Chapter 5 | Education: Inclusivity, STEM, and Smart Design

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It is 8AM on a Monday morning and Mongkol, an 11-year-old boy, is eating his breakfast while listening to a science podcast before heading to school. Mongkol takes a driverless bus to school. It is the start of the new semester, and Mongkol selected his Grade 6 subjects based on his interests. He goes to his history class and uses facial recognition to sign the attendance. During the history class, the instructor shows everyone a hologram of Angkor Wat that has been developed by senior students. Mongkol takes notes on his digital pad. After the lecture, Mongkol gets his tablet and logs into the Learning Management System to work on his history assessment. In the afternoon, Mongkol goes to the canteen to have lunch, which he has already pre-ordered from his phone. After the lunch break, he meets his friend Mony at the special education class for visually impaired students. Mongkol, Dara and three other classmates are working on a robotics project at the tech and innovation lab where they develop and innovate a personal assistant robot for the elderly. It is almost the end of the day and Mongkol takes the skytrain home via his evening Apsara dance class. After having dinner with his family, Mongkol goes to his study room to review the materials for tomorrow's seminars and watch the recorded lectures from last week as he had missed the classes. On opening his email, he is excited to have received a message from the ASEAN Exchange Program notifying him that he has been selected for an exchange program in Singapore for the next semester.

I. Future Education: Inclusivity, STEM, and Smart Design: The Ideal Scenario

In 2040 Cambodian education will be a hallmark standard of inclusion. Inclusive education means making basic education accessible to all children regardless of background, race, ethnicity, religion, or disability. The distinction demographically in Cambodia between urban and rural areas, with children in the cities having access to better educational opportunities than those in remote areas (Lay, Lim & Man, 2018), has been eradicated through a combination of distance learning and quality coverage. The promotion of inclusive education ensures that students in remote areas have equal access to quality learning and educators. School facilities have been designed to meet the needs of students with disabilities; including the standardized incorporation of wheelchair ramps, inclusive bathroom facilities, and multi-sensory teaching methods. Underpinning quality, inclusive coverage is the nationwide provision of quality internet connectivity, with all areas covered, enabling even remote schools to have access to EdTech.

A crucial feature of the 2040 vision for education is the structure around STEM subjects (science, technology, engineering, and mathematics). Public schools in both urban and rural areas have developed around the mandate to replicate the new generation schools (NGS) model.[3] NGSs have formed student unions and study clubs, enabling students to learn specialized subjects such as STEM and organize school activities. With the popular model in place at NGSs and certain private schools, over the next 20 years student unions will become autonomous and well-established, with students feeling empowered to voice their opinions

[3] New Generation School (NGS) is an education reform made by the Ministry of Education, Youth and Sports in 2014 that aims to improve the standard and quality of education. NGS has an autonomous model in which the school governing board is accountable for their performance, whereas the recruitment of educators is competitive and focuses on performance-based merit. The NGS also extends the teaching hours to include the special subject themes for students and expand the educational services such as career counselling and extracurricular activities. In addition, technology and innovation is the key factor in accelerating teaching and learning (Ministry of Education, Youth and Sport, 2016).

and concerns, as well as to create projects and solutions to serve the learning needs of their peers. The student union, a replication of the model at learning institutions in developed countries, will consist of study clubs, subject-based clubs, and common interest and hobby groups. They will organize student-run social and charity events, and project work. The student union will engage parents and all key stakeholders in its activities.

