Asia-Pacific Economic Cooperation

APEC 2018

Report on Education and Economic Development

Inclusive and Quality Education: Embracing Digital Future

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Preface

The APEC 2018 Report on Education and Economic Development is a collaborative effort by the APEC Education Network's (EDNET) multicultural team. They have produced essential reference material for anyone interested or responsible for education policy, and who is interested in economic development and inclusive growth.

It is the first publication of its kind to explore these issues from the particular vantage point of the Asia-Pacific. It pays specific attention to the driving forces, the policy levers and contextual factors concerning cross-border education and academic mobility within the APEC region. It scrutinizes the systems we have in place to keep our workforce skilled and at work in the digital 21st century.

Through qualitative and quantitative data from APEC-badged projects, and a baseline status of education in the region, it provides a diagnosis of the current challenges. By examining emerging issues the APEC forum has identified in recent years, it seeks to prepare us for challenges that will only get more pressing. The collation of best practices and case studies are useful in exploring solutions to the challenges identified.

Congratulations to EDNET for this contribution to the effort of realizing more effective and equitable education systems region-wide.

I hope that this finds its way to wide range of users, from policymakers to academics to members of the general public who want to know more, as anyone should, about the state of education in their economy as well as the region.

Tan Sri Datuk Rebecca Fatima Sta Maria

Executive Director

APEC Secretariat

Acknowledgments

The APEC Report on Education and Economic Development is the product of a long-standing, collaborative effort between government officials, experts and institutions in member economies, coordinated by Dr. Wang Yan. The publication was prepared by the EDNET team from China; Chile; Australia; Russia, and Malaysia. Chapter 1 on Education and Economic Development was co-authored by Yang Po and He Mei; Chapter 2 on Cross-Border Education and Academic Mobility Cristian R. Valenzuela; Australia's Department of Education penned Chapter 3 on Qualifications Frameworks and Skills Recognition; Chapter 4 on Education Innovation in the Digital Age was written by Semyon A. Korotich; and Habibah Abdul Rahim, Noor Hayati Uteh, Shahrizal Norwawi co-authored Chapter 5 on 21st Century Competencies and Structural Education Reform.

The team is sincerely grateful to all member economies for their insightful comments, feedback and collaboration. We specially thank economies providing case studies to enrich the content, such as People's Republic of China; Hong Kong China; Japan; New Zealand; the Philippines; Russia; Papua New Guinea; Singapore; Thailand; the United States; and Viet Nam. In particular, gratitude is extended to Thailand for hosting the "Workshop on APEC Report on Education and Economic Development" when the outline and writing guidelines of the report were decided, and to China for hosting "APEC Policy Dialogue on Education and Economic Development" when the draft was reviewed.

Thanks also go to the APEC Secretariat for streamlining the process of developing the Report. In addition, the team drew on a host of the analysis, research, and data of researchers and specialists from across the world. We could not have come this far without all these meaningful and generous contributions. Also the team appreciates Eduardo Velez, Hamish Coats, and Fan Huhua for reviewing part of the Report. Last but not least, thanks go to Xu Congcong and Wang Tingting as well as Rory Coen and Li Charles Kwun Yu for their administrative and editorial support.

The team expresses gratitude to all who contributed to the Report, and apologizes unreservedly to any organizations or stakeholders who have been inadvertently omitted from these acknowledgments.

The team members would like to thank their colleagues and families for their unconditional support throughout the preparation of the Report. Finally, gratitude is extended to the many practitioners in education sector who have given inspiration and motivation to developing the Report. Their ordinary greatness keeps reminding us of the common goal of education development and economic integration.

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Introduction

Education, or the transmission, acquisition, creation and adaptation of information, knowledge, skills and values, is a key lever for inclusive growth and sustainable development. In particular, there is credible evidence that quality education has a strong causal impact on individual earnings and economic growth. Aligned with APEC's goal of "supporting sustainable economic growth and prosperity in the Asia-Pacific region", education has played an increasingly significant role in "building a dynamic and harmonious Asia-Pacific community" in recent years.

APEC set its goal of education development and cooperation in its first long term education plan ***APEC Education Strategy 2016-2030*** with three themes: competencies, innovation and employability. As noted in the 2016 Leader's Declaration, the strategy "outlines a path for achieving a strong and cohesive APEC education community characterized by inclusive and quality education that supports sustainable economic growth and social well-being, enhances competencies, accelerates innovation and increases employability."

Aimed at enhancing mutual understanding and mutual learning, the 21 APEC member economies have shared information on their respective education systems and reforms through a *Baseline Report on Current Education Status in Asia Pacific Region*. Each economy's chapter contains an overview, an education system chart, and details regarding the education administration system, education governance system, key education policies, and key education indicators. The Baseline Report will be updated.

Thanks to joint efforts of member economies on the platform of the EDNET, many APEC-badged projects have been implemented. During 2015 - 2017, a total of 32 projects were initiated and undertaken by the EDNET members, accounting for 65% of the total number of HRDWG projects and well above the average number of projects of the APEC working group (22). The projects, which focus on issues of common concern for APEC member economies, have produced substantial results and could potentially be disseminated to a wider audience.

As endorsed by the Concluding Senior Official Meeting in 2017 and noted in the 2017 Joint Ministerial Statement, the Action Plan of APEC Education Strategy will be implemented to promote competencies, innovation and employability in the region. The Action Plan basically

serves as a central reference point for education collaboration by nine substantive targets as well as 30measurable and achievable indicators; these could partially facilitate the development of strong evidence base to underpin education collaboration, and inform the development of policy.

To increase the cost-efficiency of education collaboration in the region, and aligned to the Action Plan of the APEC Education Strategy, it is proposed to integrate the updated *Baseline Report on Current Education Status in Asia Pacific Region* and outcomes of various projects and initiatives, to develop a report on education and economic development for the sharing of best practices and mutual learning. In so doing it is hoped this will create a synergy for education-related collaborative projects and initiatives among APEC member economies. This will in turn contribute to APEC's efforts to achieve its goals of supporting sustainable economic growth and prosperity in the Asia-Pacific region.

Goal and Objectives

The APEC Report on Education and Economic Development will draw on completed and ongoing undertakings of EDNET members, in particular, the results and findings from APEC-badged projects and the *Baseline Report on Current Education Status in Asia Pacific Region*. The related global agenda will also be taken into account, as reflected in goals and strategies of the UN SDG 2030 and the UNESCO Education 2030. The Report will be developed by all economies, for all economies, and will:

- share best practices on competencies, innovation and employability.
- analyze the relationship between education and economic development in the APEC region
- generate policy recommendations on education and economic development.

The *APEC Report on Education and Economic Development* will be aligned with the following:

- APEC 2018's theme "Harnessing Inclusive Opportunities, Embracing the Digital Future" and other priority areas of APEC 2018;
- APEC Education Strategy 2016-2030 and its Action Plan, both focusing on competencies, innovation and employability.
- 2017 APEC Joint Ministerial Statement that "acknowledge the progress made in implementing the APEC Education Strategy 2016 - 2030, and welcome its Action Plan

to guide our work to promote competencies, innovation and employability in the APEC region".

- 2016 APEC Leaders' Declaration and *the 6th APEC Education Ministerial Meeting Joint Statement: "An Inclusive and Quality education"*.
- *2017 Leaders' Declaration*, "Creating New Dynamism, Fostering a Shared Future" which notes "we recognize the vital importance of continuing to work for quality and equitable education to enable people of all ages to meet the challenges of rapid changes in today's world."

The Report incorporates the findings and results from completed and ongoing APEC projects focusing on issues of common concern such as cross-border education, including higher education, and technical vocational education and training (TVET).

Content and Structure

The Report includes the following chapters: "Education and Economic Development", "Cross-Border Education and Academic Mobility", "Qualification Framework, Skill Development and Career and Technical Education", "Education Innovation in the Digital Age", "21st Century Competencies and Structural Education Reform" and "Policy Recommendation".

Chapter 1 provides a general introduction on education and economic development across APEC member economies, focusing on the status quo, as well as the relationship between education and economic development. Chapter 2 entitled Cross-Border Education and Academic Mobility relates to projects implemented by different economies with diverse focuses such as research integrity, mutual recognition of credits among universities in the region, and collaboration in higher education. Chapter 3 on Qualifications Frameworks, Skills Recognition, Technical and Vocational Education and Training emphasizes, for example, occupational standards frameworks, technical skills development, and industry-academia collaboration for talent development. Chapter 4 with the focus on Education Innovation in the Digital Age mainly addresses online learning and digital workforce development. Chapter 5, themed 21st Century Competencies and Structural Education Reform, analyzes basic education reform, youth innovation and entrepreneurship, and innovative STEM-related education for teachers' professional development. The last chapter seeks to generate practical and feasible policy recommendations which can be utilized by member economies based on their domestic circumstances.

In general, the Report takes stock of achievements relating to education development in APEC region, and creates a comprehensive database by integrating relevant data and case studies from member economies. It identifies the common concerns and priorities of member economies, and situates education issues in the larger context of economic development with an evidence-based approach for analysis. It aims to link elaboration and discussion to the three pillars of the APEC Education Strategy (i.e. competencies, innovation and employability), and provides useful reference and the most up-to-date data for policy-makers, researchers and practitioners. By demonstrating initiatives and projects from member economies for case studies and sharing best practices, the Report will not only help identify educational issues and promote mutual understanding and learning among member economies, but it will also create opportunities for enhancing education quality in the Asia-Pacific region as a whole.

Chapter I Education and Economic Development

Key Messages

- *Education is the foundation for economic and social development*
- *Education helps people become more competitive and productive in an evolving labor market through teaching, training, upskilling and reskilling*
- *Education prepares a population for the process of contributing to a healthy and stable society and enhancing social wellbeing and economic prosperity.*

Introduction

APEC member economies are facing many common challenges, in particular, short- and medium-term impacts of population ageing as well as digitalization and automation on the labor market and economic development (APEC Economic Committee, 2017). High-income economies acknowledge population ageing, the lack of equal opportunities for women and youth unemployment as key human capital challenges, whereas middle-income ones identify access to quality education as a human capital development gap. Meanwhile, the lack of equitable access to human capital services such as education and healthcare, has substantially compromised member economies' competitiveness and ability to innovate.

Consensus has been reached that education is key to APEC's primary goal of supporting sustainable economic growth and prosperity through economic integration, trade liberalization and investment facilitation in the region, among other things. In the APEC Education Strategy 2030, the first ever long- and medium-term strategy on education, member economies recognize that education can enhance and align competencies to the needs of individuals, industries and societies, accelerate innovation, and increase employability. In general, it is expected that education provides the skills and knowledge people need to be highly productive and competitive in the labor market; a better educated population is more innovative, flexible and able to adapt to structural changes; participation in education improves equity and social cohesion, and produces better health outcomes; education and lifelong learning also increases cultural understanding and promotes international engagement and people-to-people links (APEC, 2016).

Social scientists acknowledge that education has been playing multiple roles in contemporary society for centuries, such as promoting civic engagement and enhancing social equity and

cohesion. Nevertheless, it was not until the late 1950s that neoclassical economists started to argue that investment in human beings – in terms of education and training, health, migration, and domestic activities – incurred costs for the time being, but generated benefits in the future, similar to other types of capital investments. Based on rigorous theoretical deductions and empirical evidence, the human capital theory proposes that education can contribute to economic development by enhancing individual employment, personal earnings, and economic growth (Woessmann, 2016).

In brief, the concept of human capital is assumed to be the key to understanding the robust relationship between schooling and earnings premium, as well as the association between education and the growth rate of economies. As a powerful theoretical argument in explaining education's contribution to economic development, though, the human capital approach has its limitations. In a narrow sense, development refers to the growth of economy-level gross domestic product, increment of earnings and industrialization. In contrast, today APEC emphasizes both the quantitative economic growth and the quality of growth.

According to Sen (2001, 2005), the goal of development is to expand substantive freedoms. Development requires the removal of major sources of "unfreedoms", such as poverty, tyranny, poor economic opportunities, and systematic social deprivation and etc. Five instrumental freedoms are critical for development: political freedom, economic facilities, social opportunities, transparency guarantees, and protective security. In Sen's opinion, education is one of the core social opportunities which can influence the substantive freedom of enjoying a better life.

The APEC Education Strategy, to some extent, embraces member economies' new conceptualization of economic development as an approach to improving people's wellbeing. The Strategy also takes a broader view on education, defined as a combination of formal and informal schooling, technical and vocational education and training, cognitive and non-cognitive development, and 21st century skills. As such, a better educated person is one who possesses more education or training, as well as skills or competencies. In this regard, the contribution of education to economic development shall bring about improved employment and earnings as well as improvement of wellbeing such as better health, avoid of deprivation, and higher living standards.

Theories of Education, Development and Income Distribution

To explore education's potential in facilitating balanced, inclusive, sustainable, innovative and secured growth in the APEC region, theoretical arguments for economic benefits of education are summarized. The following sections discuss the potential roles of education in the development of individual competency, innovation in education, employability, and 21st century competencies, to shed light on understanding of the association between education and economic development.

Role of education in economic growth

Improvement the quality of a labor force, by raising its productivity and its ability to seize new and better opportunities – in particular, by improving the technical and allocative efficiency of the economy – is one of the main engines of economic growth (Schultz, 1967). This understanding of how education contributes to growth and development was not observed in early growth models[1].

The role of education in the debate about growth and development came about after the emergence of the human capital theory in the 1960s. Arrow (1962) introduced the ethos of 'learning by doing' and the diffusion of knowledge related to education into the analysis of growth. Nelson and Phelps (1966) emphasized the role of education in facilitating the flow of technological information and absorption. Endogenous growth models in the 1980s added education as an additional explanatory factor, highlighting the importance of skills and knowledge in labor productivity.

Hence, economists have developed two broad classes of theoretical models on the specific mechanisms by which education may affect the long-run economic development (Woessmann, 2016). The first stems from the microeconomic theory of human capital. Increased individual productivity merely aggregates at the economy level. In such so-called augmented neoclassical growth models, education simply lifts macroeconomic productivity by accumulating human capital. The second highlights the role of education in generating and diffusing new technologies. In endogenous growth models, innovation arises from intentional investments in research and development. This process is fundamentally guided by the underlying invention of people, which flows from the knowledge and skills of a population. Thus, education plays a

[1] Harrod-Domar Model of 1940s paid no attention to labor resources, but emphasized on physical capital. Solow- Swann Model (1956) introduced both labor and capital as sources of growth, but empirical works by Kuznets and others found large unexplained residuals.

crucial role in increasing an economy's the innovative capacity by producing new ideas and technologies. For instance, Galor and Weil (2000) and Galor (2011) provided a contemporary understanding of interactions between education, technological advances, and population and income growth, which induces skills-based technological changes, and alters changes household preferences for the trade-off between the quantity and quality of children.

Furthermore, Hanushek and Wossermann (2015) argue that the long-run economic growth is overwhelmingly a function of the cognitive skills of a population, or the "knowledge capital" of an economy not year of schooling. As such, both quantity and quality of education drive the accumulation of skills and competencies and creates a congenial environment for long-run growth.

Role of education in income distribution

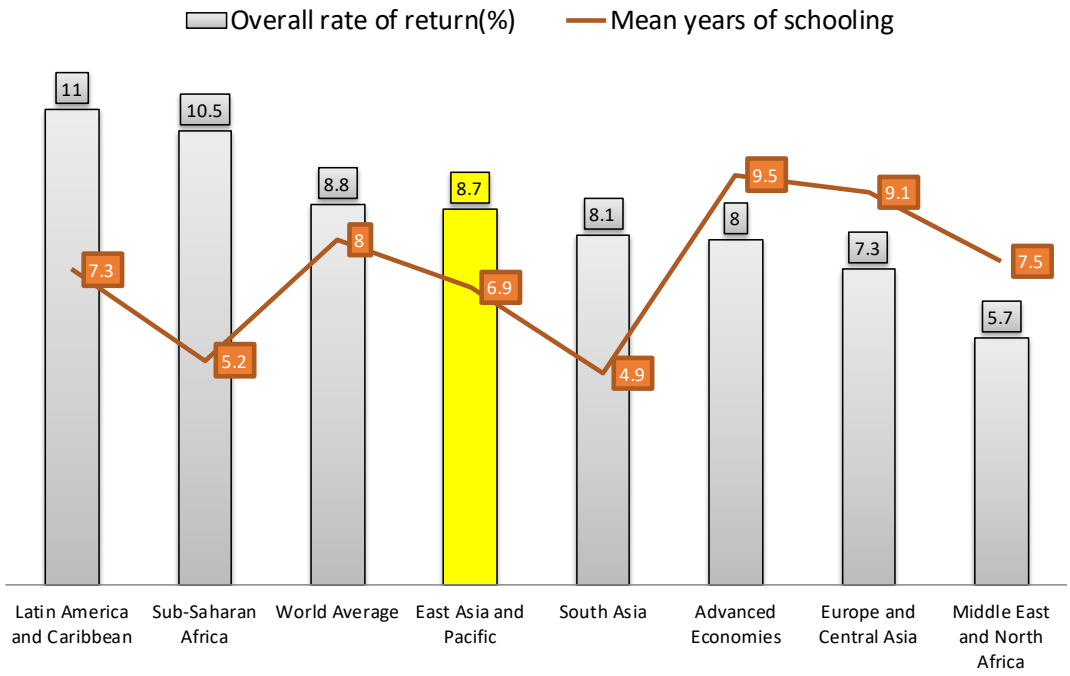
In the 18th and 19th centuries, with few exceptions, economists believed the benefits of education lay in the political and moral realms, rather than the economic ones. Political economists (such as Adam Smith, John Stuart Mill, and Alfred Marshall) thought that education provided better workers by making them better human beings and better citizens; this included improving their character in terms of punctuality and self-control (Teixeira, 2005). In the 1940s, the significant economic impacts of education drew the attention of prominent economists (e.g. Harrod, Knight, Friedman, & Spengler).

However, it was not until the post-WWII period, that economists started to link the concept of human capital to the economic benefits of education. Ever since, the human capital metaphor has become the central concept of analysis for the labor market, personal income and investigations into the wealth of economies (Teixeira, 20005). The collective and articulated research efforts by Theodore Schultz, Jacob Mincer and Gary Becker (1950s, 60s and 70s) paved the way for the emergence of modern human capital research.

With roots in the writings of classical economists (see, for example, Smith, 1776), the link between education and earnings has only recently emerged. Jacob Mincer (1957) was one of the pioneers to explore the role of education in income distribution and wage determination. Following Milton Friedman (1953), Mincer examined the age-earnings profile and found that earnings varied with age and educational levels. Thus, the economic benefit of education has been defined from the rate of return to education and can be estimated via the Mincerian wage equation.

Returns on investment in education, based on the human capital theory, have been estimated since the late 1950s. According to recent estimates by Psacharopoulos and Patrinos (2018), the private average global return to a year of schooling is nine percentage points from 1950 to 2014 and it increases from 8.7 percentage points in the pre-2000 period to 9.1 percentage points post-2000. Private returns tend to decline as years of schooling increase. In addition, private returns to education are higher in low-income economies (9.3 percent) than in high-income economies (8.2 percent). In East Asia and Pacific Region, the overall rate of return is 8.7%, similar to the world average (8.8%).

Figure 1.1. Mean years of schooling and private return to education across globe



Note. Adapted from "Returns to investment in education: a decennial review of the global literature" by Psacharopoulos, G. and Patrinos, H. A, 2018, Education Economics, 26(5), p. 452.

To understand the association between education and income distribution, two explanations are offered from behavioral perspectives (Bowles, Gintis, & Osborne, 2001). The first explanation is the Walrasian determinants of earnings. According to the "Walraisan Model", earnings differences can be attributable entirely to skill differences. Higher education leverages one's marginal productivity, which entails higher earnings. This is the conventional labor market model in which the law of the single price ensures that productively identical individuals will receive the same wage in all employment. This model implies that the best

economic enhancing strategy is to invest in education and citizens' skills with a focus on cognitive development.

The second explanation is Schumpeterian determinants of earnings. When equilibrium is not assumed in the labor market, the "Schumpeterian model" offers a better explanation for earnings differences. At any moment, the payment for labor typically includes what may be termed "disequilibrium rents". These rents can be attributed to technical change, product innovation, changes in business organization, and other shocks. People differ in their ability to identify and capture these disequilibrium rents. This ability is precisely what Schultz defined as human capital. The direct policy implication is to invest in cognitive and non-cognitive skills, the latter brings wage premiums in terms of disequilibrium rents and enhances the resilience of an economy to external shocks such as technical change and industrial upgrading.

How Does Education Contribute to Economic Development?

With regard to the productivity-enhancing and growth-enhancing roles of education, the three objectives of the APEC Education Strategy are timely and relevant. The Strategy reflects APEC member economies new understanding of education for development. Its first objective, "enhancing and aligning competencies to the needs of individuals, societies and industries", establishes the precondition for transforming education and training into productivity-enhancing skills and competencies. The second objective, "accelerating innovation", lays out the process through which education can facilitate technological advancements and economic growth envisaged by endogenous growth models. The third objective, "increasing employability", pinpoints the key role education plays in the labor market and income distribution. To realize the promises of APEC Education Strategy, member economies need to seek a close connection between education and labor market and growth agendas both domestically and within the region.

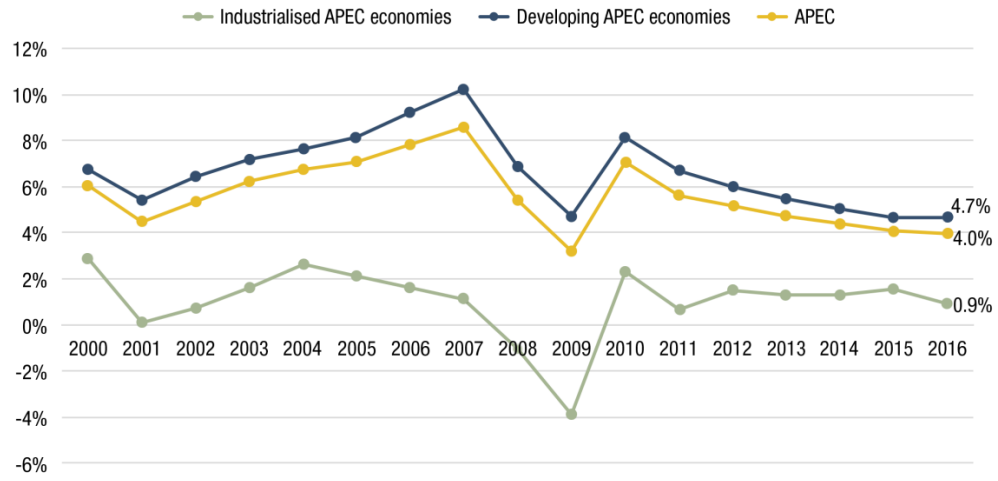
Education is the foundation for economic and social development

Growth, development, and poverty reduction depend on the knowledge and skills that people acquire. Acknowledging the importance of education to economic and social development, the World Bank Group Education Strategy 2020 emphasizes "investing early, investing smartly, and investing in learning for all". This viewpoint has been endorsed by other international and regional organizations, including the 2030 Agenda for Sustainable Development (2030 Agenda), while it's also noted in the APEC Education Strategy (2016).

