by topic and master the individual competencies that they have

not yet acquired by watching tutorial videos and practice on the app or seek help from their teachers and other resources, thus prevent a student from falling behind. Edemy has designed a learning management system which enables teachers and trainers to provide timely and personalized support to students informed by the learning analytics through creating micro-learning, a learning dashboard for learners, assessment tools, and a report dashboard. Website address: <https://edemy.org/#>

E-School Cambodia

E-School Cambodia is an elearning, online study platform. "Study smart not hard" is for intermediate learners in Cambodia. E-School Cambodia provides video material as course lectures on their website. Students registrar on the e-school website to get course material. E-School provides support for Grade 7 to 12 to the Cambodia Education Standard, Bacc II exam preparation, Teacher Entrance exam preparation, Health Science Entrance exam preparation. Website address: <https://e-schoolcambodia.com/>

IT STEP Academy

STEP Computer Academy is the largest international institution specializing in IT education. Represented in 22 countries worldwide through 85 branches, it is the biggest Microsoft, Cisco, Autodesk authorized learning center. IT STEP Academy has become an official online campus for edX, a leading international online learning platform. Through edX, Cambodian students can join more than 2800 subjects (including Computer Science, Business, Design) that are attended by more than 34 million learners globally. Among the edX members are the Massachusetts Institute of Technology, Harvard University, University of California, Boston University. Parents can check the online platform at any time and follow up on their child's progress and success. The Academy was recognised as one of the best programs for preparing children for the future (award from UN and UNESCO) Website address: <https://cambodia.itstep.org/en>

KOOMPI

Koompi is a technology development company based in Phnom Penh, Cambodia that aims to empower the youth and workforce through the development of affordable, full-power, off-grid, open-source notebook and netbook solutions. Formally established in 2017, Koompi currently has a workforce of 34, mainly developers. KOOMPI is currently working on a couple of projects, Koompi OS, Sala Koompi, Koompi Fi-Fi, and Koompi OneLab. A further project Koompi Robotic Program is currently on hold.

KOOMPI OS is built on a kernel and provides an environment for multiple applications and software to run simultaneously to meet the needs of students and employees. Similar to Mac and Windows, the system runs on linux and is designed to work in computer labs and enterprise usage.

SALA KOOMPI: formerly called KOOMPI Academy, is an eLearning platform that aims to enable a decentralized and open-ended education for Cambodian students. The website (sala.koompi.com or academy.koompi.com) can be accessed for free by everyone and caters to students from the kindergarten level upwards. School admins and teachers can sign up as members of a virtual school on the platform and distribute lessons exclusively to their students. The program also incorporates the Ministry of Education, Youth and Sports' existing digital lessons which are uploaded to its user-friendly platform.

KOOMPI Fi-Fi: is a 5000* (\$1.25) monthly subscription network service that provides secure storage and internet connection. Part of the Internet-For-All initiative, KOOMPI Fi-Fi is a school internet infrastructure provided by KOOMPI with fast fiber internet where students and teachers only pay as little as 1.25\$ per month per user, up to two devices. It is planned that the wifi will be delivered by satellite, depending on Starlink from Elon Musk's corporation, though this has been delayed until 2023.

Koompi Onelab: is a computer laboratory with hardware and software solution that enables teachers and administrators to facilitate and monitor students' progress in real time. The labs are powered by a

content server that runs independently, meaning information is stored in an offline cache and gets updated when connected to the internet (KOOMPI Fi-Fi). KoOMPI Onelab is being piloted in 2 schools in Kandal and Takeo, has been tested in 13 schools and will expand to 5 functional labs in 2022, in Phnom Penh and Siem Reap, and hope to grow further. KoOMPI is working in collaboration with UNDP on Onelab, aiming to install and run the Fi-Fi as a low-cost service – free for the first year (donor funding) and at about \$1/month in the second year. Website address: <https://www.koompi.com/projects>

SALA

Started in 2014, SALA is an online platform designed for K-12 and universities with features such as student management, HR and billing, payment and school administration. With funding and support from the Smart Axiata Digital Innovation Fund (SADIF) they expect to develop a full-suite of features that will accommodate the different needs of their growing client base.

SALA has been collaborating with the New Generation School since 2019, a nationwide education reform by the Ministry of Education, Youth and Sport, to pilot the solution at four public schools. SALA undertook a feasibility study over 10 months to identify the challenges, finding that data was not always collected every month, quarter etc., and the data was not shared centrally, with the burden being on the teacher and school side.

Two potential solutions were found.

First to centralize the data, though this has to be done in two phases; develop a consolidated dashboard using existing tools, and have a connector to link together, with a focus to get the data that is shared currently, public data only. The second phase is to develop a data exchange platform on private data.

The second solution is to bring SMIS to all schools. Currently there is no standardised software at the school level, that would enable the workload to be reduced and all departments able to access and exchange data.

There have been delays on this process due to school closure because of COVID-19 pandemic, however there is MoEYS support, with the Minister approving of the initial idea of the Dashboard, and Sala have been approved to submit a full proposal to the Education Minister in December, anticipating discussions in January 2022.

The support of Smart Axiata has been helpful as they have a footprint on technology and infrastructure in Cambodia, and other partners for synergy who can bring knowledge and resources and skills to support teachers and schools.

