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Cambodian Youth Perspectives

Edited by

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Chapter 10 | Technology in Cambodia Education's Advancement and Inclusion

Ratana SRENG

Future Scenario

It is a typical morning in the year 2121. Kheang, a teenage boy in Kampong Cham, Cambodia, is getting ready for his anatomy class in his bedroom. He puts on a pair of contact lenses, model Microsoft HoloLens Z, and presses the switch on his controller. A 3D hologram screen pops up in front of him, and with a few touches, he joins his friends and his teacher in a virtual lab. They are watching and experiencing the head transplant of two 3D humans, a medical surgery that has been a common practice for a few decades now. After taking a short break to play virtual basketball with his classmates, he then works on their mechanics of space engines project. Kheang and his friends are examining and designing parts that would go together and make this 3D engine work. Each time he creates a new virtual part and adds to it, the existing model shows whether it works and the reasons why or why not.

Resting in bed and thinking about his individual history project, Kheang imagines how crazy it is that just 100 years ago, teenagers like him were only learning from books and at best, from videos. Curious about what it was like, he puts on his lenses to go back to the time when the revolution of Mixed Reality technology in education began.

He visits the day in 2016 that Microsoft announced its release of the Microsoft HoloLens, a device in a head mounted display that allowed hologram objects and reality to coexist in real time, the primitive form of the technology he's using today. Kheang then remembers from his reading that the idea and the associated technology of blending real and virtual worlds was not new at the time. Its siblings, under the umbrella of immersive technology, were virtual reality (VR), which began in the 1800s with the invention of the Sensorama device, and augmented reality (AR), which was first invented in 1968 by Ivan Sutherland. Both technologies were used in classrooms and other areas of life such as gaming (e.g. Pokemon Go and Snapchat filters). Investments in this field were huge. US\$1.2 billion was invested in AR/VR in the first quarter of 2016 alone. By the end of the year, there were virtual reality industrial parks and labs in almost 20 provinces and municipalities in China, opening doors to compete with big names such as Samsung and Silicon Valley.

Kheang then pays a visit to the year 2021 during the Covid 19 pandemic, at which time many countries were already actively installing virtual reality technology in classrooms, with China as the lead. International organizations such as UNICEF were actively advocating for the use of virtual/augmented reality technology not just in education and training, but also health. These countries and organizations saw the potential of immersive technology for increasing the inclusion of marginalized communities. Fast forward two decades and Kheang is now at the critical moment for immersive technology in Cambodia. For years, Cambodia was experimenting

with different school systems, including virtual reality, to find the best one to use as a model. The government finally explored the possibility of a mixed reality classroom. In 2036, the Ministry of Education, Youth, and Sports announced its first model school. With cooperation from China, which had been a leader in immersive technology education for a few decades now, Cambodia was able to supply head-mounted displays to students and teachers. At the opening ceremony, people were hesitant and questioning the new model, but were won over by the argument from the Minister of Education. She said, "If we want a world class education to be made accessible country-wide, uniforms, school buildings and books are not the most efficient tool, this is. Why would we keep the traditional ways when the world is moving forward? Why would we keep the traditional ways when we can stop spending on buildings and other associated costs such as transportation and maintenance, when we can explore a whole world from our bedroom? Instead of building more schools, creating more programs for marginalized students, why don't we bring education to their homes and give everyone the same access?" The pilot was a success and mixed reality was adopted into more and more schools.

Jumping from one decade to the next, Kheang witnesses how technology has been constantly kept up to date by the Cambodian government. In an effort to enhance its own research and development capacity, the government, instead of spending on foreign consultants and engineers or buying the technology from overseas, selects highly talented young Cambodian people and hires the experts from abroad to coach them. They lowered the price of devices by incentivizing leading producers to station their factories in Cambodia through lower export taxes, ease of paperwork, and other trade-oriented policies. At the same time, local producers were also encouraged through digital business loans with low interest rates, training, and technical support. The government shifted the country to a self-reliant model in the technology sphere.

Kheang's journey is interrupted by a call via the lenses from his friend who asks him to go out this evening. Kheang considers the offer but replies, "I'm debating with Socrates today, sorry".

Introduction

Prior to the Covid 19 pandemic, the role of technology in Cambodia's general education system was minimal. Many secondary schools, specifically schools in rural areas, did not have sufficient numbers of qualified teachers or other inputs such as teaching materials and facilities, textbooks, sciences labs, computer and language labs and libraries. The teaching style was characterized by formal lecturing, copying, recitation and memorization (Ministry of Education, Youth and Sport, n.d.). Unexpectedly, this was forced to change as a result of the Covid-19 pandemic which hit Cambodia in late January 2020. Schools were closed and reopened and closed again as case numbers fluctuated. Teaching and learning activities and exams were moved to online platforms.