Educational investment can support sustainable economic growth in APEC member economies. Research shows that providing every child with access to education and the skills needed to participate fully in society would boost GDP by an average of 28% per year in lower-income economies and 16% per year in high-income economies for the next 80 years (OECD, 2015).

Education also supports economic development and prosperity in the Asia Pacific Region. According to an OECD forecast (OECD, 2018), while global GDP growth was around 3.6 percent in 2017, it should plateau at 3.7% in 2018 and 2019. In 2017, GDP growth in the APEC region surged to 4.1%, from 3.5% in 2016, indicating a 17 percentage points increment over one year (APEC Policy Support Unit, 2018).

Figure 1.2. Real GDP Per Capita Growth Rates (2000-2016)

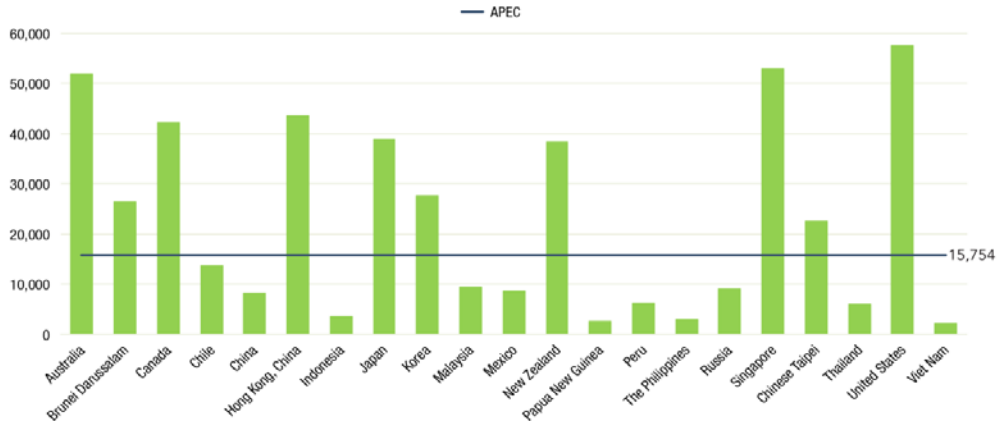


Note. Reprinted from *APEC in Charts 2017*, p.5, by APEC Policy Support Unit, 2017.

Note: Per capita GDP growth rates have been declining since 2010 and continued to do so until 2016. Per capita GDP in APEC grew 4.0% in 2016, slightly down from 4.1% in 2015.

GDP per capita was on average USD 15,754 in APEC economies in 2016, ranging from USD 2,173 to USD 57,436. There was a wide variation between Australia; Singapore; and United States with GDP per capita above USD 50,000 and Indonesia; Papua New Guinea; the Philippines; and Viet Nam with GDP per capita below USD 5,000 (APEC Policy Support Unit, 2017a).

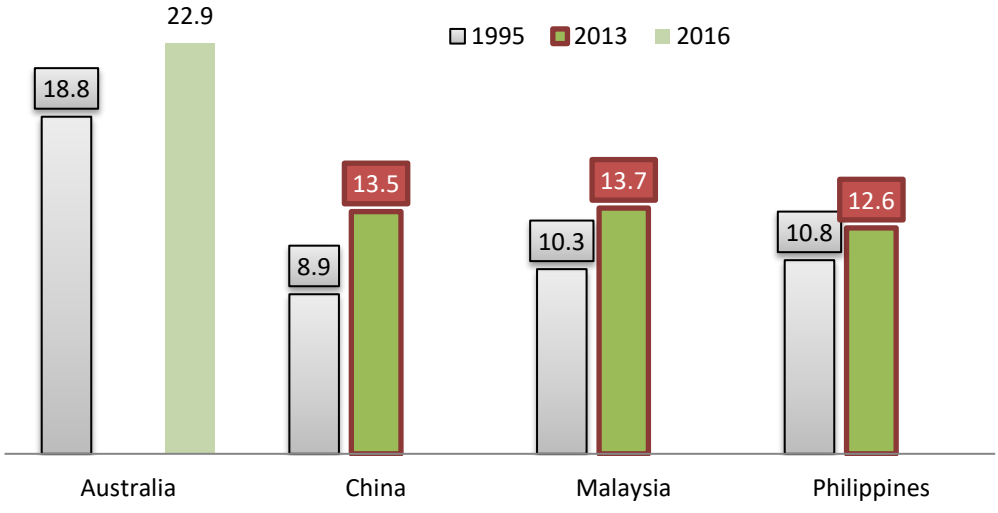
Figure 1.2. GDP Per Capita, in Current USD (2016)



Note. Reprinted from *APEC in Charts 2017*, p.3, by APEC Policy Support Unit, 2017

This robust growth is supported by equally strong education growth in the region. Although APEC-specific data is not yet available, secondary and tertiary enrollment growth is evident in some member economies. In Australia, the school life expectancy[2] increased from 18.8 years in 1995 to 22.9 years in 2016; in China, from 8.9 years in 1995 to 13.5 years in 2013; in Malaysia, from 10.3 years in 1995 to 13.7 years in 2013; in Peru, from 12.2 years in 1995 to 13.2 years in 2006; and in the Philippines, from 10.8 years in 1995 to 12.6 years in 2013.

Figure 1.3. School Life Expectancy of selected economies in APEC region



Note. Reprinted from the key indicator database of StatsAPEC (2018).

[2] The total number of years of schooling which a child of a certain age can expect to receive in the future, assuming that the probability of his or her being enrolled in school at any particular age is equal to the current enrolment ratio for that age.

Education is also positively correlated with competitiveness and inclusiveness in the APEC region through its impact on human capital development. Recent analysis shows a positive correlation between a human capital index score and a global competiveness score, while APEC economies with a higher human capital index also have a higher inclusive development index. Among other things, skills development can contribute to long-term economic competitiveness as well as inclusive growth.

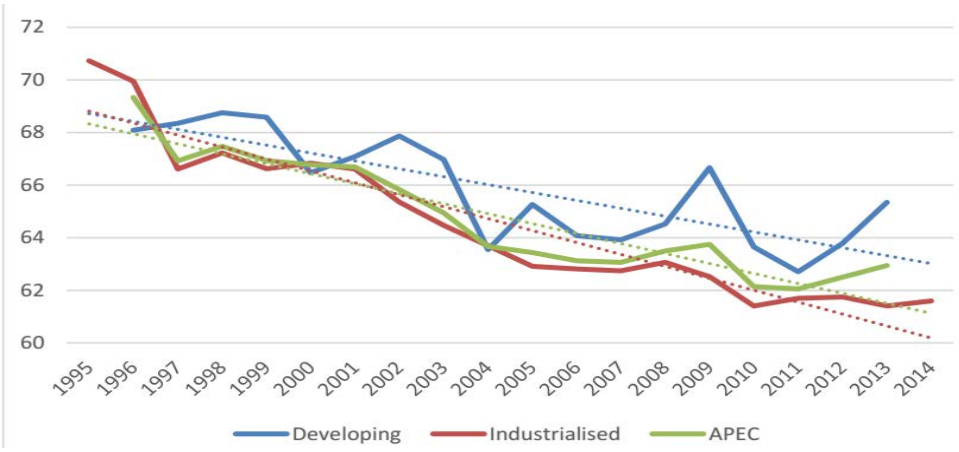
Education and training deliver competencies reflecting the current and future needs of the labor market

On the one hand, economic globalization requires new knowledge and skills that serve the economic development of the region. Education can provide students with the 21st century competencies to be international talents and lifelong learners. On the other hand, by fostering innovation and building communities, international educational collaboration can be conducive to the economic prosperity of member economies and the region at large. Cross-border education can strengthen regional ties through people-to-people exchanges, and enhance students' knowledge and skills through communication and transmission.

Currently, APEC economies are facing serious structural unemployment problems due to technological changes and globalization. This is partly attributable to structural changes in the economies such as shifting labor demand patterns caused by changes in affluence, capital accumulation, urbanization, international trade or technology. At the same time, economies often face a mismatch between the skills of job-seekers and those that industry and employers demand.

This structural unemployment and skills mismatch are associated with a declining labor share of GDP in the APEC region, echoing an earlier trend in OECD economies since the 1990s (e.g. ILO & OECD, IMF, 2017). A falling labor share indicates that wages are not rising in step with rising productivity; it also indicates that workers are benefiting less proportionally from economic growth. The following figure indicates that in the APEC region, the adjusted labor share of GDP has declined from 68% in 1995 to 63% in 2011 and 65% in 2013. The labor share was even lower in industrialized APEC economies. APEC regional trends analysis (2017c) shows that "the labor share in APEC exhibited a downward trend between 1995 and 2015, chiefly among industrialized APEC economies".

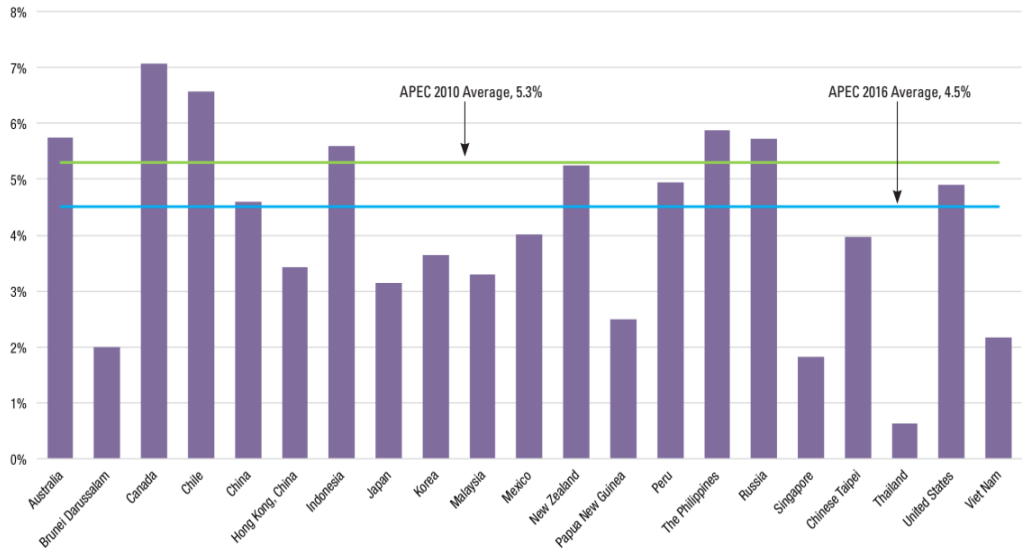
Figure 1.4. Adjusted labor share in APEC as a percentage of GDP (1995-2014)



Note. Reprinted from *APEC regional trends analysis: Declining Labor Share and the Challenge of Inclusion*, p.5, by APEC Policy Support Unit, 2017. Aggregates are weighted by GDP. Compensation data are not available for Indonesia and Viet Nam. Dotted lines are trend lines. Source: ILO, OECD, UN, WB, economy sources, and PSU staff calculations.

Skills mismatch is identified as a key challenge for APEC member economies' labor markets (APEC Economic Committee, 2017). On the one hand, young people are not always acquiring the right skills for a fast-changing labor market, which leads to high levels of youth unemployment in several economies. On the other hand, an ageing population means that older workers need to continue working and learning new skills. Skill mismatch indicates gaps in human capital development, such as low enrollment and high unemployment. In 13 APEC economies in 2015, unemployment rates among youths aged 15-25 were greater than 10%.

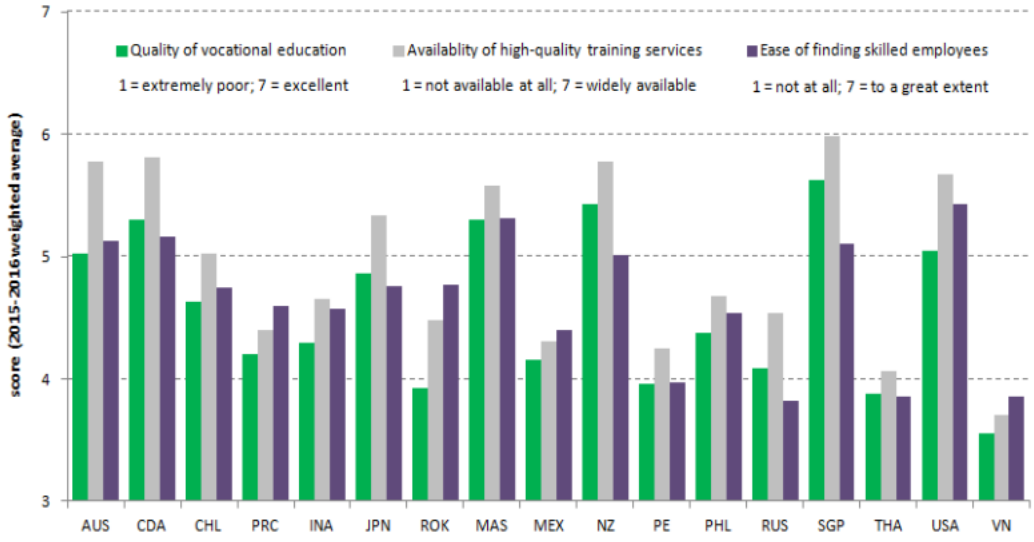
Figure 1.5. Unemployment Rate (2016)



Note. Reprinted from *APEC in Charts 2017*, p.7, by APEC Policy Support Unit, 2017

Structural unemployment and skill mismatch points to a misalignment in competencies to the development needs of individuals, societies and industries. The 2017 World Economic Forum's Executive Opinion Survey indicates that the quality of vocational education and the availability of high-quality training services are somewhat low across the APEC region. Figure 1.2 shows that the availability of high-quality training services is often higher than the executive rating for vocational education quality and the ease of finding skilled employees. Three APEC member economies were included in the top five global economies reporting skills shortages: Hong Kong, China (69%); Japan (86%); and Chinese Taipei (73%) (Manpower, 2016).

Figure 1.6. Executive Opinions on Vocational Education and Training Services in APEC



Note. Reprinted from the Inclusive Growth and Development Report 2017 online database of World Economic Forum (2017). Scores are a weighted average based on the responses from the 2015 and 2016 Executive Opinion Survey conducted by the World Economic Forum. Data for Brunei Darussalam; Hong Kong, China; Papua New Guinea and Chinese Taipei are not available.

Education and training can help resolve the above-mentioned challenges in the APEC region by delivering competencies that reflect the current and future needs of the regional labor market particularly by enhancing and aligning competencies to meet the development needs of individuals, societies and industries focusing on the promotion of cross-border education, academic mobility and individual pathways within and across education levels, and the modernization of education systems, to better meet the needs of the labor market.

Innovation in education provides new opportunities for enhancing equity and encouraging mobility

Innovation in education can transform education and training systems to provide skills and competencies required in the Digital Age. Although employment still requires basic cognitive

skills, such as literacy and numeracy, there is a growing need for skills that are easily transferable across jobs and occupations in a fast-changing economy. Moreover, higher-order cognitive, socioemotional, and technical skills are required in the Digital Age. Higher-order cognitive skills include literacy and numeracy, problem-solving skills, as well as verbal and memory capabilities; socioemotional skills consist of the Big-Five personality traits, self-regulation, as well as mindset and interpersonal skills; and technical skills include knowledge of methods and tools, general technical skills, and occupation-specific skills (World Bank, 2016).

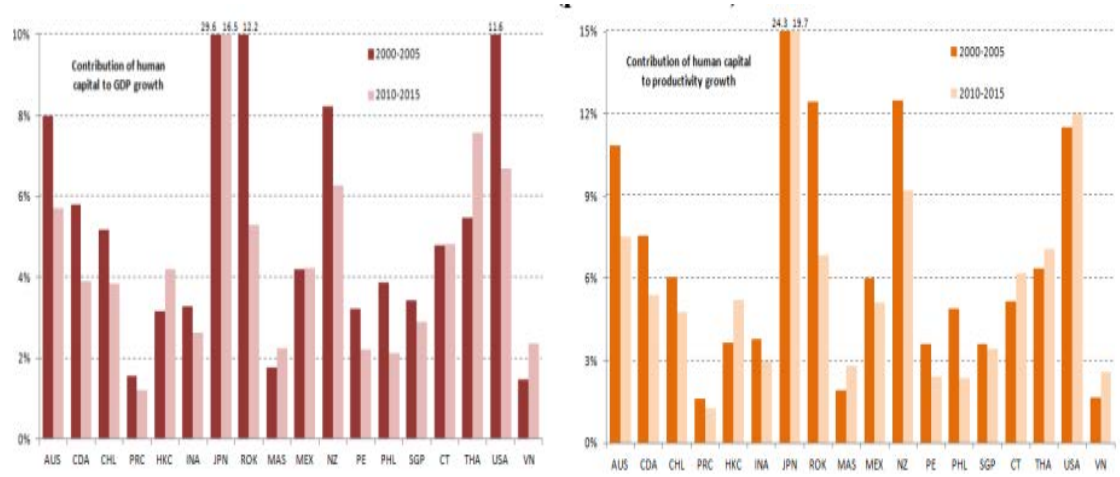
With the digital world increasingly penetrating the education and skills domain, and technology being used more and more to deliver education, knowledge and skills in new and innovative ways, demand for new skills has emerged, particularly from the increased use of fast changing digital technologies in the workplace. Digital learning is now an integral part of education design and delivery. Learning and skills development have essentially been transformed into a lifelong process (Grand-Clement et al., 2017, p.4). These changes might lead to innovation in education through the application of ICT and government-industry-academia collaboration for Research & Development.

In the APEC region, innovation in education can be realized by improving educational and technological capabilities in the teaching and learning processes; through the promotion of science, technology and innovation in education and pedagogical practices; and the promotion of government-industry -academia collaboration for R&D and innovation.

Education increases people's competitiveness and productivity through upskilling and reskilling

Education provides the skills and knowledge people need to be highly productive and competitive in the labor market; it enables them to continuously improve the way they approach their work and develop more effective ways to face the challenges of the labor market.

Figure 1.7. Contribution of human capital to GDP growth and productivity growth



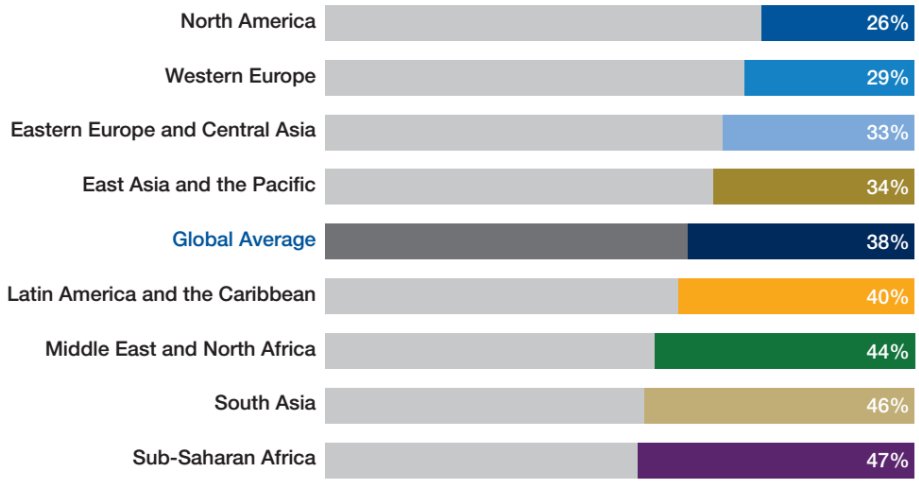
Note. Reprinted from *APEC Economic Policy Report: Structural Reform and Human Capital Development,* p.12, by APEC Economic Committee, 2017. Percentages shown are the shares of labor quality to GDP growth and to productivity growth and are based on data in 2015 US$ (converted to 2015 price level with updated 2011 PPPs). Data for Brunei Darussalam; Papua New Guinea and Russia is not available

From an economic perspective, ensuring equitable access to quality education is a promising starting point for better growth opportunities in APEC economies. Employability could be increased by a) promoting collaboration between government, higher education and TVET institutions, and business employers, b) enhancing quality assurance systems, qualifications frameworks and skills recognition, and c) smoothing the transition from education to work.

Education develops 21st century competencies to meet ever changing demand in labor market in digital age

Despite the importance of educational investment in earnings equalization and growth, existing human capital stocks are not in full use. A 2018 World Development Report focuses on improving learning to realize education's promise (World Bank, 2018). It highlights the educational crisis facing many economies, where average years of schooling are increasing rapidly yet children's standardized testing scores stagnate. A 2017 Global Human Capital Report suggests how economies develop their human capital can be a more important determinant of their long-term success than virtually any other factor. At present, on average, the world has developed only 62% of its human capital as measured by the Human Capital Index. In other words, economies are neglecting or wasting, on average, 38% of their talent (World Economic Forum, 2017).

Figure 1.8. Global Human Capital Index 2017



Note. Reprinted from *Why education is the key to development*, p.7, by World Economic Forum, 2015.

Human capital has taken on new meanings and forms in the 21st century. In 2005, the OECD announced its 21st century skill framework, including using tools interactively, interacting in heterogeneous groups, and acting autonomously (OECD, 2005). In 2015, the World Economic Forum published a report titled 'New Vision for Education: Unlocking the Potential of Technology'. It defined 16 crucial proficiencies for education in the 21st century including six "foundational literacies", four "competencies" and six "character qualities" (World Economic Forum, 2015).

Despite the different definitions of 21st century competences, critical thinking, problem solving, creativity, effective communication, high productivity, team work and collaboration and digital literacy are emphasized in almost all reports, and they also call for the modernization, innovation and reform of education systems. According to the International Labor Organization, an additional 280 million jobs will be needed by 2019. It is vital for policymakers to ensure that the right frameworks and incentives are established so that those jobs can be created and filled. Robust education systems – underpinned by qualified, motivated, and well-supported teachers – will be the cornerstone of this effort. (World Economic Forum, 2015)

Education prepares a population to contribute to healthy and stable societies, social wellbeing and economic prosperity

Social wellbeing and economic prosperity are new goals for economic development in the APEC region. Education can open social opportunities and enhance living standards in multiple ways.

First, content of education such as legal and regulatory education, language education, and ICT education directly serves social cohesion and stability. Multilingual education can enable people of different races and economies to communicate more and cooperate more, this can contribute to social cohesion.

Second, public education contributes to social equity and helps to reduce social conflicts, contradictions and instability. Equal rights and opportunities in education are conducive to alleviating sentiments of social disparity and unfairness.