Early forerunners in the NGS model have been transformed into "smart schools", with the model implemented nationwide. The Smart school model builds on the NGS model by prioritizing the adoption, incorporation, and promotion of digital learning practices throughout the curriculum. It places a significant on science, innovation, and entrepreneurship, under a hands-on learning model. Similar to the NGS model, Smart schools will focus on the delivery of high-quality educational services, with qualified and highly motivated educators, STEM education, student-centered learning and innovation labs. Smart schools will have introduced the learning management system to students since Grade 1. The learning management system will allow educators to communicate with students on subject guides, lesson plans, reading materials for each week, and assessments. In addition, the system will introduce the virtual classroom, which will allow students who missed class to watch recorded lectures. The virtual classroom also works for the long-distance learning. Schools, be they NGS of Smart, are interconnected, with students able to visit others in their area to learn about innovative projects and activities. Building on the opportunities of 2020, there is an institutionalized opportunity for students in secondary school to undertake an exchange program to study a semester in neighboring ASEAN countries. The ASEAN Scholarships for Cambodia program awarded by the Ministry of Education in Singapore, gives high school students in the kingdom the opportunity to study at an institution of a regional neighbor.

Educators in 2040 are no longer reliant on tutoring classes to supplement their income. In addition to a secured and competitive salary, they are incentivized through personal and professional development training programs undertaken in exchanges within the ASEAN region. In addition to the standard school day program, Smart schools operate additional community facing programs including opportunities for self-learning, research, and exploration at the tech and

innovation labs. An additional focus is placed on health and wellbeing with a kingdom wide coverage of extracurricular activities, covering art, sports, education in life skills and digital learning. Even though technology will be integrated into primary and secondary education, educators will still play an important role in facilitating the learning outcomes for students. The shift from teacher-centered to student-centered learning will allow educators to facilitate learning for students, and mentor and support them in the areas they are lacking. On top of that, senior students will play a significant role in mentoring and coaching junior students. The peer support system in a well-established student union and in study clubs will become popular in the next two decades. The model has been adapted currently in certain projects; for example, with senior students mentoring junior students on literacy skills based on results from the TEST app and digital literacy assessments.

The current program at NGSs will inspire the design and development of technology and innovation labs at all schools starting from primary. School technology and innovation labs will be the platform for students to access support and mentorship from educators and mentors, as well as educational resources including digital tools and software-based learning. They will be places where students receive training on digital literacy and ICT skills, working in a team to solve specific design challenges. Students will also be able to access support and counselling regarding personal, school and career opportunities. They will additionally be able to access study guidance and tailored mentorship support from their seniors as part of their learning journey. Digital literacy assessments for first to third graders were successfully handed over to the Ministry of Education, Youth, and Sports (MoEYS) this year (Rath & Chin, 2018). This was initially implemented by World Education, with funding support from USAID's Development Innovations project. The project has been scaled to include 48 public schools, with more than 6,000 active current users across Cambodia (Rath & Chin, 2018). Seeing its impact to scale, the ministry has expressed a commitment to standardizing the assessments and making them available for all public schools to use and access. Being made accessible by all levels of education will ensure transparency, accountability, effectiveness, and efficiency in the delivery of education services. In addition, based on the instant results from the assessments,

educators and senior mentors will be able to tailor their support to meet the needs of students, specifically slower learners. The digitization of these assessments and other learning materials will help schools become paperless, with the environment and climate change shaping the discussion over the next 20 years.

II. Scenario Space and Key Factors for Education: Inclusivity, STEM, and Smart Design.

Education is a core priority for the Royal Government of Cambodia (RGC) as indicated in the Education Strategic Plan 2014-2018 (Ministry of Education, Youth and Sports, 2014). With a number of potential development avenues for education to be built around, I have identified four key factors that will support and guide the kingdom's development in education towards 2040 and beyond. Each of these factors represents a crucial aspect towards the realization of an inclusive and STEM focused education system in 2040.

1. **Coverage**. Education can only be completely inclusive so long as the coverage is universal within the kingdom. This relates to both the geographical dimension (physical institutions) and the digital dimension (access to online teaching materials).
2. **Facilities**. The design and provision of educational facilities is a contingent factor on the quality of the education system.
3. **Syllabus**. The outcome of future education on economy and society is contingent on what is being taught.
4. **Technology**. As technology continues to increase its role in everyday life, the application across education is a determining feature of the ultimate success of the model.

Each of these key factors are motivated by current features of the Cambodian education and learning system. These are discussed in turn below.