In future they intend to extend the coverage to TVET and soft for students not accessing higher education, and also tools to support students while in university and links with potential employers. Website address: <https://www.sala.co/>

SystemExperts Asia

System Experts is a start-up business specializing in providing Open Source (OER) solutions. System helping clients to realize the power of Open Source based solutions. Among other projects, System Experts designed and set up a student management information system for the University of Puthisastra in Cambodia. Website address: <https://www.systemexperts.asia/>

PR3 Online Content

STEM Cambodia

STEM Education Organisation for Cambodia is a local NGO who build STEM communities through festivals, programs and events to inspire Cambodia's youth in Science, Technology (including robotics), Engineering, Arts and Maths. STEM Cambodia's projects align to their core values of Engaged

Learning, Environmental awareness and Gender Equality and they have the full support of the Ministry of Education, Youth and Sport and the Ministry of Environment. Website address: <https://stemcambodia.org/>

PR4 Integrators / Emerging Trends

InSTEDDiLab

In August 2008, InSTEDD launched the [first iLab](#) in Phnom Penh, Cambodia, with the goal of building technological capacity for addressing health, safety, and developmental issues in the Mekong Basin. InSTEDD **collaborates with End Users** through a human-centered design and development process, **co-creating tools** to support collaboration for social good, **ensuring impact** through research and evaluation, and **building capacity** within communities to foster a local culture of innovation. InSTEDD iLab is one of the implementing partners for the Go Digital ASEAN Initiative. Website address: <https://instedd.org/ilabs/>

Annex 2: Survey findings - Cambodia

As part of the process in attempting to create an understanding of the current status of eReadiness in each of the four project countries, the team has been provided teachers' survey data conducted by the Asian Development Bank (ADB) Sustainable Development and Climate change division in cooperation with TIESEA. The surveys attempt to better understand roughly three areas of teacher interaction with EdTech covering digital access (availability of devices), digital skill (ability to use devices) and digital literacy (ability to manipulate devices to create materials and train others).

Early in 2021, prior to the commencement of the TIESEA project, an online survey using Kobotoolbox³⁴ was conducted with teachers in Cambodia across the three levels of grades 1-12, TVET and higher education. Noting that the purpose of the survey was to reach teachers who are active in the use of online and digital learning. Approximately 14,000 teachers from all parts of Cambodia, both urban and rural.

The research team used a variety of methods to reach the target users, but primarily their approach was via social media teachers' groups and online professional communities of practice. Teachers were provided with an online link to the survey tool and they completed the survey in their own time with complete individual anonymity. The survey tool is able, however, to identify the geolocation of the participants, allowing a national map of respondents' location. In this way it has been possible to ensure that the survey covers all areas of each country, including both urban and rural locations.

In order to assure quality of data the survey aimed to collect a minimum sample size covering teachers from grades 1-12, TVET and higher education levels. Additional criteria on demographic distribution were collected by assuring proportionate spread across regions of the country and urban/rural location. The research team was also able to collect demographic indicators on sex, years of teaching experience. Those variables then served as cross comparison in analyzing the core questions on digital access, skill and literacy as is presented through the following graphs.

Limitation on survey sample

It is recognized that these surveys, being conducted solely online are biased toward respondents with access to the internet (and potentially may have omitted those who are not connected or poorly connected to the internet), thus creating the 'skew' of responses from teacher/educators with internet access vs those without it. E.g., as devices and connectivity are typically related to each other, the survey results regarding access to devices, teacher digital skills/literacy, etc. may have been overstated (as only those teachers with devices and internet access may have completed the survey).