However, Cambodia was not prepared to make this transition. While some students were able to fulfill the main requirements of online classes, which are a stable internet connection and a device, many were not. According to the World Bank, in 2021, there will be roughly 4.5 million near-poor and vulnerable people in Cambodia along with 0.5 million newly poor people resulting from the pandemic (World Bank, 2021). This indicates that a few million people are not able to

afford or access internet service and device fees for their children to fully participate in online learning or they are able to do so only at the cost of other essentials. To complicate the issue further, teachers, too, were unprepared for online teaching. Their lack of exposure to the devices and the digital learning environment made it very hard for them to prepare the materials and lessons, guide students and maximize the experience, assuming that they were able to afford or access a device at all.

While most students and teachers throughout the country are facing similar issues, the burden is heavily borne by those in rural areas where high numbers of poor and marginalized families are mostly situated. This contributes to worsening inequality. In fact, the problems of unequal access to education and low quality of education are not new. What the pandemic has done is highlight the existing weaknesses and strengths of the current system.

The importance of fully integrating technology into education, alongside a strengthening of teaching methods for digital platforms, has never been more important. While digital education stands as the traditional system crumbles in the face of challenges, according to the International Institute for Education Planning (2020) online learning also has important links with Cambodia's goal for a digital economy and becoming a middle-income country by 2030. Cambodia can and will achieve a strong, quality, and inclusive education that stands the test of time once it prioritizes digital education and invests in the necessary infrastructure.

Context Analysis

Inclusion in education, as defined by UNESCO, refers to the absence of barriers or limits imposed on educational opportunities on the basis of differences such as sex, ethnicity, language, religion, nationality, economic condition, and ability (UNESCO, n.d.). In Cambodia, inequality of access to education in terms of sex, disabilities and economic conditions can clearly be seen (Nget, 2018). Despite the country's attempts to provide equal access to education for boys and girls, gender disparity persists (Gillispie, 2018). According to the Public Education Statistics and Indicators 2017-2018, the number of enrollments is higher for male students across all grades in public schools (Ministry of Education, Youth and Sport, 2018). Children and teachers with disabilities are often excluded simply by how the school buildings are built, considering that, as indicated in Public Education Statistics and Indicators 2017-2018, 51.8% of schools are without water while 31% are without latrines, and facilities for people with disabilities are not included in the indicator itself (Ministry of Education, Youth and Sport, 2018). There are also barriers due to the lack of consideration of the rights and needs of people with disabilities from the local authorities and service providers (Save the Children, n.d.). Economic barriers also prevent many from fully accessing the education system. While some students are able to attend the general education sessions, extra classes, and purchase additional materials, many others cannot afford to fully invest in education or cannot afford education at all (Sem and Hem, 2016). Though public general education is free, the associated costs such as transportation, materials, uniforms and food may

prevent families from sending their children to school (Cambodia | USAID School Dropout Prevention Pilot Program, 2015).

The government has made some initial attempts to reform the education system with the goal of improving educational quality by focusing on five pillars: 1) putting its teacher policy action plan into action, 2) reviewing curricula and textbooks, and enhancing the school atmosphere, 3) improving inspections, 4) improving assessment of learning, and 5) reforming higher education. Despite its progress against these objectives, Cambodia remains one of the poorest countries in the world. In the region, Cambodia has one of the highest pupil-to-teacher ratios, while only 32 % of female third graders (38% of male) are proficient in Khmer literacy (USAID, 2021). Plus, as acknowledged by the Ministry of Education, Youth and Sport (MOEYS), students' relevant knowledge and skills still need improvement particularly in the rural areas (Ministry of Education, Youth and Sport, n.d.).

In order to achieve Sustainable Development Goal 4 which is to ensure inclusive and equitable quality education and promote life-long learning opportunities for all, the Cambodian government has been actively responding to challenges in the education system. Cambodia's 2030 Roadmap for SDG 4 defines five policy priorities: 1) All girls and boys have access to quality early childhood care and education and pre-primary education, and completely free, equitable and quality basic education (primary and lower-secondary) with relevant and effective learning outcomes; 2) All girls and boys complete upper-secondary education with relevant learning outcomes, and a large number of youth have increased access to affordable and quality technical and vocational education; 3) Ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university; 4) All youth and adults achieve literacy and numeracy, and learners in all age groups have increased life-long learning opportunities, and 5) Governance and management of education improve at all levels (Ministry of Education, Youth and Sport, 2019, p.23). The government is undertaking numerous strategies to ensure that this is achieved such as:

- Cooperating with local and international organizations such as UNICEF, Save the Children, USAID, and many more to deliver programs and projects such as the Early Grade Reading program, the UNICEF initiated Multilingual Education Radio-Based Program, just to name a few.
- Implementing policies aimed at strengthening the quality of the Khmer general education.
- Organizing and co-organizing engaging events such as the Cambodian Education Policy Forum, an online forum with 500 participants ranging from representatives of relevant ministries and institutions to education department directors to classroom teachers.
- Conducting capacity building trainings for teachers and relevant school management authorities.
- Emphasizing STEM (Science, Technology, Engineering, and Mathematics) in the national curriculum.