Policy and Priorities for Education Reform

With Cambodia aiming to reach high-income country status by 2050, human resource development is essential (Ministry of Education, Youth and Sport, 2014). In accordance with the education strategic plan for 2014-2018, MoEYS has

highlighted three policy areas to equalize access to education, enhance the quality of learning, and improve the leadership and management of education staff. In addition, priority programs in the strategic plan also include early childhood education, increased educational quality, scholarships, improved teacher performance, and technical and vocational education. MoEYS has additionally set out seven priorities to enhance the quality of education: introduce capacity building and professional development opportunities for teachers to improve their learning and teaching; increase teacher remuneration and benefits based on performance; provide sufficient educational resources; form an independent council to advise the government on education development and policy reform; improve vocational training programs for young people entering the workforce; and overhaul the instruction of sport and physical education. However, the challenges in basic education still remain, with a lack of competent educators and low pay still an issue. Education reforms began in 2014 after the appointment of a new minister. The first major reform was the crackdown on corruption during the national exams, one that received public support. The pass rate among Grade 12 students increased from 25.7% in 2014 to 62% in 2015 after the reform was implemented (Chea, n.d). In 2015, the government undertook the further reform of increasing teachers' salaries by 20% (Sem and Hem, 2016), which indicates a positive trend to incentivize educators.

Emergence of New Generation Schools

The NGS policy was introduced and piloted at certain public schools in 2014 (Ministry of Education, Youth and Sport, 2016). NGSs are autonomous public schools that focus on enhanced educational and teacher quality, and merit-based performance. There are advantages for educators, with incentives and professional development opportunities for career advancement. The newly reformed schools also aim at providing STEM education and other learning opportunities for students, such as career counselling, science labs, mobile and ICT learning, and life skills education. The NGS initiative was developed in partnership with KAPE. The model utilizes extended hours of studying and allows the schools to apply innovation in education, for example by using ICT in education

and making necessary changes to the curriculum. NGSs have also introduced a coding course for girls, Sisters of Code, to complement STEM education.

STEM Education

The goal of MoEYS with its recent education reforms is to focus on investment in human capital development and STEM education. This has also been demonstrated with the master plan for ICT in education (2009-2013), which shows the commitment of MoEYS to integrate the use of ICT to improve the quality of teaching and learning from basic education. Along with the ministry's vision and commitment, there has been an emerging trend over the past few years of NGOs and private sector partners initiating STEM education in partnership with public schools. This has led to the implementation of such programs as Technovation Cambodia, Sisters of Code, Champion Coders—a coding course for 6- to 15-year-olds—and E2STEM. These STEM programs have been adapted from those run in developed countries and localized for Cambodia. This focus on STEM education is designed to address the current challenge of a shortage of knowledge and skills among STEM professionals to meet the demands of the labor market.

Support from MoEYS on NGO Initiatives

As indicated in the master plan for ICT in education (Ministry of Education, Youth and Sport, 2010), the government has sought partnerships to minimize the cost of ICT. Non-state actors have begun to engage with the government in the early stages of their education projects. EdTech projects have been successful piloted, scaled-up, and handed over to MoEYS – the digital literacy assessments in early grade education as implemented by World Education and KAPE, the youth career counselling mobile application put into effect by InSTEDD iLab Southeast Asia and KAPE, and the digital library and STEM books program funded by Smart and implemented by The Asia Foundation, for example. Additionally, as seen earlier, the E2STEM program, which aims to build the capacity of high school students in English, e-Learning, and to build the next generation of STEM professionals, has been introduced at a public school in Phnom Penh.