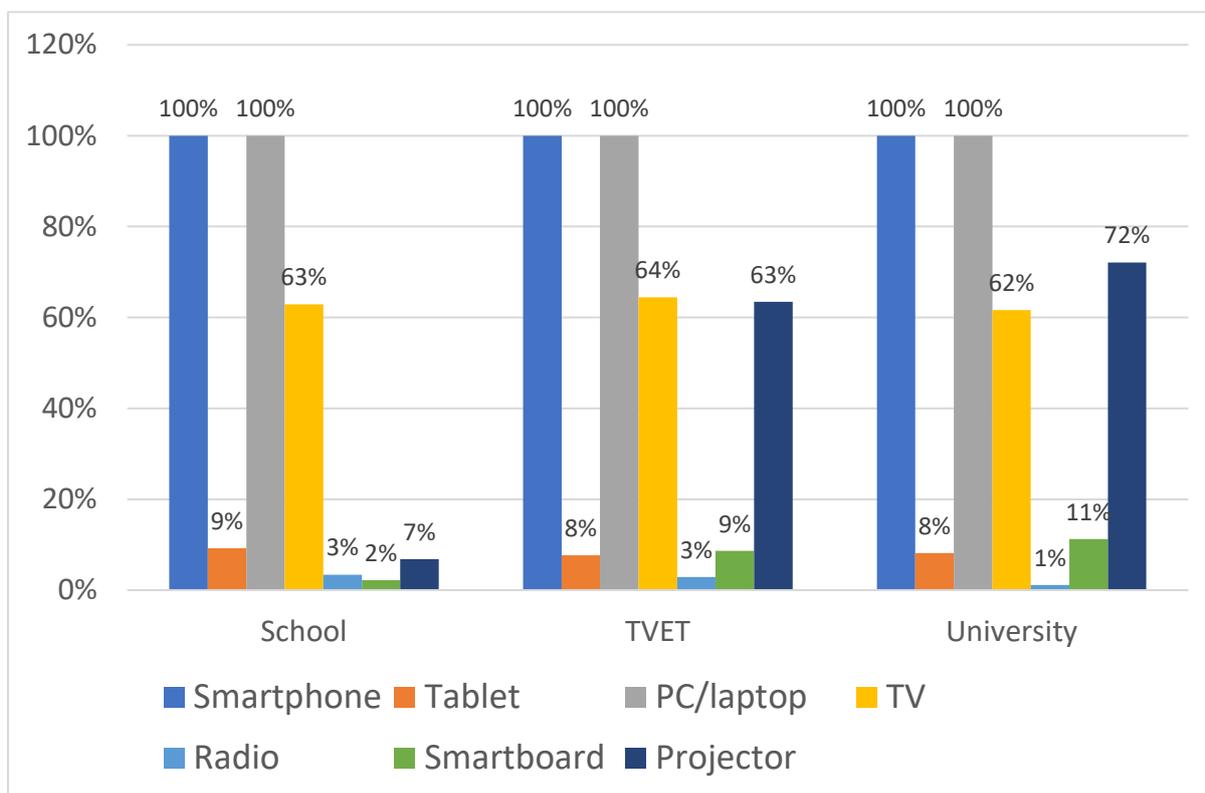
³⁴ <https://www.kobotoolbox.org/>

Access to devices by teachers at schools, TVET and universities

The purpose of the question is for teachers to self-report on which devices they have access to at school. In the survey question the respondents were allowed to choose as many devices as they have regular access to at school thus the data can be used to look at individual device availability and at the same time the range of devices available to teachers per country polled.

The research team polled approximately 1000 teachers from school, TVET and university levels to ask about the type of devices they most often access at school. Of the seven types of devices that teachers around the world commonly access while at their institution three of them appear to be more prevalent at a rate of over 60%; smartphone, PC/laptop and TV while at TVET and University levels we see a strong rise in the use of the projector with over 60% reporting access.

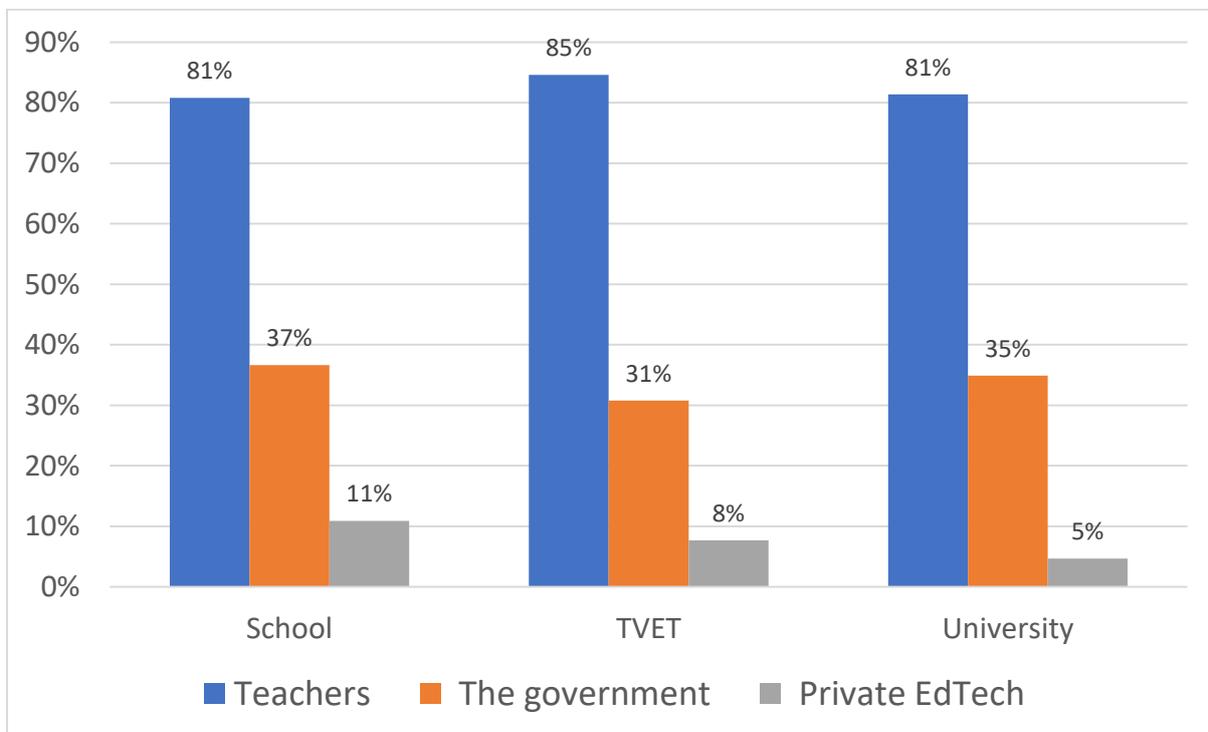
Interestingly at the school level teachers report only 7% access rate, this remains very concerning as the digital project or is a key tool in group/class learning (presentation, video, graphics etc.). While tablet, radio and smartboards are clearly not utilized across the three levels showing 1- 11% uptake. Smartboards remain one of the most expensive EdTech devices on the market and thus it is expected that few teachers will have access to such devices, while radio is possibly the most affordable device it is also very rarely utilized these days.