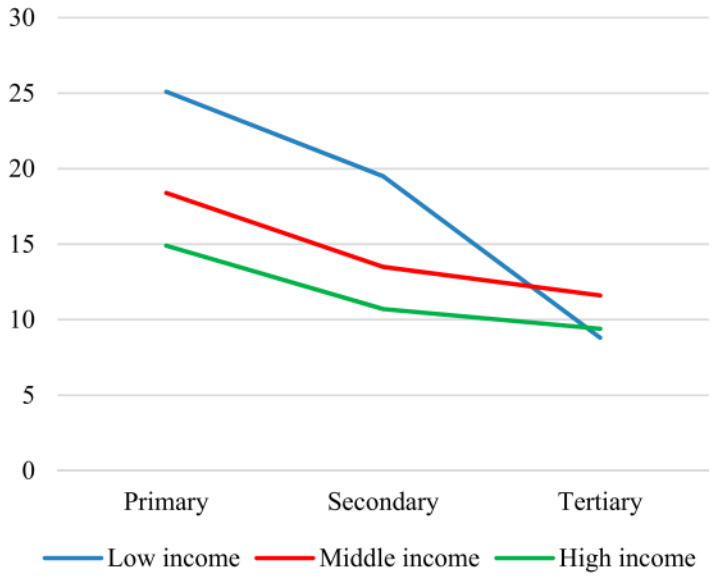
Third, education is central to the well-being of society. Higher levels of education are positively associated with better health conditions, lower incidence of criminal activity, and higher levels of societal engagement. Well-educated citizens are more likely to live healthier and happier lives, and are more active in civic engagement, such as voting and volunteering. (OECD, 2017)

Education's direct contribution to a healthy and stable society can be measured by social returns. Recent studies reveal high returns to education in private and social terms (Goldin, 2016)[3]. For individuals, rates of return to primary, secondary and tertiary education in Asian economies are 20%, 15.8 %, and 18.2% respectively; social returns are 16.2%, 11.1%, and 11%.

Social returns follow a similar pattern by level of development and level of education. In particular, social returns are higher in low-income economies and lower in high-income economies; while returns are higher at primary education level and lower at tertiary level. The following figure illustrates a comparison of social returns based on estimates from 120 economies. The average social return to secondary education is 10.2 percent and 10.6 percent for higher education (Psacharopoulos & Patrinos, 2018).

Figure 1.10. Social rate of return to education by income and schooling level

[3] Returns to these skills are private in the sense that an individual's productive capacity increases with more of them. But there are often externalities that increase the productive capacity of others when human capital is increased (Goldin, 2016).



Note: Adapted from "Returns to investment in education: a decennial review of the global literature" by Psacharopoulos, G. and Patrinos, H. A, 2018, *Education Economics*, *26*(5), p. 455.

Conclusion

Education has been contributing to economic development globally at the micro and macro levels for years. It is closely linked to individual and societal prosperity in terms of earnings, employment, and economic growth. In the APEC region, a given population's average years of schooling, school life expectancy, and skills and competencies increase over time. This accumulated human capital has gradually translated into better employment and higher earnings, higher economic growth rates, better health and nutrition, and higher living standards in member economies.

Education is contributing to economic development in APEC member economies in three ways. First, it provides valuable human capital for accelerated economic development. At the micro level, better-educated people are more likely to find employment and receive higher wages. This wage premium translates into higher returns to schooling. The average rate of return to education in East Asia and Pacific Region is 8.7%. Moreover, unemployment rates are lower for those with higher levels of education. Regarding efficiency in the use of resources, spending on education is seen as a good investment. The long-term average rate of return on stocks and bonds in United States from 1966 to 2015 was 2.4 percentage points, compared with 10.5 percentage points of private return to education in United States and 8.7 percentage points in the APEC region (Psacharopoulos & Patrinos, 2018).

Second, education and training enhance employability and earnings potential for the majority of the population in member economies. As the average years of schooling climbed to 6.9 years in East Asia and Pacific Region in 2014, the unemployment rate dropped from 5.3% in 2010 to 4.5% in 2015. APEC's GDP per capita increased from less than USD 6,000 in 1990, to around USD 8000 in 2000, and USD 15,754 in 2016. Meanwhile, GDP per capita ranged between USD 2,173 to USD 57,436. GDP per capita ranged widely, from above USD 50,000 in Australia; Singapore; and United States, to USD 5,000 or less in Indonesia; Papua New Guinea; the Philippines; and Viet Nam. In general, as education increases, so does per capita income in APEC regions.

Third, education and training are social equalizers and contribute to social cohesion, both are critical preconditions for long-term economic development. The economic miracles in "Asia's Tigers" were largely attributable to education investment made by economy-level governments (Sen, 2001). Recent analysis shows a positive correlation between human capital development and the competitiveness and inclusiveness of an APEC economy (APEC Economic Committee, 2017). Australia and New Zealand are typical examples of high inclusiveness and high human capital optimization economies; while China, Peru and Indonesia are characterized by high inclusiveness and low human capital optimization. Education's positive impact on inclusive growth demonstrates that human capital investment has translated into higher living standards and a higher degree of substantive freedoms for the populations in this region.

Building on the human capital theory, it is justifiable to develop a framework that integrates the new conceptualization of education and economic development.

Figure 1.9. Education-Economic Development Pyramid

- On the bottom level, education and training serve as the foundation for economic and social development.
- Public and private investment in education and training can translate into improved skills and competencies of the workforce and thus increase its level of employability.
- Both the quantity and quality of an economy's human capital accumulation can be improved once its labor force is equipped with better skills and competencies.
- When the newly acquired human capital of an economy is appropriately deployed, both the productivity of individual workers and the growth rate of labor productivity increase.
- This increment will lead to higher employment rates and earnings, better living standards, and better access to education and healthcare. Such inclusive social and economic advancements are regarded as quality growth in the APEC region.

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Chapter II Cross-Border Education and Academic Mobility

Key Messages

- *Cross-border education and academic mobility are key drivers for economic development, connectivity and mutual understanding through information exchange and collective knowledge building among different economies.*
- *Policy clarity will enhance people's participation in cross-border education and academic mobility as an approach to advancing their education*
- *The sharing of information on education system and quality assurance among economies' is central to cross-border education and academic mobility*

Introduction

Cross-border education and academic mobility are important ways of enhancing economic integration among APEC member economies. Although there are exchanges of ideas as a consequence of trade and investment money flows, education is critical for an effective transfer of ideas. Through globalization we are seeing a host of changes in the way people work in many areas of our community. Communication across economies is getting much easier and more intensive, facilitating these exchanges of ideas. Nonetheless, the fast pace of growth inhibits the capacity for econmies to position themselves at the cutting edge of specialized areas, unless thy engage in effective exchange to keep up with the pace.

The movement of people throughout the APEC region continues to increase and, as globalization is accompanied by the proliferation of information technology, everything in the global community seems to be *borderless.* It has become the norm to access external resources to further develop an economy's capacity.

As previous APEC reports (APEC Group on Services, 2015) have established, education can drive productivity growth and help member economies move up the value chain through the cross-border transfer of knowledge and skills. This can help reduce the transaction costs for delivering education services and facilitate expanded trade. Cooperation through education also fosters cross-cultural understanding and helps build people-to-people links of enduring value. The education environment is evolving rapidly and new forms of mobility are emerging,

including joint partnership programs, twinning arrangements and online study schemes. Such schemes help improve access to quality education, broaden the scope of courses, increase opportunities for research collaboration, boost the supply of educational services to meet rising domestic demand, and increase exports in educational services.

With these benefits in mind, in 2012 APEC leaders issued a statement encouraging further action to enhance the mobility of students, researchers and education providers in the region. The 2015 APEC Economic Leaders' Declaration instructed ministers and officials to prioritize such mobility to strengthen cross-border education cooperation in the APEC region. Since then, while many initiatives have been undertaken by member economies, certain key issues need further examination.

The commitment made by member economies can be referred back to the 2012 APEC Leaders' Declaration:

> *"All APEC economies stand to gain from enhancing collaboration on cross-border education. Many developing economies in the Asia-Pacific region are rapidly moving into higher value-added manufacturing and knowledge intensive industries driven by innovation. Access to a wide range of quality higher education services is critical for sustainable growth on this development pathway. The APEC region also contains some of the world's largest exporters and consumers of education services. Facilitating the flow of students, researchers and education providers, and reducing the transaction costs involved provides opportunities for a significant expansion of cross-border education services to the benefit of all economies. Increasing cross-border student flows will strengthen regional ties, build people to people exchanges, and promote economic development through knowledge and skills transfer. High quality cross-border education equips students with the 21st century competencies they need for their full participation in a globalized and knowledge-based society. Therefore, we, the APEC Leaders, agree that strengthening collaboration among APEC economies is crucial for facilitation of the work on specific policies, including those relating to quality assurance, accreditation, cross-border exchange and data collection."* (APEC, 2012)

APEC member economies aim to enhance cross-border education, academic mobility, and individual pathways within and across education levels. These can be measured in a number of ways, such as the number of higher education and TVET students enrolled in mobility or

exchange programs; the number of international scholarship programs offered by APEC member economies; the number of economies with government policies or initiatives that promote, academic and student mobility; or through publicly available information on recognized qualifications and recognized education and training institutions by 2030 (APEC HRDWG, 2017a).

The development of cross-border education in many regions, including Asia-Pacific, has reflected the expansion of not only tertiary education systems worldwide, but also in primary and secondary education. Meanwhile, the need for academic mobility, particularly in tertiary education, continues to rise as increased cooperation is required to deal with economic and social globalization. Nonetheless, cross-border higher education will not help developing economies unless it is accessible, available, affordable, relevant and of an acceptable quality (Knight, 2006).

Cross-border Education and Academic Mobility in Higher Education Institutions

In general, ‘cross-border education’ refers to the movement of people, programs, providers, knowledge, ideas, projects and services across economies’ boundaries (Knight, 2006). It encompasses a wide span of modalities that range from face-to-face (taking various forms such as students travelling abroad and branch campuses abroad) to distance learning (using a range of technologies, including e-learning) that take place in higher education institutions and are also applicable for other types of education (UNESCO/OECD, 2005). This type of cross-border education in the tertiary sector can refer to dual- and joint- degree programs, and branch campuses involving virtual or online education. Cross-border education initiatives can also be seen as a part of the "internationalization of HEI" and can be linked to development cooperation projects, academic exchange programs and commercial initiatives.

Benefits of Mobility

By definition, mobility can be considered a tool for socio-economic development. Most cooperation applies to academics and to scientific areas in general. The exchange of resources or experts in certain areas contributes to human resource development, and in certain cases is associated with internationalization initiatives, as internationalization is a multi-dimensional,

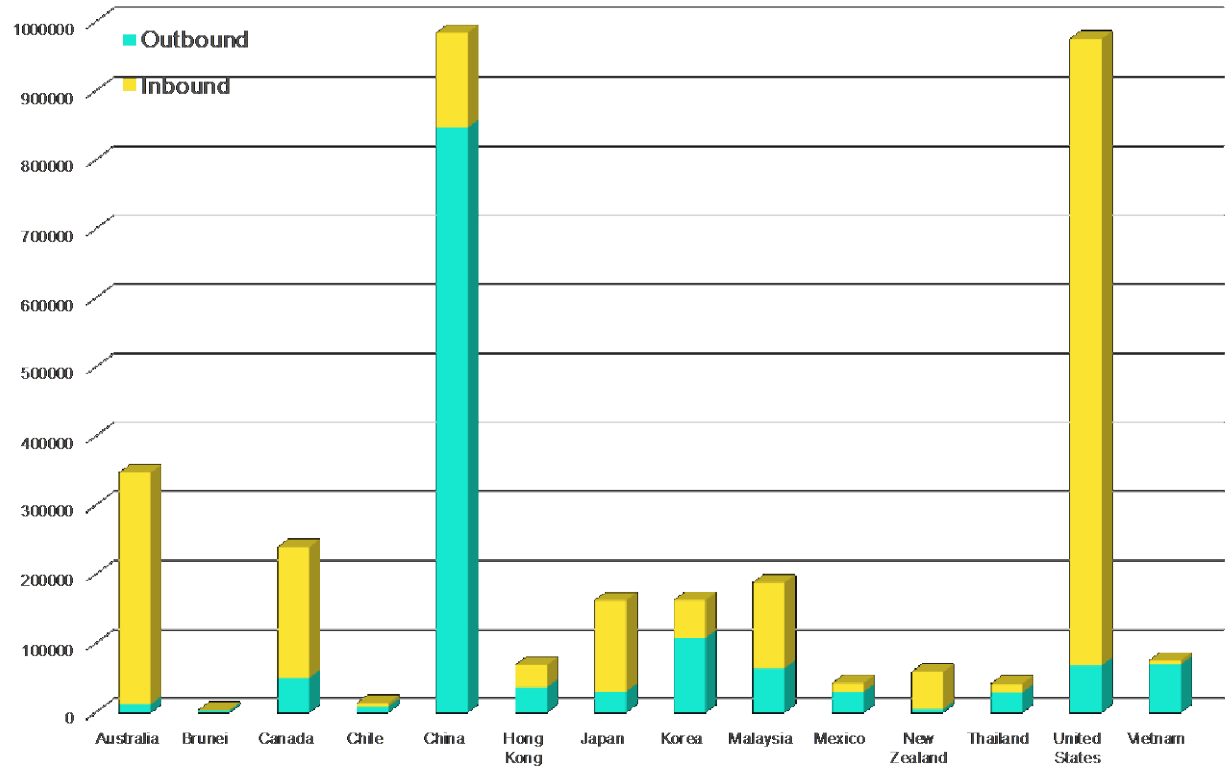
intentional process that brings international/intercultural perspectives to learning, teaching, research, outreach and the management of an institution.

As argued previously in other APEC reports (APEC Group on Services, 2015), it is important to understand the objectives that motivate mobility. They inform policymakers and impact how mobility is interpreted in each economy. Inevitably the anticipated benefits of mobility might vary with the themes identified by stakeholders:

Global graduates – Graduates need to be prepared to live and work in a global environment. Students need opportunities to gain relevant knowledge and skills, including the ability to communicate with people from different economies and cultures, be keenly aware of professional contexts at an international level and (where possible) have certain experience of a foreign economy.

Local graduates – Graduates should have skills and knowledge that have direct relevance to their local context. Students who accomplish an entire degree overseas can become distanced from the local context, to the disadvantage of their employability and engagement with their homeland, whereas mobility gives local students the opportunity to gain an international education at home, enabling them to establish and reinforce professional networks ahead of graduation.

Figure 2.1. University Student Mobility in APEC Economies (2015)



Source: UNESCO statistics.

English language proficiency – English is already the lingua franca of higher education in three economies included in the study (Malaysia; the Philippines; and Singapore). Where this is not the case, enhancing English language proficiency among higher education students is regarded as one of the strongest drivers of mobility. Economies where English is not dominant believe that the presence of foreign higher education institutions can help students improve English language skills. Some believe that the drive for English proficiency is one key reason why Australia; the United Kingdom and United States are the most preferred destinations for international students.

Parental reassurance – Parents of higher education students tend to appreciate having collaborative programs or foreign campuses nearby. Many parents express a preference for keeping their children close to home, particularly in the early stages of their higher education, and then having the option to facilitate overseas study at a later stage in their education, if it's affordable.

Expanded higher education capacity – In some economies, the local higher education systems have a limited capacity to meet student demand. In this case, mobility can be an important way of increasing higher education capacity and giving students more options. As

foreign higher education institutions tend to attract wealthier students than those from average socio-economic backgrounds, it can give middle class families an alternative to local higher education institutions, and elite families an alternative to studying overseas.

Enhanced research capacity – Host governments and both local and foreign institutions can utilize provider mobility to expand research capacity, particularly to enhance institutional rankings. Host governments oftentimes view provider mobility as a means for enhancing the capacity of local HEIs to engage in high-level research. Local HEIs are interested in gaining access to advanced research infrastructure and colleagues in foreign HEIs; while foreign HEIs regard provider mobility as a way to conduct research in different environments and contexts.

Expanded teaching capacity – One incentive from provider mobility is the enhanced methodologies used by faculties in local HEIs to teach students. Overall provider mobility makes a difference in curricula, teaching materials and pedagogy to enhance the overall quality of higher education in their economies.

Institutional revenue – Foreign HEIs could potentially make significant revenues from international campuses. As studies have clarified, costs of establishment and provision tend to be very high and it can take a number of years to recover them.

Modes of Cross-border Exchange

The mode of cross-border exchange varies from economy to economy (CIE, 2008). Information on different modes of cross-border exchange is of varying quality and availability. By far the best information available is for Mode 2: the movement of students between economies, which also appears to be the most significant form of exchange to date. Mode 3 is also important, although there is no official data available in this regard.

Table 2.1. Modes of Cross-border exchange

WTO GATS Mode	*Description*	*Other Terminology*
Mode 1: Cross-border supply	There is no physical mobility of the provider or the student, but the education services are traded. Examples include distance education or internet services.	Often simply referred to as 'distance' or 'online' education.

Mode 2: Consumption abroad	The student physically travels from one economy to another in order to receive education.	This is often referred to as 'international education'. UNESCO refers to it as 'internationally mobile students'
Mode 3: Commercial presence	Education services are provided by establishing a physical and legal presence in another economy. This includes establishing an offshore campus in the host economy.	This form of exchange is often referred to as 'transnational' education.
Mode 4: Presence of natural persons	Educators (teachers) travel to the host economy to provide services to students in the home economy.	

Source: WTO.

On a specific note, there are types of cross-border education and academic mobility that complete these modes of exchange and that highlight the main aspects of these platforms. They help us to better understand the opportunities and challenges that lie ahead.

Types of Cross-border Education

There are different types and categories of cross border education. Among the most relevant:

- Setting up of a branch campus of the HEI;
- Collaboration with a local partner where the provider institution/awarding institution controls most of the program design and delivery (e.g. teaching, materials and assessments);
- Collaboration with a local partner where the program design comes from a local HEI, but program delivery is shared;
- Collaboration where the program delivery is largely delegated to a local partner;
- Validation by an overseas awarding institution of a program designed and delivered by a local HEI; and
- The provider HEI employs a distance learning mode of delivery using

On these different applications, the idea of exchange transcends present borders. Although they are principally applicable to higher education initiatives, many of them are adjustable to fit with primary and secondary education initiatives. In any case, ***collaboration*** is a key element of the exchanges, as any initiative relies on the acceptance and implementation of global/local partners. Similarly, ***validation*** represents another key theme for the successful implementation of exchange programs that require a certified understanding from the host economy to adopt further knowledge based on that program.

Types of Academic Mobility

There are different types and categories of academic mobility. Among the most relevant:

- Internationalization of curriculum degree programs;
- Identification of 'international' competencies for all;
- Internationalization 'at home' via extracurricular activities;
- On-line and distance learning;
- Trans-national education (branch campuses, programs abroad, etc.); and
- Internationalization of research and outreach locally.

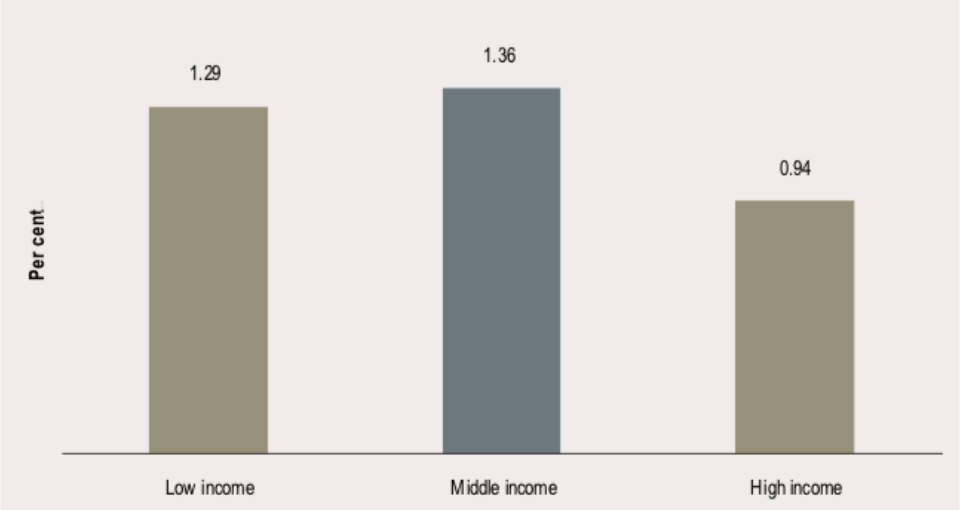
Yet again, challenges around communication are at the heart of the exchange initiatives in academic mobility. To consolidate the results of these programs, it's critical to overcome cultural barriers. Additionally, the quest to expand the results is heavily dependent on the development of technology, as the concepts of 'home' or 'abroad' are less dependent on the 'physical' and are instead expressed more in virtual terms.

However, the different modes and types of cross-border education and academic mobility are a variety of applications from a similar scheme: the augmentation of educational resources available for member economies through exchange. From the perspective of the recipient economy, a cross-border exchange effectively provides additional resources to complement the domestic resources already in place for education.

International specialization in ideas means that it is very likely that cross-border exchanges will result in lower costs than attempting to provide all education domestically. As an illustration

for a Mode 2 exchange, Figure 2.2 represents the effective increase in resources to higher education that has resulted from cross-border exchange within APEC (CIE, 2008). It shows, for example, that low-income economies have effectively increased their tertiary education coverage by 1.3 percentage points as a result of cross-border exchanges.

Figure 2.2. Effective increase in higher education resources from international education



Note. Reprinted from *APEC and International Education*, by Center for International Economics (CIE), 2008

The Role of Governments in Cross-border Education

Government policies of various kinds can have a significant effect on the cross-border exchanges of educational services (CIE, 2008). General regulation surrounding education may also affect the different modes of cross-border exchanges in different ways. Some of these government regulatory measures are put in place to achieve important public policy objectives (e.g. regulatory requirements for quality assurance purposes or consumer protection). When measures are over-restrictive in achieving a specific policy outcome, however, they tend to have an adverse impact such as increasing costs and creating uncertainty for providers, students and employers. Table 2.1 summarizes broad categories of government involvement in cross-border exchange.

Governments play a major role in determining who can provide educational services, the sorts of content of those services and the accreditation and recognition of the finished result. Governments vary considerably, however, in terms of the policy specifics which are used to address these matters.

Table 2.2. Broad effects of government involvement in cross-border exchange	***Effective price of education***	***Quality of education***	***Employment prospects***	***Attractiveness to providers***
Mode 1: Cross-border supply	Restrictions on transfer of printed or other material will tend to increase price.	Poor quality assurance will reduce the quality of education.	Quality assurance and qualifications recognition for cross-border supply will affect employment prospects.	Restrictions on transfer of printed or Internet based material will reduce attractiveness to providers.
Mode 2: Consumption abroad	Visa restrictions or restrictions on employment while studying will effectively increase the price of education.	Poor quality assurance will reduce the quality of education.	Quality assurance, qualifications recognition and accreditation processes will have a significant influence on the employment prospects of the individual obtaining the education.	Restrictions in the host economy will affect the willingness of providers to provide international education.
Mode 3: Commercial presence	Costly business registration procedures and unclear registration and accreditation processes will increase the cost of education.	Unclear or poor quality assurance for foreign providers may reduce the quality of education.	Quality assurance, qualifications recognition and accreditation processes will have a significant influence on the employment prospects of the individual obtaining the education.	Unnecessarily harsh or unclear requirements for foreign providers will make the exchange of services more expensive.
Mode 4: Presence of natural persons	Restrictions on the movement or recognition of appropriate educators will	Restrictions on the movement or recognition of appropriate educators may also affect the	Quality of the educators' contribution may indirectly	Extensive restrictions on the use of foreign educators will

	effectively increase the price of education.	quality of the services provided.	affect employment prospects.	reduce the attractiveness of this model of exchange.