Education Technology Initiatives from Public and Private Institutions

There have been a number of education technology initiatives at both public and private institutions to enhance and accelerate innovative learning approaches. Open education resources have been endorsed by MoEYS for educators and students in accessing digital and multimedia teaching and learning materials for K12, including the G7-G9 learning English app. Moreover, recent technologies have been introduced into the classroom, such as the MoEYS App Scan augmented reality educational tool that brings visual interactions to science textbooks. ICT training for teachers started in 2013 but failed due to a lack of equipment (Ministry of Education, Youth and Sport, 2010). The educator's website has been developed to help them improve their teaching methodologies through digital materials and resources. In terms of non-formal education, the master plan for ICT in education also highlighted vocational and life skills training programs, as well as multimedia and video-based training for out-of-school youth to prepare for exams (Ministry of Education, Youth and Sport, 2010). Additionally, UNESCO, with support from MoEYS, has launched the BEEP program to provide a flexible e-learning platform for school dropouts to be able to complete a basic education to ensure future livelihoods and employment opportunities (UNESCO, 2018).

III. Policy Initiatives to Achieve the Ideal Scenario

The ideal scenario described in section one is contingent on undertaking appropriate policy steps. To this end individual and combinations of key factors will be discussed in line with policy solutions that can be undertaken to attain the end goal of inclusive and scientific education.

Facilities and Syllabus

Replicate New Generation Schools Model and Adapt International Best Practices. The successful NGS model allows school administrations and management teams to be autonomous in the decision-making process and improve the standard and quality of education through applied technology and innovation. Educational institutions should evaluate the NGS pilot model to determine

what worked well, and what did not work. The lessons learned should be taken on board by other public schools, with recommendations for replicating the model. Given the recent trends for adapting global education programs, for instance the Technovation Challenge, and youth coding courses in Cambodia, conventional public schools should be encouraged to use the model as it would improve the standard of the public education system.

Coding and digital literacy are essential basic skills to acquire. At present, programming and coding programs, for instance the Sisters of Code project implemented by IT Academy STEP Cambodia and funded by USAID's Development Innovations, have gained support from MoEYS (IT STEP Academy, n.d) and have the potential to be replicated and scaled up for public schools. English language and coding skills should be introduced to students in the early grades. Teaching coding does not mean to create a pool of computer programmers, but rather for children to become confident and innovative problem solvers by acquiring critical thinking skills as they learn to communicate with a computer. This is an essential skill for children to obtain from a young age as they develop soft and hard skills with which to meet the future demands of the labor market. Coding not only teaches students about communicating with a computer, but also encourages them to be curious, problem solving, and self-motivated learners (Pena, 2018).

Prioritize STEM Education at the Primary School Level. The government's recent reforms of public education with the piloting of the NGSs come as part of a drive to enhance the quality of education as well as putting a special focus on STEM education at the newly reformed schools. According to STEM Cambodia (2018), only three percent of students in higher education enrolled in the science, technology, engineering and mathematics related subjects, which indicates a future lack of human resources in the STEM fields. Employers in the information technology sectors have also identified a lack of qualified and competent human resources to meet demand in the labor markets (B2B Cambodia, 2017). Therefore, in order to meet the needs of a competitive labor market, especially in the ASEAN region, STEM education should be prioritized and integrated at the early grades of education in order to stimulate the interests of young children to be curious, self-motivated, and problem-solving learners.

Equipped with such skills, Cambodian students will be able to build mobile apps, websites, software, and robots.

Investment in Education and Human Resources Development. Investment in public education is the first priority in the roadmap to the 2040 vision. At present, the government has taken initiatives to reform the Cambodian education system and increase its annual budget allocation. However, further investment in school infrastructure, particularly in remote areas, is essential, as is the capacity building and professional development of educators, with them receiving increased remuneration and benefits.

ASEAN is also to play an important role in contributing to educational advancement and human resource development through investment funds and accelerating innovative learning opportunities through scholarships and exchange programs for both students and educators. The ASEAN scholarship program by the Ministry of Education in Singapore and the Teaching Excellence and Achievement exchange program for educators to develop their teaching skills in the United States are two examples of such opportunities. At the same time, the government should leverage public-private sector partnerships (PPPs) to innovate and increase the efficiency of education service delivery. Such partnerships are crucial given the private sector's capacity to finance investment in school infrastructure and creative learning models, thereby improving standards. The scaling up of the NGS model to reach additional public schools in urban, rural, and remote areas needs major investment, in financing as well as infrastructure and human resources development. There remains a disparity between urban and rural areas in educational attainment. Public educational institutions and relevant key stakeholders should therefore take this into account and ensure that children living in remote areas receive an education and other learning opportunities equally.