Who provides or creates the content?

This question was designed to assess three key sources of digital content that teachers often draw from to use at school. Three choices were given teachers (self-sourced – created, borrowed, adapted), government (provided through the education system) and/or via private EdTech (other providers).

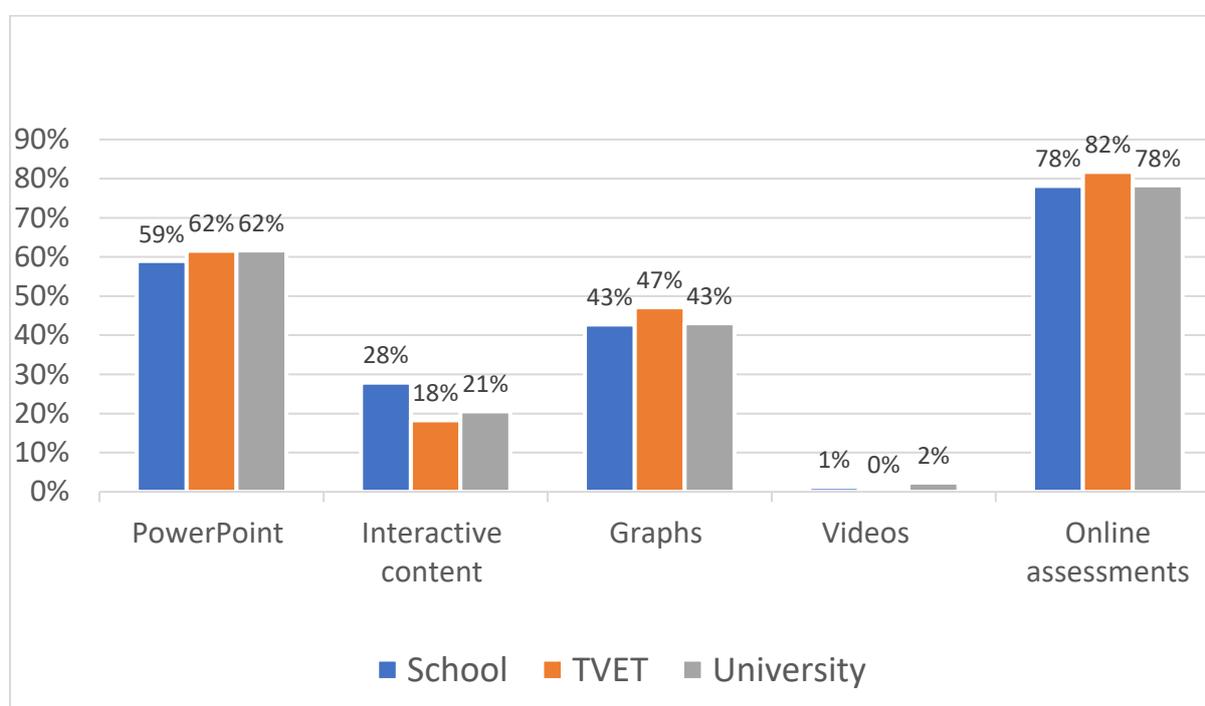
The researchers asked teachers where they get the digital content (self-provided, from the government or via private EdTech providers) used in their classes. Most notable in the result of the survey of approximately 1000 teachers across the three levels of school, TVET and University is that their profile is very similar across each level and source of content. This points to a very healthy digital content ecosystem in the Cambodia where teachers are highly involved in content creation at all levels. The government contributions about one third of the content used while private providers contribute no more than 11% across the three levels. While some teachers are clearly developing content in Cambodia an opportunity may exist for teachers to work with students to develop an ecosystem of student development content, this may also help to form the basis for teacher and student involvement in sharing content across the country and world.



Digital content that teachers can create

This question is an attempt to get teacher feedback across five common types of content that typically made to improve teaching/learning and self-made. The ability of teachers to make their own content is imperative not only in traditional formats yet equally so in digital formats.