The role of government is critical to understanding and further enhancing educational and academic exchange. Whether restrictions or barriers have been lifted, quality assurance mechanisms are hugely important in the process of adapting the already complex system of exchanges and understanding that they are the backbone of any exchanges in this area.

International Experience: Successful Approaches to Cross-Border Education

The understanding and sharing of experiences of successes (and failures) among member economies is critical to improving the results and expanding the scope of cross-border education and academic mobility in the APEC region. Some current initiatives, as points of reference, reveal the existing differences and approximation among member economies.

Box 2.1. Viet Nam: Policy on the Internationalization of Higher Education

Viet Nam has established cooperation in education and training with more than 100 economies, territories, and international organizations, spread evenly across the continents, and is a member of various international and regional organizations in education.

Higher education institutions and research institutes in Viet Nam are encouraged and empowered to actively promote cooperation in training in different forms such as academic exchanges, student and teacher exchanges, scientific research, and joint training to provide universities and research institutes with opportunities to a) study modern education systems, b) enhance management capacity, c) improve quality of education and training, d) create professional exchange opportunities for teachers and students.

To implement the policy on the internationalization of higher education in Viet Nam, many higher education institutions have developed programs conducted entirely in English that help Vietnamese students gain English proficiency, while creating favorable conditions for international students who wish to study high quality short or long-term programs in Viet Nam at a reasonable cost.

Box 2.2. Thailand: Policy on the internationalization of education

The production and development of quality graduates is linked to their ability to adapt to a changing working environments; to innovate and create knowledge to develop the economy in a sustainable manner, to enhance the economy's competitiveness in a globalized world; and to strive towards academic excellence so as to become a regional education and research hub. The Ministry of Education is in the process of improving quality in second foreign language studies to enable the Thais to compete successfully in the international arena.

Major world languages, both Eastern and Western, are the focus of instructional development, along with those of the economy's trading partners, including Japanese, Korean, German, French, Spanish, and Russian, as well as the languages of the ASEAN community, such as Vietnamese, Cambodian, Burmese, and Malay/Indonesian. Within three years, all students should have improved their communication skills in English.

Box 2.3. Hong Kong, China: Policy on internationalization of education

Hong Kong, China capitalizes on the advantage associated with Hong Kong as an international city, and further co-operation and exchanges in the realm of education with economies along the Belt and Road to facilitate students' understanding of the diverse cultures of different ethnic groups, as well as the development and opportunities in these economies and cities. Related measures include providing suitable learning and teaching resources, widening opportunities for students to learn foreign languages, and through the Quality Education Fund, further promoting student visits and exchange activities on the Chinese mainland, economies along the Belt and Road and other overseas economies.

Students may, for example, participate in service-learning and English Language Immersion programs to enhance their skills of communication with people of these economies as well as showcase the potential contributions that Hong Kong, as an international city, can make towards the Belt and Road Initiative.

Box 2.4. Japan: Quest for internationalization

The Ministry of Education, Culture, Sports, Science and Technology, MEXT, is promoting internationalization of Japanese universities, in association with Top Global University Project, which is designed to support universities that are making an all-out effort to open their doors to the rest of the world through collaboration with overseas universities; and the Inter-University Exchange Project, which provides support for collaborative programs with universities in strategically important economies and regions while assuring the quality of higher education.

There were approximately 31,000 exchange agreements between Japanese and foreign universities in 2015. Japanese universities have established various types of cross border education, including, yet not limited to credit transfer and double degree programs.

MEXT aims to double the number of Japanese students studying abroad, and the number of international students studying in Japan by 2020. To that end, MEXT is working to invite outstanding international students studying in Japan, and encourage more domestic students to study abroad.

Moreover, MEXT is also working to promote both student exchange and inter-university exchange in the region through discussion and the development of guidelines at the Working Group on Student Mobility and Quality Assurance of Higher Education among ASEAN Plus Three Countries.

Box 2.5. Russia: Global Education Program

The Global Education Program (GEP) is aimed at facilitating human development and promoting academic mobility. It serves as a mechanism for the development of high-quality specialists through funding for full-time post-graduate Russian students' study in the areas of science, engineering, medicine, education and management in the social sphere. The objective of the program is to generate high quality specialists that can contribute to innovative growth in the future.

The program correlates with the APEC Education Strategy as it enhances international academic mobility and strengthens international ties in the sphere of education and science. Global Education is a government-funded program that offers Russian citizens an opportunity to study at leading foreign higher education institutions and later to get employment in Russian companies and organizations in accordance with the qualification gained.

GEP funds full-time post-graduate studies in the areas of science, engineering, medicine, education and management in the social sphere. Besides tuition fees, the program grant covers travel expenses to and from the student's place of residence and the university, medical insurance, accommodation, meals and academic literature. The grant is for the entire duration of the program. Participants are expected to return to Russia upon completion of their studies and to obtain employment in accordance with the qualification they gained for a period of at least three years.

One of the key challenges associated with this initiative is Russia's vast territory and the need to provide specialists for all regions of the economy, especially the Siberian and Far Eastern Federal Districts. In

order to resolve this challenge, it is necessary to incentivize young specialists to go to these regions. An important part of the program is the career development tools, as all participants are offered employment opportunities upon completion.

Since 2014, a total of 685 people have taken part in the program, and the number of applications has increased. The project has created a system of human resource development which gives talented youth more cutting-edge opportunities and at the same time, resolves the shortage of skilled specialists. Beyond these, it also has several other encouraging outcomes and features:

- Promoting international academic mobility and cooperation
- Promoting international networking, as Russian students stay connected to highly skilled specialists from other economies
- Establishing an effective system of career navigation for young specialist

Box 2.6. New Zealand: International Education Strategy

New Zealand's International Education Strategy (New Zealand Education, 2018), launched in 2018, sets out a clear vision for a thriving and globally connected New Zealand through highly regarded international education, and supports other government priorities across education, immigration and economic growth. It was developed across a number of government agencies which acts as an umbrella for all of New Zealand's international education activities.

The Strategy is framed around three goals:

- An excellent education and student experience
- Sustainable growth
- Global citizens

A key element of the Strategy has been the enhanced focus given to developing global citizens:

- ensuring all students gain the knowledge, skills and capabilities they need to live, work and learn globally, and
- promoting global connections for educational institutions.

This targets New Zealanders as well as international students to ensure that they have opportunities to make global connections and understand and embrace the benefits of international education at home and abroad.

Challenges in Implementing Cross-border Education and Academic Mobility

The implementation of cross border education and the furthering of academic mobility faces tremendous challenges and barriers. In previous reports, member economies and participants recognized that one of the greatest barriers for cross- border education is cost, because the academic environment of member economies is very heterogeneous while in some economies it's affordable, for many others it is prohibitive.

Therefore, the cost barrier inhibits the exchange of students and academics from different regions. Different perspectives on the issue of cost recognize the fundamental qualities of the APEC environment such as distance and diversity, which represent a challenge to overcome.

Precisely because of this, the wide community of member economies should draw on the experiences and best practices from other economies, and present them as initiatives applicable to other realities.

On this topic, it is useful to highlight some important issues to confront, and look to amend these systems:

- Scholarships for nationals and foreigners;
- Tuition free education;
- Fair loan system;
- Living standards informed and known to students and academics;
- Academic exchanges; and
- Opportunities for everyone and not only for those who can pay.

On the other side, the issues of varying quality standards and institutional structures across the APEC region must be considered for the advancement of cross-border education and mobility. Related to cost is the way in which different member economies handle the inputs or outputs of foreign academics or students, the standard used to measure their contributions, and the requirements of interaction with different academic systems. On the same note, how returning students are considered and how their work abroad is valued upon their return should be given special attention. Relevant issues include:

- The inadequacy of quality assurance systems at the economy level to control or monitor the quality of cross-border education;
- The inadequacy of information sources for students and consumers;
- Insufficient understanding of cross-border education;
- Inadequacy of institutional quality assurance mechanisms;
- Insufficient understanding of local education systems;
- Difficulties in obtaining local resources;

- Over-reliance on inexperienced local partners;
- Inadequate inter-institutional agreements or cooperation;
- Inadequate management and governance structures;
- Focus on Quality Assessment and International Standards; and
- Bilateral Educational Agreements (among institutions and governments)

Finally, other challenges involve language barriers, cultural differences, and socio-political environments that affect integration of and aspirations for a more extended network of cross border education and mobility to materialize. Certain barriers are being lifted (or torn down), thanks to globalization and technological advances that are closing gaps and reducing the initial asymmetry between different economies and realities, many challenges persists.
First, lack of foreign language skills is a big barrier to most international students. To resolve the issue, economies could employ multi-dimensional approaches, including developing an economy-level language strategy, creating funding opportunities for native speakers, and offering second language courses in universities.

Job/study stability in lieu of immigration also counts. Certain HEIs have financial requirements for researchers employed on temporary contracts, such as post-doctoral fellows, and, as a result the researchers have to relocate around every few years when funding streams change. Female students also face barriers.

Another issue is availability of data. There are oftentimes data on degree-seeking or long-term student mobility rather than short-term student mobility, and data on inbound rather than outbound student mobility. It is hard to locate data on staff mobility. Data on mobility outcomes/impacts on individuals or HEIs and member economies are also lacking.

Certain HEIs are restricted to collaborate only with known/ranked HEIs. Such exchange barriers stymie creativity, diversification hence innovation and growth.

Brain drain is also a common issue in APEC member economies. This spurs questions about balancing the incentives to return to an economy of origin versus the capabilities of research and funding abroad.

Although this chapter could hardly resolve these challenges, mere enumeration of these issues might allow us to highlight their implications. The first step forward in improving the impact of cross-border education and academic mobility is to understand the critical role of each one of the above challenges. Digital technologies can help resolve many of these issues. Also, thanks to technological progress, information gaps will also be narrowed and economies will be better prepared to confront these issues and to gain valuable experience from partner economies.

Conclusion

In concluding, cross-border education and academic mobility are key drivers to furthering economic development, connectivity and mutual understanding, as they allow information exchanges and collective knowledge building among different economies. There are different modes and types of cross-border education and academic mobility. The role of governments has a significant effect on cross-border education, particularly by assessing the capabilities, formulating the regulations, and removing obstacles. Technological advances should play a critical role in solving the many aspects and unresolved challenges.

Further on, a focus on the common grounds concerning certification and quality assurance warrants special attention. Technology is a critical element in the advancement of educational exchange. By itself, however, technology is incapable of providing stable and recognized standards of exchange among member economies.

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Chapter III Qualifications Frameworks, Skills Recognition and Technical and Vocational Education and Training

Key Messages

- *Technical and vocational education and training is important in economic development and skills for the future of work.*
- *Qualifications frameworks can play a significant role in skills development and economic productivity and require sustained long-term investment.*
- *Qualifications recognition is a critical enabling lever for mobility.*

Introduction[4]

Development and implementation of qualifications frameworks and the role of skills recognition to support labor mobility are important issues for APEC and its member economies. As such, they feature prominently in the first action of both the APEC Education Strategy and its Action Plan.

This chapter will explore the fundamental concepts of qualifications frameworks and their value in the context of technical and vocational education and training (TVET). It includes case studies on the newly developed Philippines Qualifications Framework and the ASEAN Qualifications Reference Framework, highlighting how such frameworks can support development of quality in education systems, and play an important role in student and worker mobility.

[4] It is worth noting that 'national qualifications framework' (NQF) is a well-established and internationally accepted term. From an APEC point of view, this term can be interpreted as referring to a qualifications framework within the context of an APEC economy. For the avoidance of confusion and creation of new terminology, the term NQF will be used, but should be interpreted appropriately.

National qualifications frameworks, which provide authoritative information about an economy's qualifications, can inform decisions on the recognition of individual foreign qualifications, but it is important to note that they are only one part of the bigger picture, and at the end of the day it is qualifications and skills recognition by decision-makers that enables mobility at the grass-roots level.

The Importance of TVET for Economic Development

TVET is designed to provide the skills that employers and industry need now and into the future. A strong TVET sector can boost employment outcomes for those who complete TVET programs. TVET is central to business productivity, and technical and vocational skills also support prosperity through economic opportunity and greater social well-being.

The third and fourth industrial revolutions are changing the very foundations of the way we live, learn and work. Futurists' predict that 85% of the jobs today's learners will be doing in 2030[5], have not even been invented yet. The rate of technological change will only increase, creating even greater demand for our education and training systems to be agile, flexible, responsive, life-long and future focused, where value in the ability to learn new skills may overtake the value of the skill itself. APEC economies face immediate challenges to reform their education and training systems to produce skilled individuals to meet the demand for jobs now and into the future.

APEC economies have identified a significant mismatch between the skills of workers and the skills required for emerging jobs, presenting a common challenge for our labor markets. This mismatch affects both young workers who want to obtain skills and older workers who need to update their skills. Employers' needs can change quickly due to a number of factors including rapid changes in technology.

Well performing TVET systems are renowned for their agility in providing quality education and training to deliver new skills which help economies deal with rapidly changing work environments. Across APEC, there is enormous potential for TVET systems to be harnessed for this purpose. Factors for success in the TVET sector include a strong governance structure with a leading role for industry, appropriate funding, effective access and equity policies, quality service delivery, effective quality assurance and regulation, system transparency and

[5] https://www.delltechnologies.com/content/dam/delltechnologies/assets/perspectives/2030/pdf/SR1940_IFTFforDellTechnologies_Human-Machine_070517_readerhigh-res.pdf

fair skills and qualifications recognition. These areas can and have been unified under one vehicle - through NQFs.

National and Regional Qualifications Frameworks (NQFs and RQFs)

A qualifications framework is a formal structure used to organize levels of learning, using learning outcomes. Qualifications frameworks can be designed at the economy or regional level, and come in many forms. They can be simple or complex, formalized in legislation or administrative. They may have direct relationships to real-world qualifications, education providers and quality assurance systems, or they may stand alone. Qualifications frameworks are dynamic, and evolve over time, changing with the needs of their users and as education policy and practice develops.

> A **qualifications framework** is a formal structure used to organize the levels of learning, using learning outcomes.

There are two main types of qualifications frameworks - national qualifications frameworks (NQF), and regional qualification frameworks (RQF).

An NQF is a formal structure used to organize an economy's qualifications into levels of learning, which are described using learning outcomes. They evolved from concepts which sought to break down the traditional sectoral divides between academic and vocational streams of education and training, through references to learning and competency outcomes, to develop a lifelong view of learning. Over time, the focus of education and training shifted from recognizing the provision of the education (inputs and output-based), to looking at the knowledge, skills and competencies gained from the education (outcomes-based). Australia was one of the first economies to implement such a system through its NQF, followed by England, Scotland, New Zealand, Ireland and South Africa. Diagrammatic examples of NQFs in APEC are at Figure 3.1 and Figure 3.2.

Learning outcomes describe what a person can do at the end of learning, be it demonstrating knowledge and/or skills. Qualifications frameworks use learning outcomes to describe what is expected of learners (or graduates), typically in terms of knowledge, skills (or competencies) and responsibilities (or autonomy), for each level of the framework. However, learning outcomes can extend to beyond these parameters into such areas including behaviors, personal attributes, efficiency and productivity.

Figure 3.1 Australian Qualifications Framework

Figure 3.2. Thailand Qualifications Framework

Educational Qualifications			NQF Levels	Occupational Standards	
Basic Education	Vocational Education	Higher Education		Professional / Occupational Standards	Skill Standards
		Doctoral Degree	Level 8	PQF Level 8	
		Master Degree	Level 7	PQF Level 7	
	Bachelor Degree (B. Tech.)	Bachelor Degree	Level 6	PQF Level 6	
	Diploma in Vocational/ Technical Education	Advance Diploma	Level 5	PQF Level 5	SS Level 5
			Level 4	PQF Level 4	SS Level 4
Upper Secondary + Occupational	Vocational Education Certificate		Level 3	PQF Level 3	SS Level 3
Upper secondary			Level 2	PQF Level 2	SS Level 2
Lower secondary			Level 1	PQF Level 1	SS Level 1

Globally, there has been a proliferation of NQFs over the last two decades. In the 1990s, there were six NQFs implemented. In 2009, the Education Network of the APEC Human Resources Development Working Group (HRDWG) commissioned research to produce the *Mapping of Qualifications Frameworks Across APEC Economies* report which found around 120 qualifications frameworks, either implemented or in the process of being developed. Almost a decade later in 2018, there are more than 150 qualifications frameworks in place including

several RQFs. The number of APEC economies with an NQF has more than doubled in the last decade, and some others are considering one, see Table 3.1 below.

Table 3.1. National qualifications frameworks in APEC 2009 and 2018

APEC economy	2009	2018	Status
Australia	Y	Y	Mature with several major revisions
Brunei Darussalam	N	Y	Developing
Canada	N	Y	Mature, higher education sector
Chile	N	N	Designing
China	N	N	Considering
Hong Kong, China	Y	Y	Mature
Indonesia	N	Y	Developing
Japan	N	N	Considering
Malaysia	Y	Y	Mature
Mexico	N	Y	Developing
New Zealand	Y	Y	Mature with several major revisions
Papua New Guinea	N	Y	Developing
Philippines	N	Y	Implementation
Republic of Korea	N	N	Considering
Russia	N	N	Incorporated under law
Singapore	N	N	-
Thailand	Y	Y	Higher education sector 2009. Cross-sectoral 2013.
Viet Nam	N	Y	Developing
Total	**5**	**12**	

Note: The 2009 column is attributed to the report 'APEC: Mapping Qualifications Frameworks across APEC economies (2009)'; the 2018 column is attributed to a combination of the attached report 'Global inventory of regional and national qualifications frameworks 2017, Volume II' and research undertaken by Australia as the author of the chapter.

An RQF is broader than an NQF and contains less detail. They are sometimes referred to as a 'meta-framework' or 'transnational framework'. Like NQFs, RQFs describe the levels of learning using learning outcomes, but they do not contain qualification types. The ASEAN Qualifications Reference Framework (AQRF) (see Table 3.2) is an example of a regional framework which can serve as a translation device to support comparison of national qualifications across a region.

RQFs seek to strengthen regional integration through improved cross-border student and worker mobility, occupational mobility, and the adoption of lifelong learning policies within the region. They do this by first triggering qualitative reforms, including supporting the implementation of a learning outcomes-based system, such as through the development of an NQF. Economies can then link their NQF to the RQF through a process called 'referencing' (also known as 'aligning', 'mapping' or 'levelling'). Further information about the AQRF and referencing is located later in this chapter.

The following RQFs have been established to date:

- Association of Southeast Asian Nations Qualifications Reference Framework (AQRF), (2015, 10 countries)
- Caricom Qualifications Framework (1973, 15 Caribbean countries)
- European Qualifications Framework (2008, 39 countries)
- Gulf Qualifications Framework (2014, 6 countries)
- Pacific Qualifications Framework (2010, 15 countries/territories)
- South African Development Community Regional Qualifications Framework (2011, 15 countries)
- Transnational Qualifications Framework (2008, 32 small States of the Commonwealth).

Table 3.2. ASEAN Qualifications Reference Framework

	Knowledge and Skills	Application and Responsibility
	Demonstration of knowledge and skills that:	***The contexts in which knowledge and skills are demonstrated:***
Level 8	• is at the most advanced and specialised level and at the frontier of a field • involve independent and original thinking and research, resulting in the creation of new knowledge or practice	• are highly specialised and complex involving the development and testing of new theories and new solutions to resolve complex, abstract issues • require authoritative and expert judgment in management of research or an organisation and significant responsibility for extending professional knowledge and practice and creation of new ideas and or processes.
Level 7	• is at the forefront of a field and show mastery of a body of knowledge • involve critical and independent thinking as the basis for research to extend or redefine knowledge or practice	• are complex and unpredictable and involve the development and testing of innovative solutions to resolve issues • require expert judgment and significant responsibility for professional knowledge, practice and management
Level 6	• is specialised technical and theoretical within a specific field • involve critical and analytical thinking	• are complex and changing • require initiative and adaptability as well as strategies to improve activities and to solve complex and abstract issues
Level 5	• is detailed technical and theoretical knowledge of a general field • involve analytical thinking	• are often subject to change • involve independent evaluation of activities to resolve complex and sometimes abstract issues
Level 4	• is technical and theoretical with general coverage of a field • involve adapting processes	• are generally predictable but subject to change • involve broad guidance requiring some self- direction and coordination to resolve unfamiliar issues
Level 3	• includes general principles and some conceptual aspects • involve selecting and applying basic methods, tools, materials and information	• are stable with some aspects subject to change • involve general guidance and require judgment and planning to resolve some issues independently
Level 2	• is general and factual • involve use of standard actions	• involve structured processes • involve supervision and some discretion for judgment on resolving familiar issues
Level 1	• is basic and general • involve simple, straightforward and routine actions	• involve structured routine processes • involve close levels of support and supervision

Benefits of Qualifications Frameworks for TVET

APEC economies have reported a range of challenges in their TVET systems including actual and perceived lower status of TVET compared to higher education; engaging industry in the TVET training system; and how complex governance arrangements, often involving multiple agencies, can make it difficult to implement systemic reform.

Qualifications frameworks can provide a powerful stimulus for education and training reform to address some of these significant challenges. A qualifications framework can bring together a wide array of stakeholders with diverse and dynamic interests to achieve improved education and training policy integration, at the domestic and international levels. The simplicity of their concept offers an attractive vision for all vested parties to work towards a more unified and cohesive system.

By using a common language of learning outcomes, qualifications frameworks make explicit what is expected at the end of a learning process, for both completed programs leading to the award of a qualification, and partial studies. In effect, learning outcomes become an important part of education standards and promote quality and consistency in learning. By making learning outcomes explicit through qualifications frameworks, they can then serve multiple purposes for different users.

NQFs encourage stakeholders to reflect on the performance of their education and training systems in the 'real world', to trigger qualitative reforms. Having minimum quality standards in education and training 'housed under one roof' in a qualifications framework supports stakeholders in a range of ways:

- Learners know what to expect and can better focus study efforts to achieve their education and training goals; when learning and employment pathways are visible learners can make more informed choices to develop skills to pursue their careers.
- Education and training providers can design and deliver programs of consistent quality without stifling flexibility and innovation; and can more validly and consistently assess learners.
- Employers and industry can:
    - play a critical role in the development of quality standards, and the design and delivery of education and training so that skills are relevant for the labour market

    - streamline education and training standards with industry standards to facilitate access to employment
    - provide real-time and future focused feedback on gaps in education and training to meet the demand for skills in the labor market
    - better understand the skills held by workers, to identify and evaluate potential employees.
- Agencies involved in quality assurance, including independent regulators and education institutions themselves, can be more effective and focused when assessing program quality and institutional performance.
- Governments can implement effective education and training governance structures; determine more integrated policy settings across education, employment and industry sectors (at legislative, policy and administrative levels); monitor institutional performance; allocate funding; collect data and benchmark education and training systems to inform policy settings; and through the use of an NQF as an educational benchmark, assess the skills of incoming migrants to support worker mobility.