Recruitment, Retention, and Incentives for Educators. According to Education Reform in Cambodia: Progress and Challenges in Basic Education (Sem and Hem, 2016), primary school educators earn approximately $35-$40 per month. This often forces them to work a second job in order to support their families or take on private tutoring to earn extra money. Therefore, they do not have the

time to carry out research, prepare lesson plans, and support students outside of teaching hours, which consequently impacts the quality of education. Educators in rural areas are also often absent during harvesting season, which contributes to the dropout rate of rural students. There is additionally a shortage of teachers to meet current needs, particularly in the northeast of Cambodia, which therefore results in large class sizes (Sem and Hem, 2016). Recruiting qualified, competent, and committed people as educators is difficult as they will look for jobs with higher income and greater professional development. To overcome these challenges, the recruitment and retention of competent teaching staff should be properly addressed.

There are certain steps that should be taken in the recruitment process. The minimum education level for primary and secondary school should be increased to at least a Bachelor's degree in Education, while top performing students should be incentivized to apply for a teaching position. A higher standard and more competitive recruitment process would better motivate qualified people to apply. Furthermore, remunerations and benefits for educators should increase in line with the market value. As mentioned earlier, a teacher's salary is fairly low and not able to provide a decent standard of living. Additionally, educational institutions should provide personal and professional development opportunities in order to retain competent staff. For example, scholarships, exchange programs, and exposure visits for educators to learn from schools in developed countries should be provided so they can adapt the models and programs they experience locally. Furthermore, appreciation, awards, and incentives for the top performing teaching staff should be applied as this will increase their recognition in society and boost motivation.

Improve the Capacity of Educators in Digital Literacy and ICT. As Cambodia embraces the Fourth Industrial Revolution (also known as Industry 4.0), a basic knowledge of digital literacy and ICT is essential for Cambodia to keep up with its ASEAN neighbors. On top of the raised qualifications for teachers and their increased competency, basics skills in digital literacy and ICT, such as the use of digital devices, social media platforms, and digital security, are important skills for educators to acquire in order to maximize their teaching proficiency as well as the learning journey for students. Currently, the digital platform for educators

and instructors is the Krou website, where they access materials to improve lessons plans at all levels from primary to higher education.[4] While Krou is a good starting point, in order to get the most from it, basic knowledge on how to access and best use digital platforms is crucial. It is important to consider whether a platform has been designed to meet the needs of teachers, how often they use it, how it adds value to their teaching methodology, and in which ways teachers can use its digital and multimedia materials in the classroom. The policy option is to integrate digital literacy and ICT skills in the teacher training curriculum. Educators not familiar with using technology in the classroom should receive coaching and support from those with digital experience. Capacity building in digital literacy and ICT would help educators in utilizing such skills in the classroom, with students making use of digital tools and social media platforms for research and learning.

Public and Private Partnerships for Sustainability. There has been an increase in the role of non-state actors through PPPs to improve the quality of education and the long-term sustainability of learning projects (Kampuchean Action for Primary Education, 2014). There have also been the successful pilots of Edtech projects. The TEST app digital literacy assessment, for instance, which was handed over to MoEYS for long-term sustainability assessments. The E2STEM integrated English, e-learning and STEM education project at a Phnom Penh high school is another. The aim is to build the capacity of the students in STEM subjects through modern teaching methodologies. Similar to the NGS model, the initiative was set up by a non-profit organization. The selection process for E2STEM is very competitive, with only highly competent students able to join the program. The initial pilot proved the effectiveness of its innovative approach to education and highlights the importance of public educational institutions collaborating with NGOs and private sector partners in developing integrated education approaches that are sustainable in the long term.