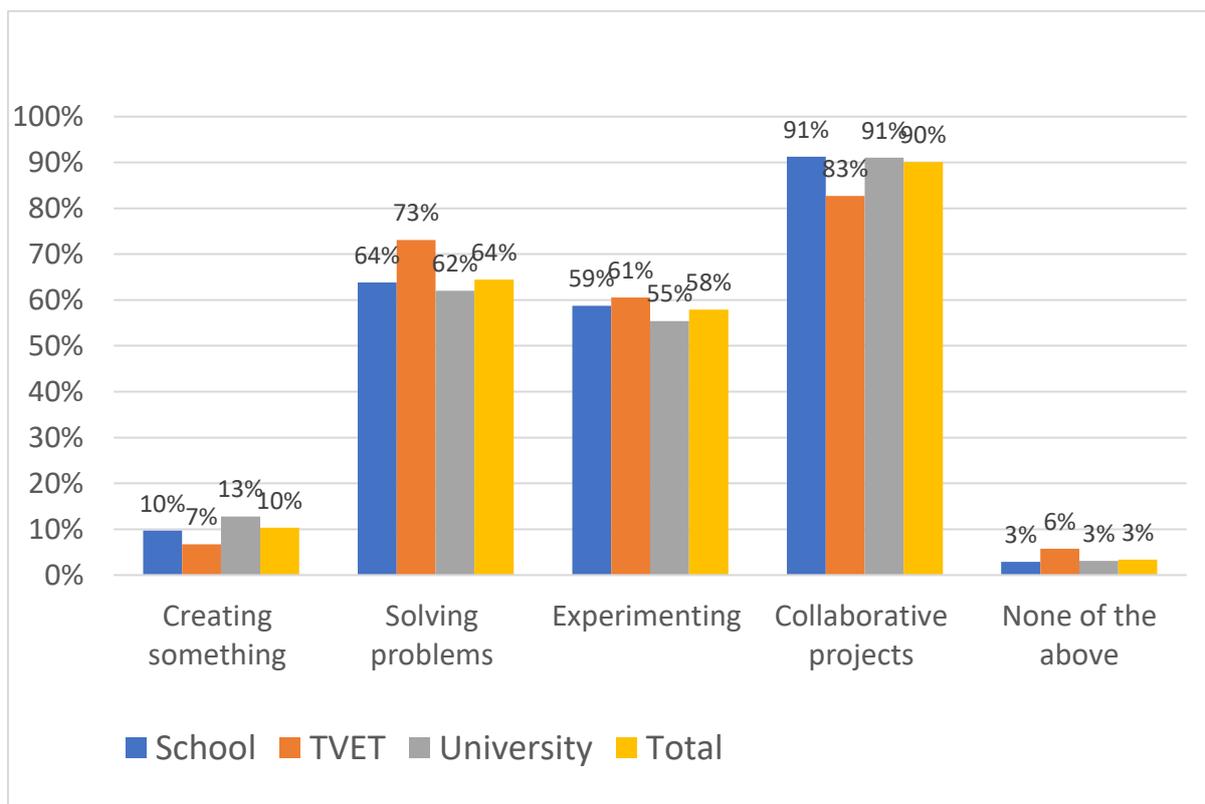
The research team asked teachers in the Cambodia about their ability to create five types of content (PowerPoint, interactive content, graphs/charts, video, and online assessment). Interestingly in the Cambodia there is no discernible difference between the three levels of school, TVET and university. The data shows that across those three levels their ability to create the five categories of content is similar. It is with online assessment that across all three levels teachers are more adept while they are less capable at creating videos. The results are somewhat surprising in that oftentimes PowerPoint is considered a more common and easy to use tool while the highest scoring category of online assessments is generally thought of as somewhat complex. It is also notable that in the category of video creation across all three levels teachers report a lack of ability in content creation.



Teachers engage students in the following creative activities

Twenty-first century skills are commonly understood to include, creativity and communication, facets that are seen to be the core need in workforce development throughout the world. The question looks at how teachers integrate 21st century skills using digital tools in their instruction

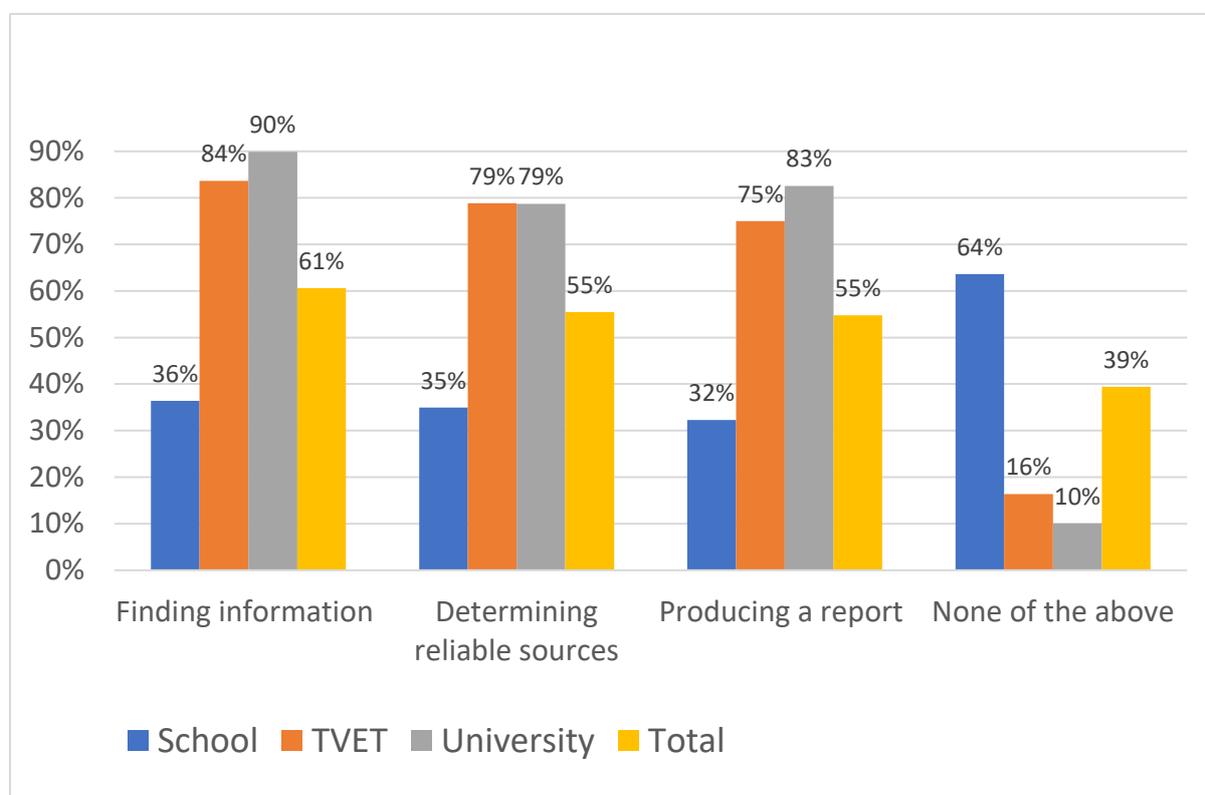
In this question the researchers wanted to check on how digital technologies are being used to further 21st century skills (i.e., communicating, collaborating, creating, problem solving). The important learning for Cambodia is that teachers perceive they are using digital technology to help student improve on 21st century skills. While we have no clear way of discerning the quality of such learning it is evident that they are engaging and considering the use of tools across the board. The data shows that in Cambodia teachers across the three levels felt that they engage less on “creative” engagement while “collaboration” appears to be a strong point. This may help in capacity development that more equally engages across the 21st century skills.