For skills development in particular, NQFs can create and streamline learning and employment pathways, including:

- within the TVET sector
- between the secondary school sector and the TVET sector
- between the TVET sector and the higher education sector
- between the TVET sector and employment
- from the higher education sector to employment to the TVET sector and vice versa

The creation of TVET pathways in an NQF improves the visibility of TVET education and training and validates their quality, thereby lifting their status.

TVET to employment pathways creates an environment where decision-makers for skills recognition may be more inclined to recognize TVET for work purposes. NQFs can also establish policies for credit transfer, recognition of prior learning, lifelong learning to support training and re-training, and provide information to facilitate recognition of TVET qualifications for the purposes of further study.

The high level of transparency that NQFs offer builds stakeholder confidence and trust in qualifications at all levels. Mature and well-developed NQFs often represent the heart of an

economy's education and training system. From an international perspective, readily accessible information about NQFs can help other economies to understand foreign education and training systems and qualifications. As a benefit, economies can more easily compare foreign education and training systems to their own system, and are therefore in a better position to be able to recognize the skills held by foreign-trained individuals.

Qualifications frameworks are an effective means of providing information about an education and training system, using the common language of learning outcomes. Authoritative and comprehensive information about an education and training system helps skills recognition authorities such as employers and education and training providers to make decisions about granting employment or entry into study programs. In this way, NQFs can support domestic and international mobility. However it is important to note that qualifications frameworks do not provide automatic recognition of foreign qualifications and skills. Qualifications and skills recognition is a distinct process with its own policy framework.

Qualifications frameworks do not provide automatic recognition of foreign qualifications and skills.

NQFs create an environment where diverse stakeholders can work together to better integrate TVET within an education and training system and with employment policies, to improve the performance and standing of TVET. They do this by offering a mechanism for TVET stakeholders to work together to clearly articulate the roles and responsibilities of each player in skills delivery.

It is worth noting that, to date, there is no evidence that having an NQF delivers a better quality education and training system, or that an NQF leads to increased or improved student and worker mobility. APEC economies without an NQF have functional mechanisms in place that integrate TVET, industry and skills recognition. For example, at present the United States does not have an NQF and there are no plans currently underway to develop one. Education in the United States is highly decentralized, and education at all levels is primarily within the purview of the various state-level Governments. With regard to secondary-level and adult TVET, state education agencies are typically responsible for establishing standards (i.e. what students should know and be able to do), and this is often done in consultation with employers. Standards for postsecondary TVET (e.g. technical/community colleges) are generally established by individual institutions and their governing boards, although often

also in consultation with employers. In the area of skills recognition, state-level and/or nongovernmental interlocutors have been involved to support improved arrangements for the recognition of professionals. For example, in the accounting occupation, a mutual recognition agreement was developed in order to help qualified professional accountants from Australia; Canada; Hong Kong, China; Ireland; Mexico; New Zealand; Scotland and the US to obtain professional licensure to practice within these locations.

There are many benefits of qualifications frameworks, however they do not come without costs. Qualifications frameworks require a significant and sustained financial investment from governments, education and training providers, employers and industry. In recognising that education and training systems change over time, qualifications frameworks must also be dynamic and agile, so they need to be reviewed periodically to keep pace with significant developments and to ensure they continue to reflect the reality of current education policy and practice.

Regional Frameworks and Initiatives Supporting TVET Quality and Mobility

The first action of the APEC Education Strategy highlights enhancement of quality assurance systems, qualifications frameworks and skills recognition, and calls for exploration of the '…development and implementation of outcomes-based occupational standards, appropriate mechanisms for quality assurance of education institutions, qualifications frameworks and skills recognition arrangements'[6]. Qualifications frameworks are being used in a number of international initiatives to improve the quality and recognition of TVET systems and qualifications for work and study purposes, and to facilitate strengthened economic integration within the Asia-Pacific region. These initiatives include the ASEAN Qualifications Reference Framework, the APEC Integrated Referencing Framework and the UNESCO qualifications recognition conventions, which are based on best principles and practices. They offer APEC economies relevant, practical and sustainable policies that can be applied and tailored to domestic settings.

[6] APEC Education Strategy, p. 6.

ASEAN Qualifications Reference Framework

As the first regional qualifications framework in Asia, the ASEAN Qualifications Reference Framework (AQRF) is one of the most significant education and training innovations in the region in recent times. It was purposely designed to cater for the large diversity in education and training systems across ASEAN, acting as a neutral influence, and respecting national priorities and socio-economic contexts. The AQRF was developed based on qualifications framework best practice principles and is in the process of transforming from a theoretical framework to a functional one in 2019. The AQRF has been endorsed by all ASEAN Economic Ministers, Education Ministers and Labor Ministers since 2015.

The AQRF is a 'common reference' framework, meaning that it acts as a regional benchmark that economies can compare their NQF (or qualifications system) to, using a process called 'referencing'. As such, the AQRF will act as a translation device to help economies in the region to better understand, compare and assess foreign qualifications and learning in the region. Overseas-trained individuals can more readily pursue international study and work opportunities, and this strengthens the economic standing of the region, and increases its international competitiveness.

The AQRF has eight levels of learning outcomes expressed through two domains i.e. 'knowledge and skills' and 'application and responsibility' (Figure 3.1. above). It can encompass multiple education and training sectors, and is underpinned by quality assurance principles and broad standards for regulators, the assessment of learning and the award of qualifications and certificates. The AQRF has a wider objective of promoting lifelong learning[7].

Engaging with the AQRF is voluntary and it does not require economies to make changes to their education and training system. However, as an established benchmark, it does promote quality standards. The AQRF, in effect, has triggered major educational reforms across the ASEAN region, such as the development of NQFs, improvements in quality assurance systems and increased transparency in education and training systems. Improving the quality of learning and qualifications builds greater confidence and trust in systems, facilitating trade relationships.

[7] The ASEAN Qualifications Reference Framework, 2014. Education and training incorporates informal, non-formal and formal learning. Formal learning includes but is not limited to post compulsory schooling, adult and community education, TVET and higher education. http://asean.org/asean-economic-community/sectoral-bodies-under-the-purview-of-aem/services/asean-qualifications-reference-framework/

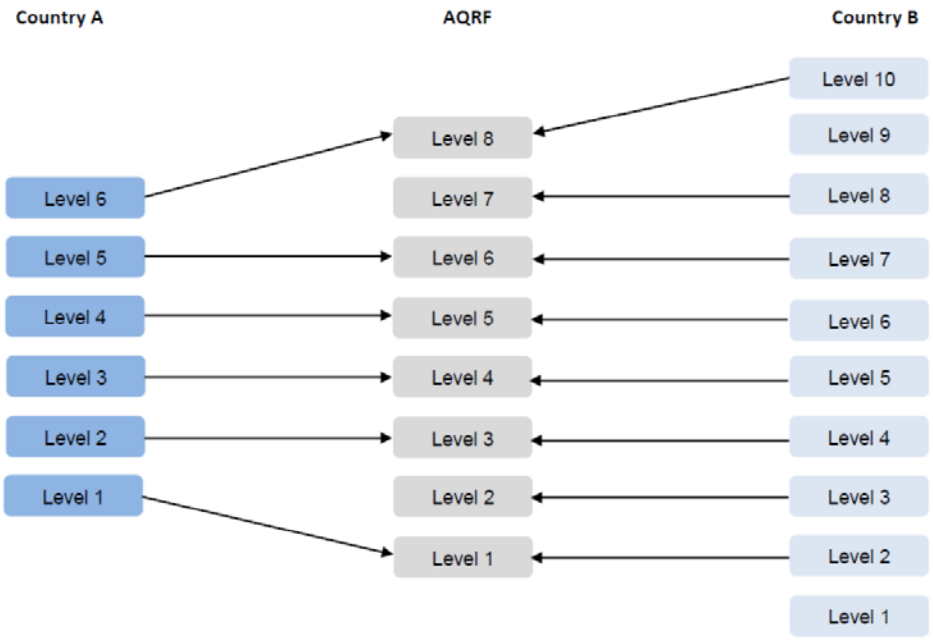
Several ASEAN countries have viewed the AQRF as a useful mechanism to address challenges in their TVET systems.

Referencing to the AQRF is a process undertaken by the relevant education and training authorities. Relevant authorities systematically work through the agreed referencing criteria to develop a referencing report which is peer-reviewed.

Referencing qualifications frameworks involves education and training authorities working through an agreed set of criteria to undertake a comparative analysis in order to make judgements about how each level of a national qualifications framework (or qualifications system) corresponds with a level on the regional qualifications framework.

Referencing criteria includes a description and analysis of education and training system governance, quality assurance systems, how the NQF (or qualification system) levels best match with the AQRF, as well as explanations of key terms, policies and framework levels. A diagrammatic representation of the outcome of referencing is at Figure 3.3. It is important to stress that referencing is not a comparison of 'real-world' qualifications and the outcomes of referencing do not mean automatic recognition, be it qualifications recognition, skills recognition or mutual recognition of qualifications between parties.

Figure 3.3. Diagrammatic Representation of Referencing to the ASEAN Qualifications Reference Framework



APEC Integrated Referencing Framework for Skills Recognition and Mobility

There is currently no consistent mechanism for recognizing qualifications earned through TVET pathways, but the APEC Integrated Referencing Framework (IRF) to support skills recognition in TVET, has the potential to address this. APEC economies are placing an emphasis on 'preparing a population with the technical and soft skills to be highly productive and capable of facing the challenges posed by rapidly changing regional and global economic environments'[8]. This is emphasized by the 2015 APEC Leader's Declaration[9]. emphasizing the development of skills required by industry into the future.

The international movement of skills and labor has an important role in global markets with significant economic benefits. Labor mobility can assist economies to match skills to jobs and improve the exchange of knowledge and technology, and ultimately productivity, where appropriate. In some economies, labor mobility remains an underused economic resource due to complexities in developing coherent global and regional frameworks that facilitate the flow of workers both within and across borders.

APEC economies are working towards obtaining better alignment of TVET outcomes with domestic and regional workforces as well as better skills recognition to facilitate mobility based on TVET achievements. The proposed IRF addresses a number of the key priorities and actions identified by APEC Leaders and Ministers for Education and Human Resources Development, including:

- the APEC Education Strategy, particularly in working towards Objective 1 – Enhance and align competencies to the needs of individuals, societies and economies;
- the APEC Labor Mobility Framework initiative by fostering an enabling environment for the portability of qualifications and transfer of skills within and across economies; and
- the APEC Human Resources Development Action Plan (2015-18) priority area C – Facilitating mobility of labor and skills development.

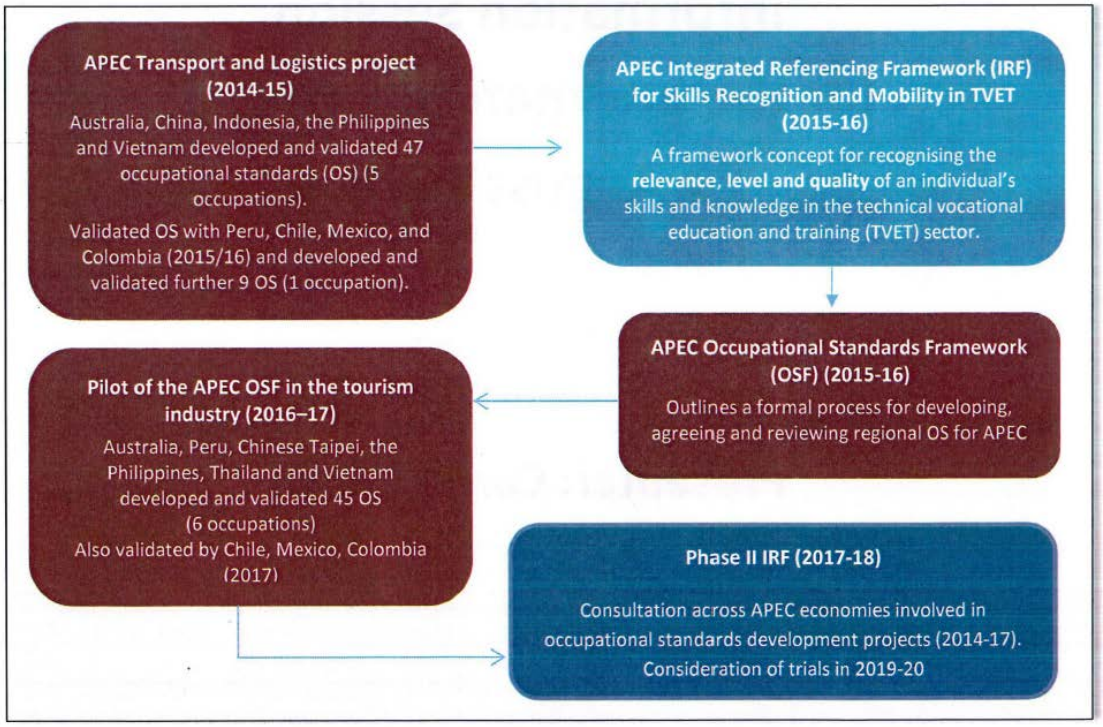
In 2014, the Capacity Building Network of the Human Resources Development Working Group identified the goal of 'competencies standardization and training quality systems to promote skills mobility in APEC economies' as a priority. A range of projects was initiated

[8] APEC Education Strategy, p. 2.

[9] https://www.apec.org/Meeting-Papers/Leaders-Declarations/2015/2015_aelm.aspx

designed to determine how an individual's skills and knowledge can be better understood across borders and TVET systems (see Figure 3.4).

Figure 3.4. APEC Occupational Standards and Recognition Projects (2014-2018)



The IRF project focused on three critical pieces of information required to determine the 'comparability' and quality of a person's skills:

- Relevance – have they developed the skills and knowledge required to do the job?
- Level – have they developed the skills and knowledge at the level of performance expected of them?
- Quality – was the training provided under a system that is quality assured by government?

Consequently, the IRF is comprised of three components, as shown in Figure 3.5.

- The APEC developed Occupational Standards Framework – a mechanism to establish a common understanding of the skills and knowledge required for specific occupations, to better understand the relevance of skills held by individuals for specific occupations;
- The East Asia Summit TVET Quality Assurance Framework – a mechanism to compare the quality of the TVET system or institution the training and certification came from; and

- Three, the ASEAN Qualifications Reference Framework as explained above.

As well as being 'integrated', the IRF is a 'referencing' framework with the component parts providing the points of reference. These points of reference provide a common standard for participating economies to compare their own systems and qualifications to and see how they measure. This may result in identifying both gaps and surpluses in existing local arrangements. Economies reporting on these measures will assist in transparency and the creation of a 'zone of trust' across APEC. Stakeholder benefits of the IRF are summarised at Figure 3.6.

Figure 3.5. Key elements of the Integrated Referencing Framework

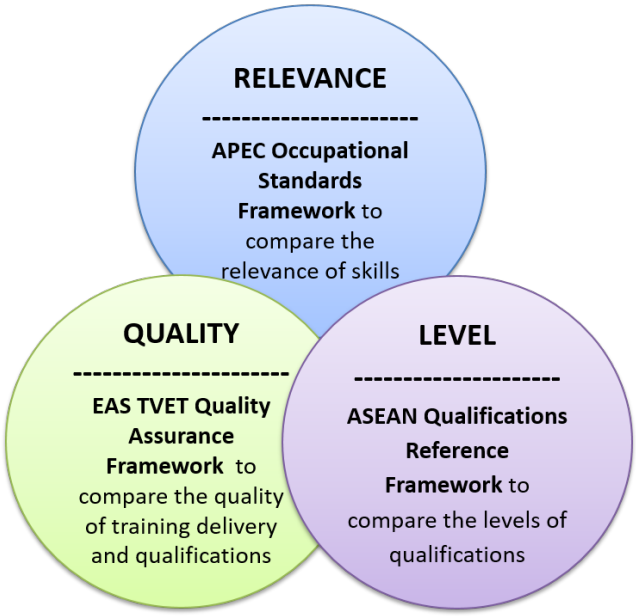


Figure 3.6. Stakeholder benefits of the IRF

To date (2018), there have been two phases to the development of the IRF. Phase I (2016/16) involved testing the concept design through a workshop in Manila in October 2015 that

involved 12 APEC economies. There was broad support for the concept and it was agreed that the concept should leverage existing frameworks (such as the AQRF) and implementation should be voluntary. Phase II has involved consultation and socialization of the IRF with APEC member economies, including targeted consultation with industry, government and educators. Consultations focused on assisting stakeholders to understand issues, challenges and barriers to skills recognition, and identifying whether the IRF is an appropriate mechanism for addressing the challenges identifies, and consideration of IRF pilot activities.

The IRF remains a conceptual framework and has not been tested. However, key elements of the project are already developed, which could form the foundation for future implementation, including the AQRF, the Occupational Standards Framework and EAS TVET QAF. There was broad support for the IRF concept during consultation undertaken in 2017-2018. Further consideration will be given to testing elements of the IRF in 2019.

Qualifications Recognition

It is important to note that the existence of qualifications frameworks, and regional initiatives such as the AQRF and IRF, do not deliver any automatic recognition of qualifications.

Qualifications frameworks do not deliver qualifications recognition.

Qualifications recognition is the evaluation of an individual's 'real-world' education/training qualifications and if they meet a benchmark for a specific purpose. It is done by the relevant authority/decision-maker such as an employer for employment purposes, or an education and training provider for admissions purposes.

If two economies reference their NQF to an RQF, it does not infer that the two qualifications, even if they are referenced to the same RQF level, will be recognized by decision-makers as equal for study or employment purposes. Referencing qualifications frameworks involves a comparison of the broad learning outcomes and quality assurance systems of two different frameworks. Qualifications recognition is an entirely different process involving a different set of policies.

Referencing qualifications frameworks also does not mean skills recognition or mutual recognition.

Mutual recognition can be confused with qualifications recognition and skills recognition and the terms are often used interchangeably. However, they do not carry the same meaning.

Mutual recognition is a formal agreement between two or more authorities to accept each other's qualifications or skills for a specific purpose such as employment or study.

Skills recognition is the evaluation of individual 'real-world' skills and if they meet the skills standards for employment. 'Skills' can include education qualifications, training certificates, competencies, practical training, work experience and language proficiency. It is usually done by the relevant authority or decision-maker such as an employer for employment purposes, and in regulated occupations, a regulatory body must first approve/authorize an individual to be able to work in that occupation.

NQFs, RQFs, referencing qualifications frameworks, qualifications recognition, skills recognition and mutual recognition all support skills mobility but in very different ways ranging from the provision of official information on education and training systems to improving quality standards. It is important to recognize that although qualifications frameworks can play a significant role, mobility can occur in the absence of a qualifications framework. Qualifications and skills recognition is a critical component for successful student and labor mobility.

UNESCO qualifications recognition conventions

Qualifications frameworks are associated with supporting mobility. They can provide comprehensive overarching information about an economy's qualifications, making their

Recognition authorities are the key enablers to student and worker mobility. Their decisions enable skilled individuals to participate in study and/or work, and realize their full potential and contributions to society, building a stronger economy.

qualifications easier to understand. And, they can be a vehicle to improve the effectiveness of education and training quality assurance systems, making them more transparent and instilling trust amongst stakeholders. However, authoritative, reliable and robust information about education and training systems are only one part of the information picture as previously discussed, which can inform decisions on the recognition of qualifications and skills.

Quality policies and processes for the recognition of qualifications and skills by an economy's authorities and decision-makers are an enabling feature for successful mobility, allowing skilled individuals to pursue further education and training, and obtain gainful employment. However, there are instances of unfair and unreasonable recognition practices, creating unnecessary barriers to labor and student mobility. It may therefore be useful to consider the creation of a shared international understanding of what is fair and reasonable.

The UNESCO regional qualifications recognition conventions are based on best principles and practices and offer countries an effective, sustainable and practical framework to support two-way mobility. These principles and practices build trust within the national setting, between different national institutions and competent recognition authorities, and in the international environment between counterpart bodies. Although the focus of the conventions is on higher education, some key principles and practices provide a useful guide for the recognition of TVET.

One key principle of UNESCO regional qualifications recognition conventions is that individuals have the right to access a fair, consistent, transparent, timely and non-discriminatory assessment of their foreign qualification, where recognition authorities should seek to recognize as fully and widely as possible unless they have good reason not to. The recognition conventions also support lifelong learning through specific provisions on the recognition of formal, informal, non-formal, partial studies and non-traditional modes of education. There are also provisions for the recognition of qualifications held by refugees or similarly displaced persons. UNESCO has also developed a *Toolkit for the Recognition of Foreign Qualifications: A Reference for Asia-Pacific Practitioners* which provides and easy-to-understand practical guide to recognition decision-makers.

As access to authoritative information on qualifications is essential to making decisions about them, a key practice under the conventions is the establishment of National Information Centers (NICs). NICs provide dedicated and authoritative information about a country's education system and qualifications, and about how individuals can get their foreign qualification recognized in that country – a 'one-stop shop' for questions about how to get qualifications and skills recognized in a country. Countries can determine the form their NIC takes. NICs also co-operate as a network to develop recognition tools and frameworks, and exchange information to support the recognition of foreign qualifications from grassroots levels to more broadly within the region. UNESCO has developed *Guidelines for National Information Centers*

offering a practical and easy-to-understand reference for countries that are interested in developing a NIC.

There are currently two active regional UNESCO Conventions:

- 2011 Asia-Pacific Regional Convention on the Recognition of Qualifications in Higher Education (Tokyo Convention).
- 1997 Convention on the Recognition of Qualifications concerning Higher Education in the European Region (Lisbon Recognition Convention)

There are other regional recognition conventions covering Latin America and the Caribbean, the Arab States and the African States, some of which are currently under review, emphasizing the importance of modernizing recognition instruments to promote mobility.

The Tokyo Convention is open to all APEC economies as a UNESCO Member State. It came into force in 2018, and APEC economies who are Party to the Convention are Australia; China; Japan; New Zealand and the Republic of Korea. The Tokyo Convention is the result of the revision of the 1983 *Regional Convention on the Recognition of Studies, Diplomas, and Degrees in Higher Education in Asia and the Pacific (Bangkok Convention)*, to which many APEC economies are Party. The Tokyo Convention supports student and academic mobility, as well as access to employment opportunities, through qualifications recognition.

A UNESCO Global Convention on the Recognition of Higher Education Qualifications is currently being developed with several APEC economies on the drafting committee which delivered the first draft in 2017. The Global Convention aims to build on and complement existing regional conventions and lift the focus of the sheer importance of recognition as an integral part of global higher education standards. UNESCO also has a number of other initiatives underway to support TVET development and recognition.