Technology

[4] Krou Website: Open Educational Resources, available at http://krou.moeys.gov.kh/en/

With the Fourth Industrial Revolution, technological advancement and innovation will not only have a significant impact on the socio-economic development of Cambodia, but also on the education sector, with students, educators, and public and private institutions embracing technology to accelerate innovative learning. Free and affordable basic programming and coding courses will have been made available for children from the age of six. Given advancements in technology, students will be greater connected in a flexible learning environment, becoming tech natives in comparison with previous generations. At the same time, there will be new emerging actors, such as Education and Technology (EdTech) companies and private sector partnership funds to incubate and accelerate digital programs for both children and adults.

User-Centered Design and User Uptake in Technology. Technology can greatly increase the quality, effectiveness, and efficiency of education; however, if it is not designed to meet the needs of its users, particularly institutions, educators, and students, it will not add value to education. Prior to the design of technology for educational projects, the educational institutions, policymakers, development practitioners, and relevant stakeholders concerned should carry out rapid design research to assess the needs of educators and students, as well as the challenges hindering education service delivery that they may be facing. Rapid design research will provide useful insights for the development team on how to design EdTech tools that respond to the needs and concerns of educators. For instance, prior to the development of open education resources, the development team should assess the educators' uptake of the technology—the digital literacy and ICT skills of the teaching staff, and what kind of tech tools they use to conduct research and prepare lesson plans, for example.

The Open Education Resources (OER) developed and managed by MoEYS provides educators with digital materials and resources at all levels and subjects that they can use to improve their teaching methodologies. OER is a good starting point, but it still has areas for improvement. The platform is currently only in English and might not be accessible for some educators with language and digital know-how barriers. OER can be adapted to the learning management system (LMS) to facilitate the administration and management of teaching and learning.

According to Computer Aided Learning (n.d), LMS provides a number of benefits for educational institutions, educators, and students, such as supporting in-person learning through blended learning and virtual classrooms, personalized content with multimedia teaching materials. These can enhance the effectiveness and efficiency of teaching methodologies, the management of student assessments, and communication between school administration, teachers, and students. LMS is very popular in the higher education systems of developed countries and has the potential to be applied and integrated into K12 education in Cambodia. Another area to be considered is the effective and ethical use of technology in teaching and learning. Technology can improve learning outcomes, but this might not be the only factor to take into consideration. Digital security and safety for both students and educators should be properly addressed as there have been growing concerns over cyberbullying and user privacy.

Coverage

Mandatory Education for All Children. The first priority is to equalize access to education, especially for children living in remote areas and those from ethnic and minority groups. In order to bridge the gap between urban and rural education standards, appropriate measures should be taken such as building school infrastructure, especially in remote areas, to make them easily accessible for children, and putting in place a public school transportation service that allows children living far away to be able to attend classes. Children should also be incentivized to stay in school through support programs, particularly the school feeding schemes currently being implemented by NGOs. Given the lack of educators in remote areas, educational institutions should recruit qualified teaching staff through identifying the top-performing students in communities and encourage them to apply for teaching positions (Sem and Hem, 2016). In addition, capacity building and training with personal and professional development opportunities are important for current educators to improve their teaching methodologies and keep up with innovative trends in education.

Support Systems for Students with Disabilities and From Disadvantaged Backgrounds. The dropout rate among lower-secondary school students in

Cambodia was 19.2% between 2015-2016 (Sem and Hem, 2016) and mainly due to poverty, with the rate much higher in rural areas, where a lack of educators also undermined the quality of the education on offer. Support systems for disabled children are also limited in the kingdom, with special education services only available at a handful of disability NGOs. Krousar Thmey, for example, offers special education services for visually and hearing-impaired children.