Teachers teach students to conduct online research in the following ways:

Where teachers engage students on research (online), this question attempts to query teachers on the key areas in which they focus in building student digital skills. The question is focused on three key stages in inquiry-based learning – finding information (interaction/clarification), determining reliable sources (clarification/questioning) and producing a report (design).

In modern day use of online resources to conduct school-based research, it is assumed that there are three key areas in which teachers should engage their students to build research skills (finding information, determining the reliability of such information and producing reports based on the information found). Teachers across all the three levels, seem to equally teach their students on 'Finding information related to a task or assignment on the internet'. However, there is a significant disparity between higher education and TVET which seem to produce similar levels of perceived engagement across the three skill areas while at the school level the data suggest far less engagement across the board. We can therefore surmise that schools engage in far less research, which is what these findings indicate. Nevertheless, it is an area that needs to be strengthened as is exemplified in the desire to improve on 21st century skills.



Annex 3: Report on gender gap in EdTech in Cambodia

Gender inequality in education

The Cambodian government is committed to gender equality and continues to mainstream gender in all sectors and at all levels of development, as evidenced by the "Neary Rattanak Strategic Plan³⁵", a five-year strategy for gender equality and women's empowerment led by the Ministry of Women's Affairs. The Neary Ratanak strategy emphasized the education of women and girls. It also highlights the importance of promoting women and girls in STEM fields and gender equality among young people. Each Ministry's Gender Mainstreaming Action Plan (GMAP) is the mechanism for achieving the SDG 5's common goal.

The Ministry of Education, Youth, and Sport (MoEYS) recently released a five-year strategic plan for 2019-2023³⁶ outlining how IT skills will be strengthened through youth strategic development reform and a gender mainstreaming strategy, with one key focused attention being the development of interventions and measures to promote and encourage female students to study science, technology, and mathematics (STEM), such as orientation programs and career counseling for female secondary and higher education students.

During the COVID-19 pandemic, all educational institutions were closed for nearly a year and are still not fully operational. To reduce the risk of transmission of the pandemic, both public and private schools, as well as training centers, implemented some form of distance or e-learning to continue classes or courses. They do face a number of challenges, however, including a lack of IT skills among instructors and students, unstable internet connectivity, and a scarcity of high-quality e-learning materials. As a result, gender inequality becomes more visible. This is due to the new and unexpected context, as well as gender stereotypes prevalent in Cambodian society and the long-held belief that women are less technologically proficient than men. Parents or guardians always advise or send their children to school as a result of this belief. They will advise them to study accounting or business if they are a girl, but technology or mechanics if they are a boy. This concept is still prevalent and obstructs female participation in Information and Communications Technology (ICT) education. The respondents, all university students between the ages of 20 and 22, described being a minority in the classroom and receiving messages from peers and family that "**tech is only for men**". *Additionally, the female tech entrepreneur characterized general stereotypes as "sitting in front of computers with no life"*³⁷.

According to the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), 22% of graduates pursue careers in information and communication technology (ICT), while the vast majority (57%)⁶ pursue non-ICT careers due to a scarcity of ICT jobs³⁸.