Conclusion

There is already considerable expertise within APEC economies for qualifications frameworks. Some of the first generation of comprehensive cross-sectoral NQFs in the world were developed by APEC economies, including Australia in 1995 and New Zealand in 2010. Within APEC, Hong Kong, China; Malaysia; Mexico and Papua New Guinea developed the second generation of NQFs, placing APEC economies in a significant position of advantage to share best practice policies in qualifications frameworks and quality assurance and lessons learned. There is also considerable expertise in TVET specific qualifications frameworks in Chile; Singapore and Thailand.

There is currently no system for global recognition of TVET qualifications, but TVET qualifications are typically included in comprehensive qualifications frameworks which provide links between TVET and HE qualifications. Qualifications frameworks however do not necessarily account for the specific skills and competencies required for particular occupations. In recognition of this, the APEC Occupational Standards Framework was developed.

In further support of skills recognition, the concept of an Integrated Referencing Framework has been developed with a view to aligning standards and qualifications with the regional labor market, enabling comparison of qualifications to establish levels and ensuring quality of accreditation, delivery and certification of TVET outcomes. Still in a conceptual phase, the IRF has the potential to further enhance skills recognition, align qualifications more closely with labor markets, prepare the workforce for future skills, and increase employment mobility, in accordance with economies' laws and regulations, by creating a quality assured, conducive and enabling environment for the development and quality service delivery of the TVET sector.

NQFs can help to meet the demand for current and new skills as a result of rapid changes in technology. They require long-term investment and need to be reviewed and updated over time so that they continue to be fit-for-purpose. When developing NQFs, the impact of globalization on business and the workforce, compels economies to take more fully into account, the international dimension of education and training, such as online delivery, to support innovation, grow economies, and improve international competitiveness.

Chapter IV Education Innovation in the Digital Age

Key Messages

- *New technologies are changing orientations, contents, mechanics and modalities of contemporary education, equipping it with the toolsets to overcome existing challenges and find solutions to persisting social and economic problems.*
- *Uneven access to the Internet and ICTs across the APEC region prevents wider accessibility, affordability, flexibility and personalization of education, which ultimately challenges human resource development and economic growth.*
- *Sharing best practices and experiences, as well as tools and technologies is vital for bridging existing development gaps and promoting greater connectivity within APEC.*

Introduction

As the world is entering the Digital Age, digital solutions, information and communication technologies (ICTs) and Internet-based tools are becoming essential elements of modern life. Now, with more than half of the world's population online, these new technologies and tools are not just adding new layers to contemporary economic processes, they are reshaping the way people live. One of the most noticeable influences of digital technology is the changes it's bringing about economic, socio-cultural and academic interactions beyond physical and bureaucratic obstacles; as digital economy and e-commerce sectors continue to grow, the effective application of digital technologies and the development of the related infrastructure are being prioritized by APEC member economies. However, levels of Internet connectivity, as well as levels of appreciation for and use of technology as the preconditions for implementing relevant policies in the Asia Pacific region are still not consistent.

Nine APEC member economies (Australia; Canada; Chinese Taipei; Hong Kong, China; Japan; Republic of Korea; New Zealand; Singapore; and United States) are among world's top 20 economies in terms of overall ICT readiness in the Networked Readiness Index (WEF, 2016). According to the latest e-commerce index that assesses the readiness to engage in the digital economy, three APEC economies (Japan; Republic of Korea; and New Zealand) are among world's top 10 economies in terms of e-commerce readiness (UNCTAD, 2017). Furthermore, according to the United Nations E-Government Survey 2016 (UNPAN, 2016), Republic of Korea; Australia and Singapore are ranked among the world's top five e-government

economies, followed by New Zealand (8th); Japan (11th); United States (12th); and Canada (14th). The International Telecommunication Union (ITU) Global ICT Development Index 2017 (ITU-D, 2017a), which measures ICT access, usage and skills, lists eight APEC economies in the world's top 20: Republic of Korea (2nd); Hong Kong, China (6th); Japan (10th); New Zealand (13th); Australia (14th); United States (16th); and Singapore (18th). Despite these success stories, the remaining APEC members are still lagging behind, which indicates a noticeable digital divide.

Along with increasingly digitalized economic processes and automated production, education remains the basis for human resource development, equipping people with knowledge, skills, and competencies for work and life. However, modern day education is still to a significant degree based on conventional (classroom) models and it is evidently failing to catch up with the rapidly advancing Digital Era. In order to keep up, education has to embrace the new means and technologies provided by recent innovations and advancements. Moreover, as production gets more sophisticated and the roles of people in economic processes get more complex, modernization of education plays a vitally important role in supporting economic growth and sustainable development. Digital technologies are not just changing the learning process; rather they are transforming learning and education, making it more interactive, accessible, efficient and personalized, partly by overcoming existing limitations and challenges.

Given the ongoing transformations enabled by ICTs, multilateral organizations highlight the potential of digital transformation of education. Looking to promote concerted efforts and exchange of experience, a number of relevant international frameworks were established on a basis of multilateral organizations.

One of the global overarching frameworks addressing modernization of education is the **Sustainable Development Goal (SDG) 4,**[10] which reaffirms education as a fundamental human right and a key catalyst for achieving wider goals related to economic development. It aims to "**ensure inclusive and equitable quality education and promote life-long learning opportunities for all**". Indicator 4.4.1, selected for Target 4.4 by the Inter-Agency and Expert Group on Sustainable Development Goal Indicators (IAEG-SDGs), focuses on the "proportion of youth and adults with information and communications technology (ICT) skills, by type of skill". A second indicator has since been advanced: "Percentage of youth/adults who have achieved at least a minimum level of proficiency in digital literacy skills" (UNESCO, 2017c).

[10] Please refer to the UNSDGs, https://www.un.org/sustainabledevelopment/sustainable-development-goals/

The Incheon Declaration **and** ***Framework for Action*** adopted in 2015 recognizes the immense potential of ICT in attaining the SDG4. It highlights the need for ICT to "be harnessed to strengthen education systems, knowledge dissemination, information access, quality and effective learning, and more effective service provision" (UNESCO, 2015b). Generally, learning about (ICT training and relevant digital skills development) and learning with ICT (use of ICT for education) are supposed to facilitate the innovation of learning and education.

The ensuing **Qingdao Declaration,** adopted on May 25, 2015 at the International Conference on ICT and Post-2015 Education underscores the potential of relevant ICT-based resources and solutions by providing access to lifelong learning opportunities, enhancing the quality of learning, supporting teacher innovations and knowledge-sharing, diversifying learning pathways and modalities, and enhancing the management of education systems (UNESCO, 2015c).

The Strategy Framework for Promoting ICT Literacy in the Asia Pacific Region prepared by the UNESCO Bangkok Office in 2008 establishes the priority of integration of ICT into educational programs and curricula in Asia-Pacific economies, improving the quality and effectiveness of ICT literacy education/training to enable citizens to take advantage of opportunities and meet the challenges brought forth by new and emerging ICTs (UNESCO, 2008).

The Asia-Pacific Regional Strategy on Using ICT to Facilitate the Achievement of Education 2030, adopted at the Asia Pacific Ministerial Forum on ICT in Education 2017, aims to create an enabling environment for ICT in education in frames of the four priority areas: Secondary Education, Technical Vocational Education and Training (TVET) and Higher Education; Quality of Teaching and Teaching Practices; Inclusion and Equality; and Monitoring & Evaluation (UNESCO, 2017a).

The APEC Education Strategy and **its action plan, milestone** documents within the APEC framework, are aimed at consistent and effective development of international cooperation in the sphere of education. Among other provisions are the use of ICTs in education and teaching as vital instruments for improving quality, equity, effectiveness and inclusiveness of education. (APEC HRDWG, 2017a, 2017b).

Improving Accessibility of Education

Disparity in access to information and knowledge remains a complex problem. The digital divide limits people's capacity to adapt to rapidly changing conditions, develop professionally and contribute to economic growth. Providing physical access to ICTs, promoting ICT and computer literacy, and facilitating digital connectivity are essentially key steps to greater accessibility of education in today's modern world.

Providing access to Internet and ICTs

While the Asia Pacific region is becoming a center of global economic processes, ICTs turn vital for supporting growth. Currently, there are about 1.9 billion Internet users in the APEC region, which equates to a regional penetration rate of 65.1% (Annex A), relatively higher than the global rate of 54.4%. Some APEC member economies have seen a remarkable increase in their penetration rate over the past five years. Notable examples are Thailand (56%); Indonesia (39%); Brunei Darussalam (34%); Viet Nam (29%); Philippines (27%) and Mexico (25%).For example, Papua New Guinea has almost tripled the population connected to the Internet (from 3.5% to 11%). (Figure 4.1; Annex B)

Despite the positive trends, lack of access to ICTs remains one of major challenges for the wider engagement of people in education, both as learners and as educators. The basic telecommunications infrastructure spreads unevenly across the Asia-Pacific region (Table 4.2). Among other things, the Internet penetration rate ranged widely, from above 90% in Brunei Darussalam; Japan; Republic of Korea and Canada, to 60% or less in China; Indonesia; and Papua New Guinea. Developing ICTs and Internet infrastructure are becoming preconditions for education development and economic advancement.

Figure 4.1. Internet penetration in APEC (% of Internet Users)

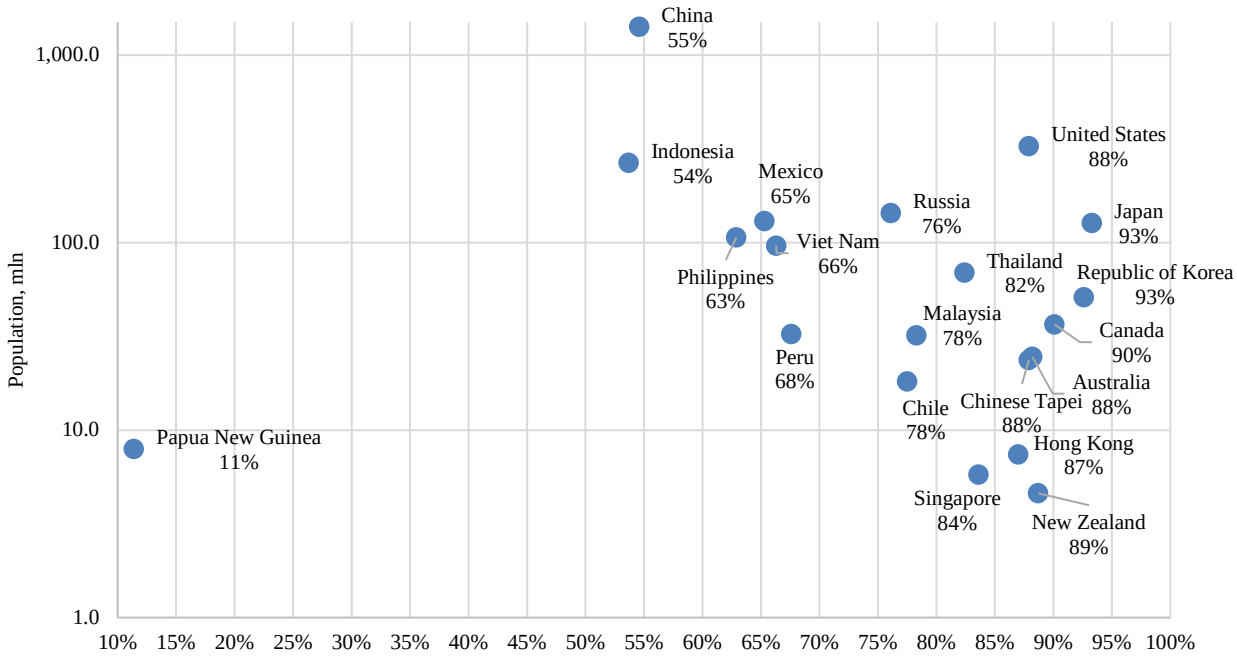
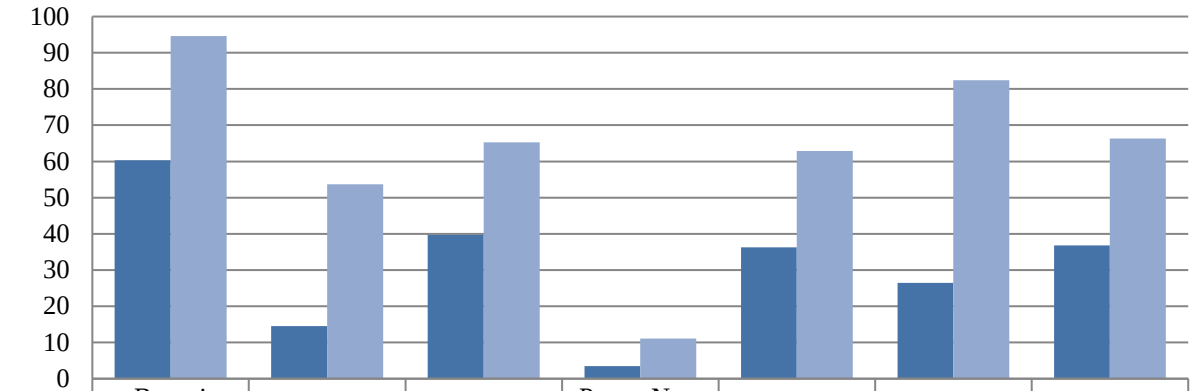


Figure 4.2. Major breakthroughs in internet connectivity in the past 5 Years (%)



	Brunei Darussalam	Indonesia	Mexico	Papua New Guinea	Philippines	Thailand	Viet Nam
2012	60.27	14.52	39.75	3.5	36.24	26.46	36.8
2017	94.6	53.7	65.3	11.04	62.9	82.4	66.3

Note: See detailed data in Annex B.

Promoting ICT literacy

Having physical access to the Internet and e-based learning platforms is just one component of digitalization, digital connectivity largely depends on the level of ICT literacy and acceptance. It's equally if not more important to equip people with the skills demanded in the increasingly digitized environment so they can fully leverage digital technologies and take advantage the opportunities in the digital age. Computer and Internet proficiency and related skills are becoming as crucial as reading and writing skills. People who are ICT-illiterate may be secluded from economic processes as digital literacy is fast becoming a 'gate skill' for employment (Krish et. Al., 2018).

On the other hand, investment in ICT infrastructure *per se* do not guarantee immediate optimal utilization and adoption of new technologies. ICT education and training is seen as the most effective way to take advantage of the newly created infrastructure.

While economies such as Japan; Republic of Korea; United States and Singapore boast quite high levels of ICT adoption per capita, other economies are catching up by launching projects and introducing policies concerning ICT literacy and adoption. APEC member economies have initiated a host of programs: Australia's "Digital Education Revolution" and "ScopeIT framework"; Canada's "Digital Literacy Exchange Program" and "CanCode" Initiative; Chile's "Enlaces" Program; China's "Stepping Up" Initiative; Hong Kong's "Information Literacy for Hong Kong Students Strategy"; Indonesia's "National Digital Literacy" Initiative and "Internet Literacy Program"; Mexico's "Digital Inclusion and Literacy Program"; Russia's "Information Society 2011-2020" State Program,; Thailand's "Smart Thailand 2020"; Viet Nam's "YouthSpark" Digital Inclusion Program are all aimed at promoting ICT literacy and digital skills. Some of these initiatives are even expanding overseas. For example, "ScopeIT" network originated in Australia and has spread beyond its borders ─it now operates in New Zealand; Malaysia and United States.

The APEC-level "Internet Volunteers" project represents another outstanding initiative that fosters ICT literacy and shares educational technologies as well as offers information and guidance on education systems, ICT model classes, and training for educational specialists (e.g. teachers and principals).This project involves deploying special expert groups, consisting of professors, teachers, students, and specialists, in different APEC member economies, for invigorating educational communities and developing local education systems in APEC (APEC HRDWG, 2018).

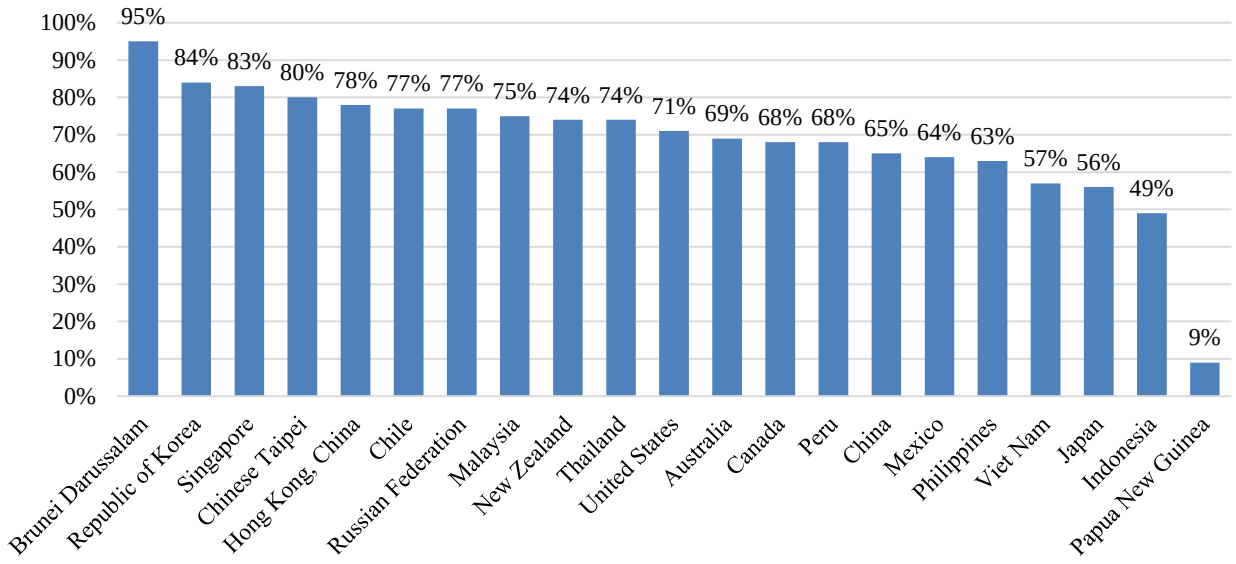
Facilitating digital connectivity

Building an environment, in which people using new ICTs would be connected regardless of their location and background, also contributes to accessibility of education. These kinds of networks should help fill the gap of physical infrastructure, overcome bureaucratic and regulatory limitations, boost the collaborations and exchanges necessary for upholding research and business activities, and improve people-to-people connectivity.

Digital Connectivity has become a priority with the framework of APEC initiatives (APEC, 2014). Alongside the increased ICT connectivity is growing social network penetration in the region. Social media serve as platforms for exchanging ideas, discussing joint projects and remaining connected on various matters. The soaring number of social network users in the region makes substantial contribution to connectivity, vice versa. Similar to ICT penetration, economies with the biggest social media penetration are Brunei Darussalam; Republic of Korea; Chinese Taipei; Singapore; Hong Kong, China; Malaysia and New Zealand (Figure 4.3).

It is believed that through international exchanges and sharing best practices and experiences at university and agency-cooperation levels, education and relevant fields like science and research collaboration, as well as people-to-people connectivity, should improve. A typical example of APEC initiatives aimed at building connectivity in the sphere of education is APEC Learning Community Builders (ALCoB). For details, please refer to Annex.

Figure 4.3. Social Media Penetration in Economies



Note. Reprinted from “We Are Social Ltd” (http://wearesocial.com).

Introducing New Methods and Technologies

The modernization of education inevitably implies reexamining the traditional models of education and incorporating new forms, tools and mechanisms. The innovations in the Digital Age could potentially make education process more flexible and effective by transforming traditional modes of learning and adding new mechanics.

Promoting online and ICT-based modes of learning

With a growing number of services being transferred to the Internet or acquiring ICT-based forms, digital elements are increasingly incorporated in education. ICT is becoming ubiquitous in the education field, and it has been used far beyond the enhancement of teaching and learning to include promoting research, innovations, scholarly community engagement and administration (Balasubramanian & Clark-Okah, 2009). In many ways, ICT changes the way knowledge is presented, conveyed and received. New technologies provide an increasing number of tools and mechanisms, making education a never-before-seen platform for creativity and development.

Likewise, the integration of ICT into education is not just providing education institutions with personal computers, relevant equipment and software anymore. It involves new mechanics and modalities, employs new technologies such as virtual and augmented reality, cloud and neural network interfaces, simulations and games, as well as personalized learning, online class environments, and outside classroom learning experiences. Among other things, higher education systems in the region have to be innovative and leverage the developments of ICT to be more accessible, affordable, effective and efficient. Economies, on the other hand, demand graduates with up-to-date and competitive qualifications t to contribute to development and growth (Hong& Songan, 2011).

Recognizing the potential and promise of ICT in education, APEC member economies are implementing a spectrum of initiatives aimed at integrating ICT-based education modalities at various levels of education.

Singapore’s Student Learning Space (SLS) is an online learning portal that provides students with access to quality curriculum-aligned resources for self-directed learning. It provides learners with opportunities to both learn individually and to collaborate with their peers. The SLS also provides teachers with tools to enhance teaching and learning in school. Singapore

also implements a host of other ICT-based learning initiatives under the ICT Masterplan for Education.

The Philippines' initiatives "Project Care" and "ICT on K-12" intends to improve school education through the use of ICTs. In 2012, China announced its first Ten-Year Development Plan on ICT in Education (2011-2020), involving promoting of Internet connectivity as well as availability of high-quality ICT resources and online spaces for every student; ICT in education is also an important part of the "Modernizing Chinese Education 2030" initiative announced in 2017 (Du, n.d.). Peru has introduced an "ICT Policy" initiative, which is aimed at creating areas and spaces for institutional articulation; developing connectivity and access to educational centers; consolidating new approaches on ICT and education; and promoting pedagogical innovation processes and equity (UNESCO, 2016a). Thailand has its Digital Education Development Plan (2017-2020), with main strategies of developing a high-performance digital infrastructure that covers all departments and institutions and to create equity and equality in access to education through the use of digital technology.

In 2017 New Zealand introduced Digital Technologies | Hangarau Matihiko into the New Zealand curriculum for all students from Year One, which will be mandated in 2020. It is designed to help students develop as digitally capable thinkers, producers and creators; teaching them how digital technologies work (i.e. the computer science principles); and how they can use that knowledge to resolve problems and become creative innovators of digital solutions. Meanwhile, a Digital Readiness programme is in place to provide training and resources to support teachers with the new curriculum content.

The results from the introduction of ICT into schools are mixed among the economies with available data. Republic of Korea; Singapore; and Brunei Darussalam have a 100% score for 'Internet and computer use for pedagogical purposes'; Thailand and Malaysia are catching up with the leaders, while others still lag behind (UNESCO, 2018a).

Digitalizing education processes

Education can also significantly benefit not only from the introduction of new ICT-based modes of teaching, but also from a more complex digital transformation, involving content conversion, system integration and automation of administrative processes. The digital transformation is bringing forth a number of significant changes to the teaching and learning experience, implying that new methodologies, content, curriculum structure and teacher-student interaction models will be introduced into the process of modern learning (Clark, 2018).