School facilities and infrastructure in Cambodia often do not support the needs of children. Long distances to schools on poor roads coupled with poverty often means disabled and disadvantaged children do attend school (Sem and Hem, 2016). The disabled and disadvantaged are often neglected by society in terms of education, social activities, and employment. In this regard, MoEYS, the Ministry of Social Affairs, Veterans and Youth Rehabilitation (MoSVY), Ministry of Health (MoH), policymakers and NGOs should collaborate in joint initiatives to design and develop programs addressing the needs of children with disabilities and special needs, as well as those from disadvantaged backgrounds. Schools should be fitted with wheelchair ramps, multi-purpose toilets, and special learning spaces with assistive devices, for example, to provide an accessible environment for children with disabilities. Education in digital literacy and ICT should also be made accessible to them, with educational institutions utilizing multimedia tools to assist disabled children in learning. Additionally, building the capacity of educators regarding inclusive education methods is hugely important, ensuring they have the necessary knowledge and tools to provide special education services to the students that need them. Educational institutions should encourage children with disabilities to go to school despite the restrictions of poverty by implementing scaled up versions of the school feeding program, for instance.

Plan International Cambodia and Kampuchea Action to Promote Education (KAPE)[5], for example, provide children with free uniforms, bags, books, and

[5] Kampuchea Action to Promote Education is one of the leading local NGOs that aims to equalize the access to quality education for Cambodians, with the primary focus on integrating innovative approaches in Cambodia's education system. Available at http://www.kapekh.org/en/

school materials. They encourage parents to send their children to school through providing school and take-home meals. Services such as escorting pupils to school, assistive devices, and health support for children in need should be established and made available at all times. Life skills education, vocational training, internships, and apprenticeship programs should also be tailored to students with special needs.

IV. Inclusivity, STEM, and Smart Design Under the Baseline Scenario: Business as Usual in 2040

Notwithstanding the positive visions of human capital development of Cambodia in 2040, without major interventions to improve the quality of education, Cambodia will face several challenges. Human capital development is one of the most important contributing factors in becoming an upper-middle-income country in 2030. Transitions in the political landscape could have a significant impact in terms of foreign investment and private partnership funding in the education budget. Reforms in the education system, particularly expanding the current NGS model, and infrastructure, recruitment, retention, and capacity building, as well as incentives for Cambodian educators, need major financial investment. Therefore, a decrease in foreign aid investment and budget deficits would have an adverse effect on education sector development. Education was approved $915 million in the budget for 2019, a 7.32% increase on the previous year (Kay, 2018). The 2019 national budget allocation aimed to increase the salary of educators to $300 per month (Kay, 2018). The increase, coupled with a competitive working environment, intended to enable them to put their focus on education service delivery, without the distraction of needing second jobs. Changes to the allocation, particularly budget cuts, could have negative influences on the recruitment and retention of the necessary capable educators.

The NGS model is regarded as a successful reform by MoEYS. However, investment for its scaling-up requires increased budget allocation and additional human resources. The current model has not yet been implemented in all schools in Cambodia. This could create internal inequality, forcing children in rural areas to move to the cities in pursuit of a better education. With the high cost of private education, low-income families are not able to afford such schools. The children

left behind by migrant parents will not have an equal opportunity to access education, given the standards and infrastructure available at the schools in rural areas.

From a technological perspective, there are two potential issues as regards the development of an inclusive and STEM focused system. Firstly, there needs to be a targeted nationwide infrastructure project to ensure that coverage is universal. In the absence of full coverage there will emerge a gap between students educated under a top Smart school model, and a, likely, rural model inhibited by a lack of resources. This itself could cause an issue whereby Cambodia experiences a major gap in quality provision between urban and rural schools. Separately there is also a need to ensure that the school population is educated in how to use new digital technologies as they emerge. This will require teachers to also understand the process. In the absence of suitable teacher training programs, the application of technology in the classroom will be uneven and fail to achieve the intended outcome.

From a syllabus perspective there is a danger that a full STEM focus faces over-educating a workforce prior to the changing demands of its economy. In this sense, even if inclusive STEM education was achievable there is a need for an economic development plan that can ensure the Cambodian workforce can make use of highly educated members of society under the new system. In its absence the kingdom faces a brain-drain of students to markets that can provide employment opportunities.

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