- Assigning target schools for enhanced monitoring quality
- Creating the New Generation Schools which are model schools with a much higher standard compared to normal schools.

The New Generation Schools (NGSs), first implemented as a pilot project in 2011, currently represent the future of education in Cambodia in terms of administration and pedagogy (Ministry of Education, Youth and Sport, 2016). Responding to major concerns in Cambodia's education sector, as stated in the New Generation Schools policy guidelines published by MoEYS in 2016, New Generation schools were developed with seven main objectives: 1) Create autonomous public schools governed by strict rules of performance accountability linked to high investment, 2) Create new governance boards that will hold schools accountable for their performance, 3) Create an accreditation system that will facilitate an Oversight Board for decision-making about a school's adherence to New Generation Schools core principles, 4) Provide new institutional freedoms (i.e., operational autonomy) to drive innovation in the way educational services are formulated and delivered, 5) Enable the education system to be more efficient and socially equitable with respect to the teaching and learning process by instituting a rationalized resource allocation system that enhances educational services, 6) Improve teaching standards through new approaches that include competitive teacher recruitment, performance-based incentives, intensive capacity-building in educational technology, STEM and problem-based learning methodologies, and explicit teacher career paths linked to professional development opportunities, and 7) Expand educational services for Cambodian youth that include career counseling services, differentiated learning channels (e.g., project work, subject clubs), mobile learning, and life skills education (Ministry of Education, Youth and Sport, 2016, p.2). The schools are considered model schools and focus sharply on STEM education. Students study in an innovative environment and follow an unconventional curriculum. They work on individual and group projects. They conduct their own research and often work with electronic devices. Over the last few years, more and more schools in different areas have been designated as target schools which receive special attention from MoEYS.

As a part of the educational reform in Cambodia, NGS represents a remarkable transformation; nevertheless, the model is not without flaws. As addressed a publication from the Yusof Ishak Institute, the following points need to be considered: 1) the model requires huge investment to operate, putting its sustainability and scalability in question considering the limited government budget, 2) NGS's true effectiveness has not been empirically evaluated. As of 2020, 3 years after the official accreditation of NGS, US\$6.62 million had been invested by the government in 10 NGS sites and one research center, located in four provinces and Phnom Penh and serving 5,722 students, with a target of expanding to 100 schools across Cambodia by 2022 (Chea and Chen, 2021). Parents are also required to pay on a voluntary basis to support the school operation. The dependency of the model on the government's investment and students' parents' contribution makes NGS' future uncertain. What is more, NGSs are only located in the urban areas, making accessibility another question. On top of this, students enrolling in NGSs have to pass the entrance examination, which places further limits on accessibility.

The analysis above shows that the latest model, the NGS, still lacks sustainability and accessibility. Though NGS is not the only initiative or project being implemented, being labelled as the future of education of the country, it reflects how far Cambodia is from inclusive and equitable quality education.

Policy Recommendations

In order to bring about an education reform that guarantees a sustainable, inclusive, and quality education system, on top of the existing focused points discussed above, the Cambodian government should not only increase the use of technology in classroom activities, but look to the future migration of physical classrooms to digital platforms and the changing roles of teachers. In this proposed vision for Cambodian schools, the role of physical classrooms would be complementary to online learning rather than primary. In a typical school day in this model, students would learn from the comfort of their home with the facilitator and classmates in their virtual classrooms and labs, attend extra physical classes by choice, and explore a wide range of interesting learning content in the provided virtual world.

Furthermore, a centralized hub monitored by the Ministry of Education would take care of the curriculum and standardized contents available. The role of teachers would change to be that of knowledge facilitators. As a facilitator, lecturing would be a rare activity; instead, a facilitator would lead the class to discuss materials and lessons covered as a way of educating. Though MoEYS prioritizes the student-centered approach, classes in public schools are generally conducted with teachers giving lectures and presentations while pupils listen, participate, and take notes. A change in the role of teachers, giving opportunities for students to take the lead in activities, discuss, and apply what they learn to real life examples can better serve the student-centered approach. On top of this, a facilitator's role is the perfect match for a technology dominated classroom as teachers do not need to have complete control of the class. Materials and assignments are given to students to read off-line and discussed in the class. Facilitators shift their power to students by initiating and monitoring the discussions from time to time while students take control of carrying the activity forward. While a lecture can also be conducted in the aforementioned type of classroom, its effect is lessened considering the fact that the teacher cannot guarantee student's attention in the presentations.