Digital technologies are expected to accelerate the automation of administrative activities and streamline the education process. In so doing, it can become an enabling force in cutting costs, increasing the profitability of education, and creating better customer experiences as well as greater agility across educational institutions.

Integration of digital elements can basically make education process more efficient and less resource-demanding in three aspects (Munoz, 2017):

- Reduce reliance on manual resources – printed books and teaching materials, tape- and CD-recordings, etc.
- Increasing the flexibility and transparency of the learning process – online material can be quickly and efficiently updated and distributed, and the format is adaptable to changes in student numbers
- Automation of learning management – cloud technologies as well as AI-based analytic tools can help measure and assess student progress, reduce the burden on reporting and record-keeping, and streamline education-administrative procedures. In other words, digitalization of education administration helps to accumulate statistics, intensify monitoring, and increase efficiency.

Digital transformation is undeniably perceived as a priority for APEC member economies, however there are just a few examples of modernization in digitalization of educational content and processes. Three economies in particular have achieved remarkable progress in this field: Singapore; Republic of Korea; and Malaysia.

Singapore's "eduLab Programme" explored new modalities of learning that rely on ICT, as well as innovative curriculum and partnerships with researchers.

Republic of Korea has an advanced learning program "SMART Education Advancement Strategy", aimed at applying digitalization in all schools, including digitalizing curriculum via development and dissemination of digital textbooks and online evaluation systems based on cloud computing services (Grzybowski, 2013). Since 2007, a total of 130 Korean schools have been testing digital textbooks as a replacement for paper books. Another initiative of Republic of Korea, the National Education Information System, offers a web-based integrated administration system for various education organizations.

With the goal of transitioning towards a creative and innovative knowledge-based society, cultivating the use of technology and equipping people with the skills for the Digital Age, Malaysia launched the "Smart Schools" project in 1999. The initial stage involved supplying

88 schools with ICT and data infrastructure, smart school management systems and new digital learning modules and courses. By 2005, all 10 000 schools across the economy were computerized. Since then the Malaysian government has implemented strategies for the further acculturation of technology in education. Besides the new approach to teaching that utilizes this new equipment, it included digital courseware and programs as well as online-based platforms for independent study (Mirzajani et. Al., 2016).

New Zealand, through a collective, sector-led effort with the Ministry of Education acting as steward, has developed an Education System Digital Strategy. Education for the Digital Age is designed in four areas: 1) modern and responsive learning environments; 2) efficient corporate and common services; 3) engaged and productive workforce; 4) efficient administration of the education system. The aim of the strategy is to enable learning anywhere, anytime through the innovative use of technology, and at the same time to support the social and collaborative nature of learning. The vision is based on a student-centric approach, which recognizes that the education system is evolving and will continue to change over time.

United States also has a plethora of programs concerning the digital transformation. The #GoOpen initiative under the Office of Educational Technology supports school districts and educators in documenting and sharing new approaches to professional learning for teachers and curating resources that offer students and teachers options for personalizing learning, and strategies to support curating, creating, adapting and sharing educational resources (Office of Educational Technology, n.d.). Another project that has gained economy-wide reach is the "Future Ready Schools Project", which helps school districts develop comprehensive plans to support students with their learning by transforming instructional pedagogy and practice while simultaneously leveraging technology to personalize learning in the classroom (Future Ready Schools, n.d.).

Similarly, the Philippines is implementing the "Text2Teach" program, which promotes the use of digital content in education. It offers access to interactive multimedia packages that may be accessed via smartphones and other equipment provided to the participating schools. Since 2003, Text2Teach has been implemented in 1,103 schools, and has provided training to more than 4,000 teachers and benefited over 3,000 students (Roble, 2018).

The Queensland government in Australia is implementing a Digital Strategy (DIGITAL1ST), which addresses modernization on a number of levels including personalized digital learning

experiences and resources for both teachers and learners, as well as streamlining administration procedures, planning and policymaking.

Transforming roles of learners and educators

With updated modes of education and digitalized education process, the roles of learners and educators are shifting. Teaching is no longer about classroom management, content delivery and learning assessment – more and more it is expected that teachers and learners discover and master content together to achieve deep learning outcomes. Teachers equipped with new tools and mechanisms are performing the role of creative output maximizers that organize the processes of education in interactive ways by engaging their students in problem-based creative learning – using immersion and simulation – placing them in an environment that naturally develops their skills as well as entrepreneurial and innovative competencies. Learners, on the other hand, from mere recipients of the content turn into fully-fledged subjects of the learning process, capable of obtaining new knowledge and skills independently, and aware of how to practically apply knowledge to resolve practical problems.

Providing students with technology in the classroom does not automatically lead to higher productivity or better learning achievements. Central to an effective ICT-enhanced learning environment is qualification and competence of teachers. Changes in the labor market demands have profound implications on the requirement of teachers' competences for teaching 21st century skills to their students. Hence effective implementation of digital innovation warrants more advanced and sophisticated teacher education, implying strong ICT learning components need to be incorporated into teachers training programs.

Initial training and continuous professional development of teachers and other educators is a precondition for the pedagogical use of ICT and successful implementation of any innovation in the educational process. In order to keep up with the technological development, teachers need to upgrade their qualifications regularly, for example, through enrolling in special training programs (UNESCO, 2018b).

In recent years, many of APEC member economies have embedded ICT-literacy requirements for educators in their education or digital economy development strategies and master plans. Meanwhile, some economies have developed special initiatives or indicators directed at ICT-training for educators. For example, the Philippines' "Teach2Text" initiative includes components to train teachers to apply multimedia materials in the teaching process. Smart classroom initiatives are also instrumental for creating innovative learning environments. A

proper modern classroom environment encompasses both a seamless flow of information among the participants of the learning process and a new model of interaction. Innovative classrooms integrate all digital tools and resources, support new learning modalities and facilitate innovative educator-learner interactions. In 2018 China announced its Education 2.0 Plan which focused on deepening the application of ICTs in learning and teaching, as well as enhancing ICT competencies of learners and teachers.

Besides the aforementioned Korean "SMART education" and Malaysian "Smart Schools" initiatives, smart/digital classroom initiatives of various size and reach are being successfully implemented in the majority of APEC economies. In many cases, local IT corporations are offering software and hardware support for setting up and buttressing such high-tech infrastructures.

In spite of APEC member economies' efforts, levels of development vary across the APEC region and even inside the APEC member economies themselves. The APEC region is currently confronted with a shortage of qualified and motivated teachers. According to the UNESCO Institute of Statistics, there is a need for 68 million new teachers in order to achieve the objectives in the sphere of primary and secondary education by 2030 (UNESCO, 2016b).

Improving quality of online and ICT-enhanced learning

With the rapid expansion of new forms of education, the public concern over the quality of online education services has been growing, for instance, limited teacher-student interaction, and the absence of group work and communication between classmates among the main drawbacks. In fact, policies regulating quality assurance of ICT-based learning in the APEC economies vary considerably.

In this regard, APEC member economies may be identified as two groups. The first group – represented by Hong Kong, China; Malaysia; Indonesia; the Philippines; and Singapore − apply similar procedures and criteria to all types of educational provisions. The second group, including China; Republic of Korea; and Japan; acknowledges the distinctive features of distance learning and thus applies different quality assurance procedures and criteria. (Jung, Wong, Li, Baigaltugs, & Belawati, 2011).

There have been several attempts in the Asia-Pacific region to address this problem. In the 1990s the Australasian Council on Open, Distance and E-Learning first launched activities to advance policy and practice concerning open, distance and e-learning in higher education by

sharing best practices, providing networking opportunities as well as developing and evaluating new approaches to distance education (Australasian Council on Open, Distance and E-Learning, n.d.).

One of the largest relevant international institutions is Asian Association of Open Universities. Founded in 1987, it strives to improve the quality of education in "open university" in terms of educational management, teaching and research. The Association established the Quality Assurance Framework, comprised of indicators in policymaking and planning, management, learning assessment and evaluation, program design and curriculum development (Asian Association of Open Universities, n.d.).

There is also APEC Quality Assurance in Online Learning Toolkit project led by Australia. It is aimed at helping APEC economies to develop, deliver and evaluate online courses. The project will further support the recognition of online education in the APEC region, improve quality of online education, reduce potential barriers for Australian and international providers, and increase cross-border student mobility.

Promoting Inclusiveness and Personalization

Over the past 20 years, systems of education in APEC economies have gone through multiple transformations, reflecting the increasing demand of societies and economies for a skilled workforce. New technologies provide a number of solutions to problems relating to inclusiveness in education, creating enabling conditions for increased participation of people, regardless of age, gender or place of residence.

Developing distance and blended learning

Besides introducing new modalities and mechanics to classroom learning the spread of the Internet and ICTs has contributed to the emergence of distance and blended learning. Being flexible and affordable in nature, the education mode is rapidly gaining prominence. The online learning market grew by 9.2% between 2010 and 2015, with tens of millions of people participating in online learning and education all over the world (IMOD Education, 2016). The size of the e-learning market is projected to exceed US $200 billion by 2024 (Learning News, 2018). With an increasing number of open universities offering distance learning courses

worldwide, there are currently six so-called mega-universities (focused on distance learning with more than 100,000 students) in the APEC region[11] (UNESCO, 2014).

Accounting for this growing number of providers and students who rely on digital and distance learning technologies, the United States oversaw the APEC project on Digital Workforce Development to highlight practices from across member economies to build a strong 21st-century workforce and expand access to quality education, training and employment[12]. Examples of distance career and technical education have shown promise in removing barriers to access for women, girls and underrepresented populations while offering innovative, flexible and personalized experiences that are responsive to industry demands. The final report offered several recommendations for academics, policymakers, and education providers to enhance the content, delivery, and quality of distance CTE across the APEC region.

For example, as of 2013 "ChinaEdu" e-learning platform had more than 311,000 online students in both degree and non-degree programs. The Korea National Open University had more than 200,000 online students by far and is the largest university in the Republic of Korea in terms of enrolments. Over 90,000 students are enrolled in the Open University in Malaysia. The Open University of Japan is the largest online education provider in the economy, with over 85,000 students enrolled in 2014 (Adkins, 2012).

Distance and blended learning could help learners overcome physical, medical or financial challenges. Distance learning is also viewed as an important instrument in providing education for rural and remote areas. For instance, in 2003, the People's Republic of China launched the Modern Distance Education Project for the Western Rural Middle and Elementary Schools (MDEPRS), aimed at developing education in rural areas through modern distance education technologies, relying on computers and satellite-receiving stations (Yu & Wang, 2006). The Mexican National System of Distance Education, established in 2010, recognizes distance learning as a means to improve access, quality, and equity of education and to support knowledge generation and management for economic growth and social wellbeing (Ontiveros & Canay, 2013). Singapore's Student Learning Space seeks to provide every student with equal access to quality, curriculum-aligned learning resources so as to encourage students to take

[11] Including Liberty University (USA), Modern University for the Humanities (Russia), University Terbuka (Indonesia), Korean National Open University (Republic of Korea), Sukhothai Thammathirat Open University (Thailand) and Open University of China (People's Republic of China).

[12] The project website can be found at https://tech.ed.gov/apec-digital-workforce-development-project/
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greater ownership of their learning, and pursue their individual learning needs and interests, preparing them to become lifelong learners. Under the Malaysian Education Blueprint, Malaysia established an economy-level e-learning platform to coordinate and spearhead e-learning content development (Ministry of Education Malaysia, 2013). Many Malaysian higher education institutions are developing massive open online courses and taking part in international consortia of universities.

The increasing demand for and popularity of distance education is supported by a considerable volume of online, open and blended learning programs, as well as degree or credit programs. Cost is one of the most important factors for prospective students who are considering options for distance and blended learning. Affordability of distance education makes it a viable alternative for those who cannot access traditional models of education. Furthermore, a growing number of interactive ICT solutions increase the efficacy of the distance and blended learning courses (Hanover Research, 2011).

Digital education for lifelong learning

As literacy and inclusiveness of education remain points of concern for APEC member economies, ICT has emerged as a key driving force in stimulating lifelong learning mechanisms and narrowing existing gaps and inequalities. Recognizing such role of the ICT, APEC economies have gradually been introducing relevant frameworks.

The “lifelong education” concept spans all age and social groups, education policies of APEC economies reflect current demographic shifts, characterized by rapidly aging societies. Technology is supposed to play an essential role in providing solutions to include elderly people in education and retraining programs. Economies with a greater proportion of elderly population, such as China; Japan; Republic of Korea and Thailand, have initiated a number of projects for senior citizens to boost their ICT skills and digital literacy. Typically, Online Education Institute of the Republic of Korea, established within the Korea University of Technology and Education serves as a hub for online vocational training in technology and engineering. Currently, it offers about 300 e-learning courses in the spheres of electronics, mechatronics, ICT, design, materials, architecture and chemistry (UNESCO, 2017b).

The Philippines launched the Accreditation and Equivalency Programme that integrates radio- and computer-based instruction and TV-based modalities of learning, expanding its coverage and effectiveness gradually. Thailand has established “cyber homes”, delivering learning

materials to learners via high-speed internet, advancing educational television and mobile learning through portable devices and the creation of "smart classrooms" (UNESCO, 2015a). Following a similar logic, in 2016 Singapore launched the "Reading Movement" project, which offers a digital library of business books and other related online resources in particular to adults and seniors.

Overall, APEC economies are making considerable efforts to develop a systemic approach to promote lifelong learning. Another regional trend is an increasing involvement of civil society and NGOs in alternative learning experience projects. "Asia South Pacific Association for Basic and Adult Education", "Plan International", and "Oxfam International", among others things, all offer platforms for capacity-building and shared learning.

Making education more personal and customizable

With ICTs continuing to develop, as well as the emergence of innovative infrastructure and new modes of learning, the behavior of learners has started to change accordingly. Growing massification, internationalization and privatization of education (Songkaeo, Loke, 2016), coupled with a variety of learning options, enable learners to create their own learning experience independently. Thus, personalized learning tools are expected to spread rapidly (Pandey, 2018). Among the main advantages of this mode of education is having the freedom to design programs and curricula individually, and not being bounded by the schedule of the educational institution or the prescriptive format. With the personalized learning mode, students are given opportunities not only to choose from a variety of subjects and courses, but also to select the learning scheme, choose devices, decide on nature and level of interaction, receive personalized feedback and use it to assess progress (Groff, 2013). More notably, the shift to the participative Web 2.0 introduces a key concept that learners are not only content users but also content producers. The benefits of customized learning are widely recognized in APEC member economies. As a part of the UNESCO Global Network of Learning Cities, the city of Uijeongbu of Republic of Korea provides customized learning for its citizens by developing the knowledge based on the needs of citizens.

Under its economy-level e-learning policy (Dasar e-Pembelajaran Negara or DePAN), Malaysia is shifting from a mass-production delivery model to personalized learning using ICTs. Recently, under the National Technology Imitative framework, the Russia started to implement the project "University 2035". It represents an innovative approach to higher

education, providing students with an opportunity to design individual learning trajectory and choose from modules and courses taught in the most advanced universities of Russia.

Challenges Confronting Education Innovation in the Digital Age

First, basic physical infrastructure (e.g. electricity, transport communication, telecommunications) is still lacking in many regions. Mobile connections, being the most convenient tool for accessing the Internet in the regions with limited broadband connectivity, is primarily used for entertainment, communication and searching purposes, rather than education.

APEC economies fall short of technical specialists for building, sustaining and maintaining ICT infrastructure, as well as qualified specialists on policy-making and implementation levels. Unaware about the benefits brought forth by ICTs, significant parts of population still perceive technology as something extraneous. Existing education systems and institutions are at times hesitant to accept ICT-based education technologies and modalities. The dominating traditional education model, with prescribed roles of educator and learner impedes the introduction of new education mechanisms.

Affordability of technology is another challenge because of the high cost of Internet and ICT equipment and low competition among ICT providers. Government regulation concerning ICT in some economies is quite modest and lacks incentives for business and the public to use ICTs. Initiatives related to the promotion of inclusiveness and lifelong learning opportunities are still quite sporadic, and relations between state-sponsored, university-initiated and private e-learning platforms are oftentimes ambiguous.

Overall, quality assurance of distance and blended learning in APEC economies vary with the systems of education, reflecting geographical and policy characteristics of APEC member economies as well as relevant government regulation and the legal status of programs (Stella, 2008). The usefulness of e-learning is oftentimes underrated, partly due to a lack of mechanisms to accredit learning outcomes. In particular, an effective framework for measuring and assessing e-learning is absent.

Despite its improved quality, many learners remain skeptical about e-learning. Generally, the amount and quality of e-learning content provided in the native languages of APEC member economies is relatively low compared to courses of English language. The controversy is also attributable to negative aspects in wider use of digital technologies in education such as student's over-exposure to the Internet and overwhelming screen time, cyber-security and ethical issues related to implementation and use of ICT implying serious risks that may challenge the efficacy of education processes and human resource development in the longer run.

Conclusion

Digitalization of economic processes and other transformations and innovations of the Digital Age constitute new sets of challenges to APEC member economies. In addressing the aforementioned issues, member economies share an understanding of the importance of education in mitigating risks and ensuring human resource development for sustainable and inclusive growth. Recognizing modernization of education as a priority, member economies have made continuous efforts to adapt to changes by increasing ICT connectivity, designing and introducing relevant subjects in the curricula, creating opportunities for better utilization of new technologies, and bringing in innovative software and hardware solutions. Digitalization of education is aimed at making both content and delivery more effective, inclusive, flexible, affordable and personalized.

Last but not least, another problem related to education innovation in the APEC region is the ongoing divide among APEC member economies, both in levels of ICT infrastructure development, Internet penetration and education digital transformation. Facing similar challenges and setting similar goals, member economies still tend to follow akin paths and make similar mistakes. In that case, the most effective and impactful initiatives and relevant experience would remain the property of a single economy. Hence sharing best practices and experiences, as well as tools and technologies is vital for bridging existing development gaps and promoting greater connectivity within APEC.

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Annex A. Internet Penetration in APEC

Economy	Population	Internet Users	Penetration
	(2018 Est.)	2017	(% Population)
Australia	24 641 662	21 743 803	88.2%
Brunei Darussalam	434 076	410 836	94.6%
Canada	36 626 083	33 000 381	90.1%
Chile	18 197 209	14 108 392	77.5%
China	1 415 678 346	772 512 352	54.6%
Hong Kong	7 428 887	6 461 894	87.0%
Indonesia	266 794 980	143 260 000	53.7%
Japan	127 185 332	118 626 672	93.3%
Republic of Korea	51 164 435	47 353 649	92.6%
Malaysia	32 042 458	25 084 255	78.3%
Mexico	130 222 815	85 000 000	65.3%
New Zealand	4 604 871	4 084 520	88.7%
Papua New Guinea	7 933 841	906 695	11.4%
Peru	32 551 815	22 000 000	67.6%
Philippines	106 512 074	67 000 000	62.9%
Russia	143 964 709	109 552 842	76.1%
Singapore	5 791 901	4 839 204	83.6%
Chinese Tapei	23 694 089	20 821 364	87.9%
Thailand	69 183 173	57 000 000	82.4%
United States	326 474 013	286 942 362	87.9%
Viet Nam	96 491 146	64 000 000	66.3%
TOTAL APEC	**2 927 617 915**	**1 904 709 221**	**65.1%**

Note. Adapted from Internet World Stats (https://www.internetworldstats.com)

Annex B. Individuals using the Internet

Economy	2012	2013	2014	2015	2016	2017
Australia	79.00	83.45	84.00	84.56	88.24	88.2
Brunei Darussalam	60.27	64.50	68.77	71.20	90.00	94.6
Canada	83.00	85.80	87.12	88.47	89.84	90.1
Chile	55.05	58.00	61.11	64.29	66.01	77.5
China	42.30	45.80	47.90	50.30	53.20	54.6
Hong Kong, China	72.90	74.20	79.87	84.95	87.48	87.0
Chinese Taipei	75.99	76.29	78.04	78.04	79.75	87.9
Indonesia	14.52	14.94	17.14	21.98	25.37	53.7
Japan	79.50	88.22	89.11	91.06	93.18	93.3
Republic of Korea	84.07	84.77	87.56	89.65	92.84	92.6
Malaysia	65.80	57.06	63.67	71.06	78.79	78.3
Mexico	39.75	43.46	44.39	57.43	59.54	65.3
New Zealand	81.64	82.78	85.50	88.22	88.47	88.7
Papua New Guinea	3.50	5.10	6.50	7.90	9.60	11.04
Peru	38.20	39.20	40.20	40.90	45.46	56.0
Philippines	36.24	48.10	49.60	53.70	55.50	62.9
Russia	63.80	67.97	70.52	73.41	73.09	76.1
Singapore	72.00	80.90	79.03	79.01	81.00	83.6
Thailand	26.46	28.94	34.89	39.32	47.50	82.4
United States	74.70	71.40	73.00	74.55	76.18	87.9
Viet Nam	36.80	38.50	41.00	43.50	46.50	66.3

Note. Adapted from International Telecommunication Union (ITU) (www.itu.int) and Internet World Stats (www.internetworldstats.com)

Chapter V 21st Century Competencies and Structural Education Reform

Key Messages

- *Matching skill demand and supply warrants an understanding of the needs of the labor market not only at present, but more importantly, for the future*
- *Values and attitude are two essential elements that bind cognitive, soft and hard t skills in the 21st century competency framework.*
- *Collaboration counts for reducing the likelihood of a "skills and competencies" gap amongst APEC economies.*

Introduction

The dynamics of the labor market have changed drastically since the invention of digital technology (APEC Economic Committee, 2017). With advent of the fourth industrial revolution emerging technologies and broad-based innovation are diffusing much faster and more widely than before (Schwab, 2016, p.12), resulting in an ever-changing demand for skills. In other words, the skills learned today may become obsolete tomorrow, and workers need to constantly update their skills and competencies to function effectively in the changing workplace (Ananiadou & Claro, 2009).

These changes demand education systems to empower children and youth with rather different skills and competencies. It is imperative for APEC economies to address what exactly these skills and competencies are and how to deliver them in the 21st century.