Historically, ICT degrees were dismissed as irrelevant to the job market, despite the fact that opportunities for software developers have increased significantly in recent years (particularly in the last two to three years). Even more intriguing is the fact that only four of the 45 faculty members in RUPP's Department of Computer Science are female, representing less than 9% of the department's total. This partially proof of female participation in ICT education is low, which also reflects the stereotypes discussed previously. Without supportive measures, there will be a shortage of female faculty candidates due to a lack of female students. According to One Tech Education, 20% of our enrollees

³⁵ https://www.kh.undp.org/content/cambodia/en/home/library/democratic_governance/cambodian-gender-strategic-plan--neary-rattanak-4.html

³⁶ MoEYS: Education Strategic Plan 2019-2023, Available at: [Education Strategic Plan 2019-2023 \(moeys.gov.kh\)](http://moeys.gov.kh)

³⁷ USAID: Factors affecting women engaging in tech careers in Cambodia, 2018, available at: [Microsoft Word - Factors Affecting Women Engaging in Tech Careers in Cambodia - final By Sophat.docx \(development-innovations.org\)](https://development-innovations.org/)

³⁸ UNESCAP: An Enabling ICT Policy Environment for Women Entrepreneurs in Cambodia, Available at: [Cambodia WIFI P Module 0.pdf \(unapcict.org\)](https://www.unapcict.org/)

are female; however, after foundation year, 80% choose science, with only 3% choosing information technology³⁹.

A lack of job opportunities, a lack of knowledge about the importance of STEM and ICT, a lack of support from family and other relevant stakeholders, and gender discrimination in this sector are all factors that discourage females from entering the tech sector.

STEM and digital are relatively new fields of study with a low level of public awareness, especially in rural areas. Students, particularly female students, are less likely to choose these subjects if they lack knowledge of the subject, lack family support, and lack a role model. During the Case Study of the Secondary Resource School (SRS) workshop organized by the Ministry of Education, Youth and Sports, Policy Department in late 2021, a female teacher from Preah Reach Bocheanikech, Steung Treng province stated, "To get students to study STEM, we need to advertise our subject as we do for our topics, or else no one will be interested in it." It is consistent with other assessments' key findings, such as "a supportive family was critical in assisting women in continuing to rise in their field, even after marriage; I want to study, but it is dependent on my husband" and "It is critical to begin communicating with them at a young age," as well as "there is a dearth of exposure to technology in high school. "Students have little understanding of what information technology and computer science are or how they are applied in the real world" (ibid).

As a result, increasing female participation in ICT will necessitate a collaborative effort from all sectors, including the public and private sectors, as well as civil society. Female participation in this sector can be increased in the future by raising awareness of the importance of ICT, involving female students early in their school years, and promoting female entrepreneurs of online business.

Investing in education is critical for both boys and girls, but the distance to school is one of the most significant challenges, particularly for girls, due to the dangers associated with travel and staying away from home, as expressed by female respondent students from remote provinces such as Preah Vihea, Ratanakiri, Steung Treng, and Modulkiri.

According to the MoEYS statistic in 2020 – 21, the number of female students in upper secondary school is higher than that of their male counterparts, but the number of females repeating class students is lower. The table below shows the number of students enrolled in the 2021 school year at various school levels.

Total number of students enrolled in all levels of public schools (Source: MoEYS Public Education Statistics & Indicators 2020 – 2021)⁴⁰

Education level	Total Students		Repeated Class	
	Total	Female	Total	Female
Pre-school	229,092	114,974 (50%)	0	0
Primary School	2,010,286	964,152 (48%)	142,309	50,940 (36%)
Lower Secondary School	632,303	335,972 (53%)	2,599	918 (35%)
Upper Secondary School	351,794	191,973 (54.56%)	624	287 (45%)
Total	3,223,475	1,607,071 (49.85%)	145,532	52,145(36%)

³⁹ USAID: Factors affecting women engaging in tech careers in Cambodia, 2018, available at: [Microsoft Word - Factors Affecting Women Engaging in Tech Careers in Cambodia - final By Sophat.docx \(development-innovations.org\)](#)

⁴⁰ MoEYS Public Education Statistics & Indicators 2020 – 2021, available at: [Public Education Statistics and Indicators \(moeys.gov.kh\)](#)

Wage disparity

According to the UNDP⁴¹, a significant progress has also been made in terms of women's labor participation. Cambodian women participated in the labor force at an 84% rate in 2019, up from 77.5% in 2014 and 80.1% in 2017. This rate is significantly higher than that of its neighboring countries. Women are less likely to be employed than men, but slightly more likely to be self-employed, at 39% and 37%, respectively. However, the wage disparity between men and women is narrowing. It decreased from 24% in 2017 to 19% in 2020.

Women's knowledge and abilities in digital economy

The report published by Cambodia's Ministry of Economic and Finance of Cambodia shows that women own 65% of businesses, 96% of which are small and informal. This aligns with the UNDP 2021 report, demonstrating women becoming more self-employed. They contribute significantly to economic growth across all sectors.

As female entrepreneur Khmum APP stated, "the COVID-19 pandemic has acted as a catalyst for change in the digital economy; businesses must run before they can crawl." However, as with any unexpected event, women encountered a number of barriers in terms of technology, personal skills, and infrastructure when it came to conducting online business. Additionally, according to various sources, the age of an active online business in the country from 15 to 41 years old. Individuals over the age of 40, particularly female farmers, may struggle to adapt to this new era due to a variety of factors such as access to a smartphone, the internet, and a low literacy level.

Within the context of ecommerce, the online enterprise is critical for all businesses, large and small, to address pandemics and empower women. Khmum eShop is an online business platform that enables producers (including small, medium, and large businesses) to rethink their traditional market strategies through the use of technology. Khmum eShop's CEO anticipated that 50% of women will own online businesses in the next few years. However, then enabling environment support and enhance their technology skills.