Integration of technology goes beyond video calls, slide projectors, ICT classes, online learning platforms, and the like. Mixed reality technology can be used to allow students to experience learning in more interesting ways. Being managed by a centralized system, standardized contents and lessons will be uploaded and made accessible to everyone equally. This will help to address existing inequalities in study materials based on geographical areas and affordability. What is more, students will have access to more informative and up-to-date information and lessons as online content can be uploaded and taken down with just a few clicks at very low cost, compared to course books which can take a long time to publish and distribute, often at high cost. The ease

of updating online curricula will allow educators to add new information while filtering out anything that is out of date. This can help to grab students' attention and maximize learning effectiveness.

The model would contribute to inclusive education as well. Marginalized students are able to enjoy the privilege of accessing education that they deserve as problems related to transportation, hygiene, and infrastructure are obsolete.

Two main policies are the prerequisites to achieve the mixed reality education model discussed above:

- Tech Ed
- Self-Sustainable Digital Industry

Tech Ed

In 'Tech Ed', technology in education is prioritized. Managed by MoEYS, awareness of the importance of technology in education is raised. At the school level, Information Technology subjects are no longer taken lightly, and students have to complete certain projects to pass the subject to complete each grade. Computer devices are one of the materials that each school is required to have. Teachers, too, will have to undergo annual summer tech camps to become IT literate and get training on the effective use of technology in teaching.

At the national level, the government should actively seek support from and cooperation with countries who have already experienced the process of integrating advanced technology in education. Partnerships with NGOs and INGOs are enhanced. It is through such cooperation that Cambodia will learn and access the technology to be used in its own education system. Once technology becomes a regular part of general education, a transition of some subjects such as language to virtual classrooms can be made.

"Tech Ed" is not yet implemented in Cambodia. It will be a gradual process for Cambodia to get there. However, the current trend suggests a high possibility for a policy with similar scope and focus in the near future. The increasing focus on STEM education and incorporation of technology such as distance learning classrooms, online teacher working groups, the active promotion of learning platforms such as E-School Cambodia to public schools across the country, and the decision to conduct the national high school examination and teacher entrance exam on online platforms are small steps toward a digitized education system in the foreseeable future.

Self-Sustainable Digital Industry

A sustainable digital education happens when the country is less dependent on other countries. Though technology will need to be imported at first, a transition to a self-reliant and independent digital industry is a prerequisite for a complete and advanced digital education system. Relying solely on foreign partners and investors is not a sustainable approach. At any point, foreign investors have the option of taking their investment elsewhere if they deem the conditions more

favorable, leaving Cambodia's digitized education system vulnerable. Therefore, the Cambodian government should invest in the goal of self-reliance in terms of digital infrastructure.

Instead of hiring foreign engineers and tech companies to deliver infrastructure building projects in the long-term, the government can cooperatively work with the private sector to employ them strategically to train young Cambodian talents. Additionally, foreign investors are a source of tax revenue for Cambodia as well as bringing with them expertise. Cambodia can attract foreign investors by creating great conditions for their investments such as ease of doing paperwork, tax reductions for a certain period of time and attractive export policies. On top of this, local investors and tech startups are the future of Cambodia's self-sustaining digital infrastructure. Subsidies in the form of state-owned tech business loans with favorable rates and ways of paying back and free training would encourage local talent and business owners to start investing in the field. This would give Cambodia experience and revenues while allowing devices to be cheaper in price.

Conclusion

The awareness and incorporation of technology into everyday education is necessary. Students and teachers and the system as a whole need to gradually mature to be able to transit successfully to a digital education system. The situation during the Covid-19 pandemic serves as a great reminder of what can happen. Had students and teachers been more exposed to and involved with using technology in their day-to-day learning and teaching activities, Covid-19 would not have been able to shake the system to the extent that it did, including leading to the elimination of the 2020 national examination.

The mixed reality model discussed gives a glimpse into what a sustainable, quality and inclusive education system for Cambodia could be like in the future if a focus on technology development in education is prioritized. Digital transformation in education is a gradual process that takes both time and effort of the government, development partners, the private sector, as well as citizens, but it is also something which needs to happen.

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