Gender gap in device access

According to ITU⁴² report 2021¹, the proportion of people who own a mobile phone (including smart phones) is high, exceeding 90% regardless of gender. Similar to other studies, this one discovered that more than 70% of females and males own a smartphone. Young people under the age of 40 have widely access to smartphones. Smartphone ownership is more prevalent among young people, and urban areas have a higher rate of penetration than rural areas (60% and 40% respectively). Rural women are the least likely to own a cell phone⁴³.

A joint study published by MoEYS, UNICEF, and SCA⁴⁴ demonstrates that teachers at all levels have access to a smartphone, with teachers having the most (93%) and students having the least (69%). However, only 37% of people have access to the internet⁴⁵.

⁴¹ UNDP Gender Wage Gap in Cambodia, 2021, available at: [The Gender Wage Gap in Cambodia | UNDP in Cambodia](#)

⁴² ITU: Connectivity in the Least Developed Countries Status report in 2021, Available at: [Connectivity in the least developed countries: Status report 2021 - ITU Hub](#)

⁴³ UNESCAP: An Enabling ICT Policy Environment for Women Entrepreneurs in Cambodia, Available at: [Cambodia WIFI P Module 0.pdf \(unapcict.org\)](#)

⁴⁴ MoEYS, UNICEF & SCA: Cambodia COVID-19 Joint Education Needs Assessment, 2021, available at: [Cambodia COVID-19 Joint Education Needs Assessment.pdf \(unicef.org\)](#)

⁴⁵ WVI: Survey on the impact of the COVID-19 on vulnerable households in Cambodia, available at: [Survey on the impact of COVID-19 on vulnerable households in Cambodia - Cambodia | ReliefWeb](#)

The study discovered disparities in access to ICT, including increased access to advanced technology such as smartphones, computers, social media, and the internet, as well as increased use of online messaging applications (e.g., Telegram, Messenger and WhatsApp) by students, teachers, and school administrators as the school level increases. Males and females appear to have comparable access to smartphones (78% versus 74%, respectively) and the internet (34% versus 31%, respectively); however, the most significant differences were in access to a personal computer (28% versus 18%, respectively).

The differences between male and female adult females' access to smartphones. Research by UNDP (2020) shows five married women out of every nine own at least one smartphone, and their husbands own at least one as well.

Female educators and students' literacy in ICT

Distance learning is a completely new concept for most educational staff and students in Cambodia, both in the public and private schools. The typical private school appears to be capable of and quick to adopt new technology platforms. The joint study (ibid) indicates that the top three of the six critical areas of distance learning support are as follows:

- assisting students in studying at home (64%)
- providing parents and caregivers with practical guidelines and instructions on how to best support their children's distance learning (55%)
- disseminating information about distance learning tools and resources available to families (48%)

New Generation Schools (NGS) and secondary resource schools (SRS) were established to encourage students in upper secondary school to pursue careers in science, technology, engineering, and mathematics (STEM). The country currently has 247 secondary resource schools, and the Ministry of Education and Youth Services has established 50 secondary resource schools (SRS)⁴⁶

Female teachers were trained in online and distance learning, accounting for 157 (38%) of the 411 participants. They come from six secondary resource schools in the provinces of Kampot, Kandal, Otdormeanchey, and Kampong Thom. The Department of Information Technology had conducted an information technology training course in the third quarter of 2021. Female teachers appear to be less in technology and have low literacy levels in the context of digitalization⁴⁷.

It is consistent with findings of UNDP 2020, the female students in almost all study fields have significantly lower levels of digital literacy in both hardware and software domains than their male counterparts. And the large gap is among student in university (44.3 versus 54.8 between female and male) and high school 49.5 versus 56 between female and male⁴⁸.

As illustrated in the table below, competence in the use and maintenance of personal computers remains low, especially among female youths. The most concerning aspect of the findings is that female youths consistently perform worse on most ICT tasks than the male youths. When combined with other findings from a variety of sources, gender issues in the ICT sector become complex and necessitate a strategic approach to equity.

⁴⁶ MoEYS-A: Public Education Statistics & Indicators 2020 – 2021, available at: [Public Education Statistics and Indicators \(moeys.gov.kh\)](http://moeys.gov.kh)

⁴⁷ ADB, 2021. USESDP Annual Report

⁴⁸ UNDP: Digital Literacy for Employability and Entrepreneurship among Cambodian Youth, 2020 available at: [Assessment of Digital Literacy for Employability and Entrepreneurship among Cambodian Youth | UNDP in Cambodia](#)

Advance ICT capacities among Cambodian youths (value in%) Source: UNDP, 2020

Task	Hi.SC		Univ.		EMPL	
	Female	Male	Female	Male	Female	Male
Install mobile app	51	73	63	96	88	96
Uninstall desktop program	28	44	28	81	55	81
Factory reset phone	22	51	22	69	31	69
Cloud storage	58	71	61	80	67	80
Use digital map	44	68	60	96	67	96
Share location	44	61	75	92	79	92

This Report presents preliminary findings and an official ADB publication will be produced in due time