Skill Mismatch in the Digital Age

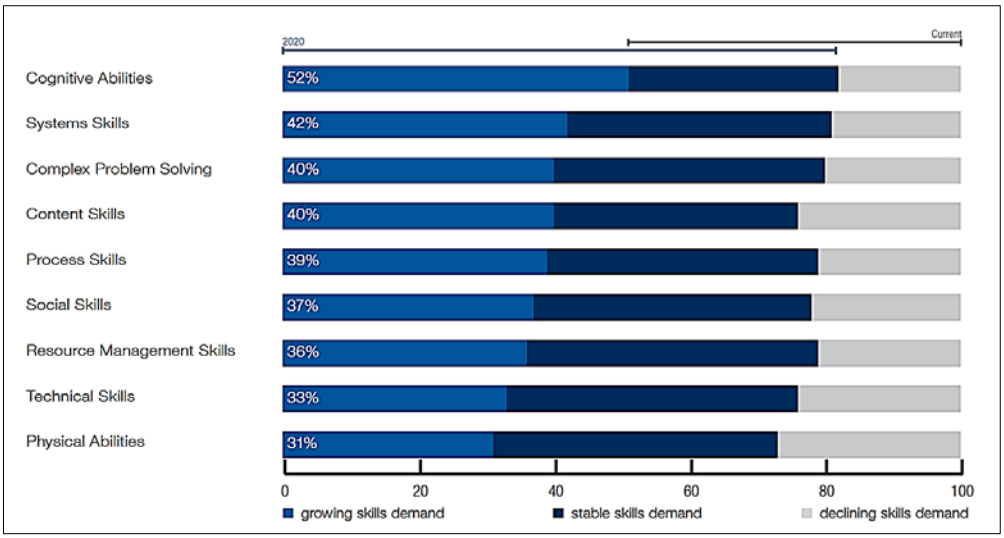
Automation and technological advances in the fourth industrial revolution demand a change of skills that would be relevant to the labor market both today and into the future (McKinsey Global Institute, 2017). Technology accelerates automation that may replace many human roles. On the other hand, technology is transforming how tasks or jobs are performed, and creating new roles that require different sets of skill and competencies. The potential impact of automation on employment varies by occupation and sector. Jobs that are most susceptible to

automation are physical in nature such as operating machines. Automation has less impact on employment involving managing people, applying expertise and social interaction. Automation would inevitably cause hundreds of millions workers to switch occupational categories.

There is growing evidence of mismatch between the skills required for current and future workforces and the skills of current employees including those of recent graduates from various education institutions. Many employers in OECD economies find that the skills and educational credentials of individuals do not suit or match what companies actually need (McKinsey Global Institute, 2018). Similarly, in APEC economies there is mismatch between knowledge and skills delivered by education systems and those demanded in the fast-changing labor market (APEC Economic Committee, 2017). This "21st century skills gap" is rather costly (Trilling & Fadel, 2009).

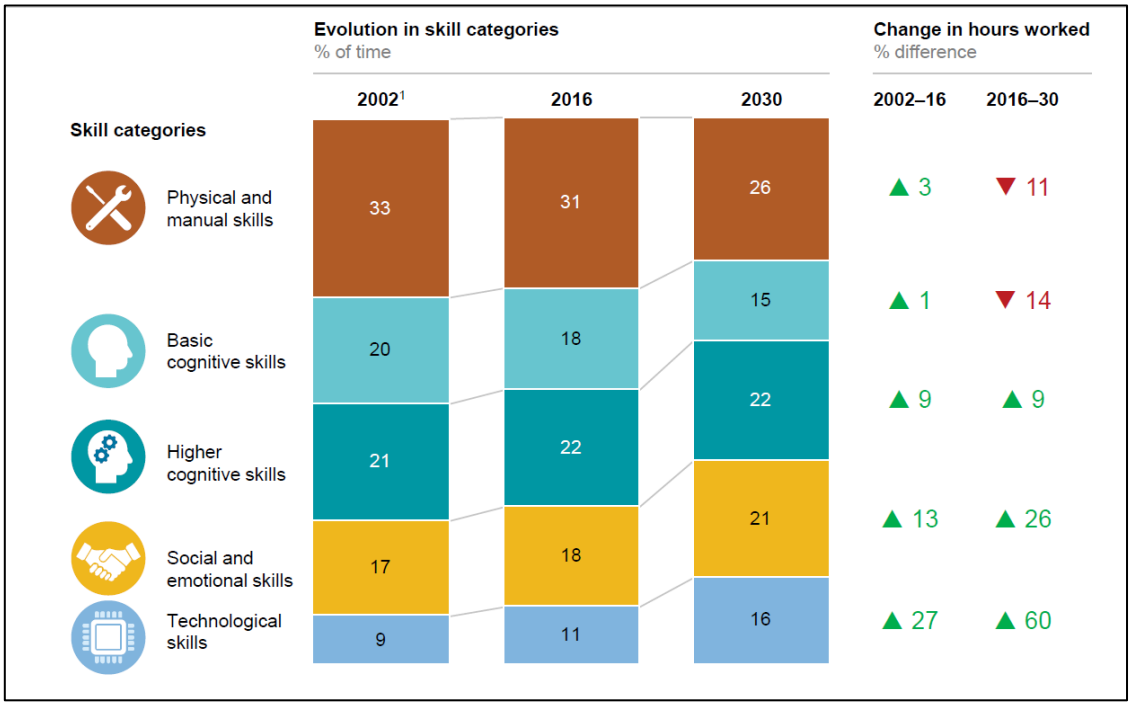
There is a plethora of research on what the skills and competencies are expected from future employees in the era of the fourth industrial revolution. It's anticipated that globally employers in a wide range of occupations demand employees with higher degree of cognitive abilities, systems skills, complex problem solving skills and content skills as part of their core skill sets as compared to physical abilities (Figure 5.1) (Schwab, 2016). Specifically, there will be a decline in demand for physical and manual skills as well as basic cognitive skills, and an increase in demand for higher cognitive skills, social emotional skills and technological skills (McKinsey Global Institute, 2018). It is suggested that by 2020 over a third of the desired core skillsets of most occupations will be comprised of skills that are not considered crucial to the job today (Schwab, 2016).

Figure 5.1. Change in demand for work-related core skills (2015-2020)



Note. Reprinted from *The Global Information Technology Report 2016,* by Dutta, S., and Lanvin, B., 2016. Geneva: World Economic Forum.

Figure 5.2. Skill shifts (2002-2030)



Source: McKinsey & Co, 2018

Note. Reprinted from *Skill Shift: Automation and the Future of the Workforce*,by McKinsey Global Institute, 2018. New York: McKinsey Global Institute.

Technological skills are increasingly in need. Even many established jobs like food services, healthcare, and law enforcement are requiring higher-level computer skills (APEC, 2017a). , In the area of data science and analytics segment (DSA) employers seek skills and abilities in gathering, analysing, and drawing practical conclusions from data, as well as communicating findings to others (APEC, 2017b). In reality, there is huge demand for qualified employees , compounded by a serious shortage of supply, as what occur to DSA (Table 5.1).

Table 5.1. Projected need for workers in DSA

Economy	Current DSA Workers	Projected DSA Workers	Change (%)
Malaysia	4,000 (2016)	20,000 (2020)	400
Philippines	147,420 (2016)	340,880 (2022)	131
Singapore	9,300 (2015)	15,000 (2018)	61
Canada	33,600 (2016)	43,300(2020)	33
United States	2,350,000 (2015)	2,720,000 (2020)	16
Japan	15,000 (2017)	50,000 (2020)	70

Source: APEC, 2017b.

Many economies face difficulties filling the jobs, in particular, Japan; Peru; and Hong Kong, China (Manpower Group, 2015); and 47% of employers had difficulty filling vacancies throughout Asia as compared to 28% in 2006. The demand for highly skilled workers, especially in Southeast Asia, is projected to grow by 41% (or 14 million workers) between 2010 and 2025 (Boyd, 2017) .

Matching skill demand and supply warrants an understanding of the needs of the labor market not only at present, but more importantly, for the future.

Urgency of Education Reform in Response to the Changes

Undoubtedly, the change in the economy and the labor market caused by the digital and technological advances is an important driving forces for the need to re-examine key 21st century skills. Employers expect workers to have complex and higher cognitive skills, soft skills and technological skills. The question of whether the current education system is able to meet the future workforce needs warrants serious attention.

The education system (from basic education to higher education) is supposed to equip students with the necessary skills and competencies to be effective workers and citizens in the 21st century. This would not be achieved unless essential skills and competencies linked with the needs of the future are fully addressed. In fact, the knowledge and skills gained in school are often inadequate in keeping up with the increasing demands of technological advances (Lee, 2016).

In many cases, it is difficult to strike a balance between imparting academic content and knowledge through normal classroom instruction and equipping students with practical skills and competencies needed to function effectively in the real world. The skills mismatch usually comes down to a clash between the supply of the education system and the demand of the labor market, i.e. education and training systems fail to meet the skills needs of an ever changing labor market, resulting in either over-supply or under-supply of certain occupations or particular skills (APEC, 2014). It is partly attributable to factors such as inadequate co-ordination and communication between education and training institutions.

Arguably traditional curriculum is not adequate as schools must provide students with a broader set of "21st century skills" to thrive in a rapidly evolving, technology-saturated world (Jerald, 2009, p. 1). There is a real need for reforms in schools and education to respond to the social and economic needs of students and society in the 21st century (Ananiadou & Claro, 2009, p. 2). Furthermore, the development of 21st century skills and competencies should not be reserved for students at higher levels of education, instead it should begin at the earliest stages of formal education (Scott, 2015).

Conceptual Framework on 21st Century Skills and Competencies

Whilst skills refer to the specific area learnt or acquired (i.e. knowledge), competencies refer to the degree and ability of a person in carrying out those skills. Being competent means that a person has developed the skills and knowledge necessary for him or her to apply in real life (Trilling & Fadel, 2009). Nonetheless, competence and competency are often used interchangeably (Ananiadou & Claro, 2009). According to OECD (2018), competency is the mobilization of knowledge, skills, attitudes and values to meet complex demands of the future, including creating new values, reconciling tensions and dilemmas and taking responsibility.

Whilst there are many definitions as well as conceptual frameworks that explore competencies and skills, only the five of the most current and referenced are illustrated in Table 5.2.

Table 5.2. Comparison of frameworks for the skills and competencies

Knowledge and skills rainbow (Trilling & Fadel, 2009)	**21st century competencies and skill sets** (Soland, Hamilton, & Stecher, 2013)	**ISTE Standards** (ISTE, 2016)	**OECD Learning Framework** (OECD, 2018)	**Potential 21st century skills and competencies proposed by UNESCO** (Scott, 2015)
Learning and Innovation Skills • Critical thinking and problem solving (expert thinking) • Communication and collaboration (complex communicating) • Creativity and innovation (applied imagination and invention **Information, Media and Technology Skills** • Information literacy skills (Access information efficiently and effectively/ Evaluate information critically and competently/ Use information accurately and creatively)	**Cognitive competencies** • Academic mastery • Critical thinking • Creativity **Interpersonal competencies** • Communication and collaboration • Leadership • Global awareness **Intrapersonal competencies** • Growth mindset • Learning to learn • Intrinsic motivation • Grit	**Empowered Learner** • Leverage technology in choosing, achieving and demonstrating competency in their learning goals. **Digital Citizen** • Recognize the rights, responsibilities and opportunities of living, learning and working in an interconnected digital world. **Innovative Designer** • Use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions. **Computational Thinker** • Develop and employ strategies for understanding	**Knowledge** • Disciplinary • Interdisciplinary • Epistemic • Procedural **Skills** • Cognitive & meta cognitive • Social & emotional • Physical & practical **Attitudes and values** • Personal • Local • Societal • Global **Transformative competencies** • Creating new value • Reconciling tensions and dilemmas • Taking responsibility	**Learning to know** • Mastery of core subjects **Learning to do** • Critical thinking • Problem solving • Communication and collaboration • Creativity and innovation • Information, communication, technology (ICT) and media literacy **Learning to be** • Social & cross cultural skills • Personal responsibility, self-regulation and initiative • Sense making skills • Meta-cognitive skills • Entrepreneurial skills

• Media literacy skills (Analyse media/Ability to create media) • ICT literacy skills (Ability to apply technology effectively) **Life and Career Skills** • Flexibility and adaptability • Initiative and self-direction • Social and cross-cultural interaction • Productivity and accountability • Leadership and responsibility		and solving problems by leveraging the power of technology. **Creative Communicator** • Communicate articulately and express oneself creatively using platforms, formats and digital media appropriately. **Global Collaborator** • Use digital tools to broaden perspectives and enrich learning by collaborating with others and working effectively in teams, locally and globally.		• Lifelong learning skills **Learning to live together** • Seek and value diversity • Teamwork and interconnectedness • Civic and digital citizenship • Global competence • Intercultural competence

The synthesis above shows substantial congruence among the frameworks, notwithstanding their varying conceptions of 21st century competencies. It indicates a degree of consensus on the set of skills and competencies students need to function effectively in the labor market and real life. The frameworks include a broad set of skill or competency dimensions, and several subsets of skills or competencies. It is noteworthy that, UNESCO has not introduced a specific 21st century skills and competencies framework though, it explores potential skills and competencies which are aligned with the Four Pillars of Education.

All the frameworks suggest at least one common element or dimension of 21st century skills and competencies: critical thinking, communication and collaboration, creativity and leadership. Information and Communication Technology (ICT)-related skills and competencies are highlighted in all but one framework (Soland, Hamilton, & Stecher, 2013).

The frameworks suggest a wide range of skills and competencies comprised of a mix of soft skills, hard skills, cognitive skills and ICT literacy. The APEC Education Strategy in particular pairs both "hard" technical skills with "soft" skills advantageous to the workplace. The overlap in these frameworks represents the need for global citizens to master a variety of skills and competencies which are relevant in the labor market.

Structural Reform in Education for 21st Century Competencies

It is imperative to incorporate 21st century skills and competencies in education reform in response to the changed global and economic needs of society. (Ananiadou & Claro, 2009). However, it is not just replacing traditional academic subjects like mathematics, languages (including reading and writing), arts and science with a new set skill (Jerald, 2009). Instead, 21st century competencies should be embedded in the current academic curriculum, as many competencies, such as critical thinking and problem-solving, are highly dependent on deep content knowledge and cannot be taught in isolation.

The structural reform entails realigning various parts of the education system to support students in acquiring the competencies. Alignment starts in the curriculum that identifies what students are intended to know about a content area in the context of 21st century competencies. Schools should adopt curriculum that is comprehensive yet flexible and center on content that fosters thinking and reasoning (Scott, 2015).

Most current educational policies seem to respond to the need for the implementation of 21st century skills and competencies through school curricula (Voogt & Roblin, 2012). Integrating 21st century skills has become a tidal force in the policy reforms - reinforced by the transformative influence of technology on society. This demands educators, policymakers and practitioners to review local, economy-level, and regional education systems to resolve the emerging challenge. These reforms are not just adding new competencies to an already established set of expectations, but rather should be based on a comprehensive reconceptualization of education and its role in society.

The following section is examples of economies adopting 21st century skills and competencies in their education reforms.

Box 5.1. Malaysia: Integrating 21st century skills into education system

The Malaysian education system has made significant improvements over the past five decades in terms of access, quality, equity and efficiency. However, the economy faces the challenges due to rising international education standards, meeting increased public and parental expectations from education policies as well as better preparing its children for the needs of the 21st century.

Against this backdrop, the Malaysia Education Blueprint (Ministry of Education, 2013) – a long-term planning framework to transform the education system – was launched in 2013. The reform is unique in that it built upon the foundations of policies developed during the early years of the economy's formation; it also underwent a rigorous public and cross-sector consultation process which aimed to gather multiple perspectives on education; it's anchored on performance against international standards, and is focused on implementation. The Blueprint sets out six student aspirations – to develop a refined articulation of the specific skills and attributes that students need to thrive in tomorrow's globalized world. These are:

- Knowledge - a master understanding of core subjects
- Thinking Skills - connect and create knowledge in everyday life through cognitive skills, such as critical thinking, reasoning and innovation
- Leadership Skills - collaborate and assume leadership roles
- Bilingual Proficiency - communicate effectively through both Bahasa Melayu and English, and have the opportunity to learn an additional language
- Ethics and Spirituality - make decisions and resolve conflicts using such values as integrity, compassion, justice and altruism
- National Identity - understand, accept and embrace diversity and patriotism, and share common aspiration for the future

To meet these aspirations, Malaysia must transform its curriculum, pedagogy and assessments to help students become well-balanced individuals who could thrive in a globalized world. Teaching and learning are geared

towards 21st century skills with an emphasis on encouraging students to be independent, creative and innovative. Higher order thinking skills (HOTS) are emphasized and incorporated into curriculum (and co-curriculums) and assessments. The utilization of ICT has been further expanded and strengthened.

The introduction of 21st century skills in the curriculum design of the revised Primary School Standard Curriculum (KSSR) and the new Secondary School Standard Curriculum (KSSM) is based on 4Cs + Values i.e. Critical Thinking, Creative Thinking, Cooperation and Communication; values refers specifically to a student's self-competence – to be able to lead, collaborate, embrace differences and show compassion. 21st century competencies have been further institutionalized under the School Transformation Programme 2025, implemented in 2017, which is a whole school approach to embed the 6Cs – Critical Thinking, Creative Thinking, Cooperation, Compassion, Communication and Collaboration – in 200 pilot schools.

In line with the economy's digital demands, Malaysia has integrated computational thinking and coding into its curriculum to enable students to better grasp various concepts and theories. Coding is introduced at Year 4 of primary-level education. Basic computational thinking and coding is an elective at lower secondary level. Computer science is introduced as an elective at upper secondary level. These subjects help students to algorithmically resolve complicated problems of scale; they involve thought processes (abstraction, automation and analysis) that require the students to formulate problems and express solutions in a way a human and machine can effectively resolve. It essentially trains them to be digital users and creators.

As part of the reform, Malaysia began implementing school-based assessments in 2011 and placed a greater emphasis on HOTS. HOTS items are being included more and more in public examinations, doubling from 20% in 2014, to 40% in 2017.

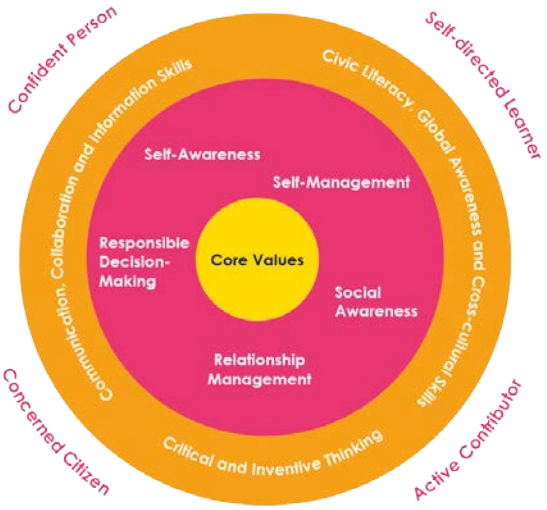
Box 5.2. Singapore: The Framework for 21st Century Competencies

Singapore's education system is perhaps one of the most well-managed in the world. For many, it is regarded as an integrated, coherent and well-funded centralised education system. Education reform is characterized by a continuous process of evolution and change that aims to ensure that education remains relevant and meets the economy's needs. This approach to change shows that the Singapore government is open to learning, with high self-renewal capability. Like many economies around the world, rapid technological advancements and globalization are key drivers for policy reforms and initiatives in the city-state's economic, social and political spheres.

A major milestone for education in Singapore came in 1997, with the launch of *Thinking Schools, Learning Nation* (TSLN). TSLN communicated a vision of 21st century education among teachers and other stakeholders, in which schools and classrooms were envisioned to be "crucibles" (Goh, 1997), where teaching and learning reflected a thinking culture. Education's focus turned to helping students develop a capacity for lifelong

learning. There was increased emphasis on learning through inquiry, and students were empowered to participate more actively in the learning process, and to learn from and with one another.

Teach Less, Learn More, a movement started in 2005, built on the TSLN vision to focus on improving the quality of teaching and learning, as well as promoting school-based curricular innovations to further customize students' learning. TSLN set the stage for Singapore to strengthen its design of learning experiences that would prepare students for the future. The momentum generated from this movement led the Ministry of Education to develop the *Framework for 21st Century Competencies and Student Outcomes* in 2010.The "21CC framework" (as is commonly referred to by the teaching fraternity in Singapore) articulated the values and competencies that would enable young people to thrive in the 21st century. As illustrated in the figure[13] below, at the core of the framework are the values of *Responsibility*, *Respect*, *Resilience*, *Integrity*, *Care* and *Harmony.* These core values help to anchor students as they acquire and apply their 21CCs. In the second ring of the framework social and emotional skills are identified, which help students recognize and manage their emotions, develop care and concern for others, make responsible decisions, establish positive relationships, and effectively handle challenging situations.



Key competencies such as *Civic Literacy, Global Awareness and Cross Cultural Skills, Critical and Inventive Thinking and Communication, Collaboration and Information Skills* make up the third ring of the 21CC framework. Together, these values and competencies will nurture the 21st century Singaporean to become a *confident person, self-directed learner, concerned citizen* and *active contributor*, which had been defined as the Desired Outcomes of Education for Singapore.

The design of the Singapore's curriculum has since been guided by the 21CC framework to ensure that students' 21CCare developed through both academic and non-academic domains. Singapore's regular review of its curriculum, to ensure that it remains relevant and rigorous, has enabled it to incorporate the development

[13] Source: Ministry of Education, Singapore (Reproduced with permission from the Singapore Ministry of Education; MOE, 2014

of 21CC into formal education in meaningful and sustainable ways. This perhaps demonstrates the city-state's consideration of long-term outcomes when developing and fine-tuning its educational policies. The engagement with relevant stakeholders – such as government, education practitioners, and education researchers – is key. The processes of consultation, collaboration and co-construction among the different groups have proved invaluable and effective in ensuring effective policy implementation and buy-in.

Box 5.3. Papua New Guinea: Structural and Curriculum Reforms

The traditional educational process that existed in Papua New Guinea (PNG) was to provided learners with the skills, knowledge and values necessary for social cohesion and communal survival. This was achieved through the transmission of pragmatic practices and traditional values. The nature of its curriculum was non-competitive, contextual, individually focused and informal (Cleverley, 2007). Western education was introduced in the nineteenth century through the arrival of the Christian Missionaries. PNG gained its independence in 1975 and this became the catalyst to change and expand its education system, from elementary to university-level. Education became part of the economy's development agenda, to train an appropriately competent workforce to replace the expatriate staffed bureaucracy.

The Papua New Guinea Vision 2050 is PNG's long-term strategy that aims to map out the economy's future direction and reflects the aspirations of its people. It is essentially a 40-year development strategy underpinned by seven strategic focus areas called "Pillars". The first is *Human Capital Development, Gender, Youth and People Empowerment,* and it highlights the importance of human capital development in driving both economic growth and development, and the need for PNG's initiatives to improve the quantity and quality of opportunities at all levels of education. All policies and plans regarding education, TVET and higher education in the economy must reflect the aspirations of the PNG Vision 2050 (Pillar No. 1: Human Capital Development, Gender, Youth and People Empowerment).

Over the past two decades, PNG's education system has undertaken structural and curriculum reforms driven by 1990 Education for All and 2000 Millennium Development Goals. The focus of the reforms is on the eradication of poverty and achieving universal primary education (UPE). A review was commissioned in 1991 to identify and develop strategies to address problems in the education system. Among the issues highlighted were high attrition rates at primary level, low transition rates at post grade-six and grade-ten levels, a largely irrelevant curriculum and pedestrian management and administration. Radical reform was recommended. In 1993, an education reform was introduced to expand access to primary and secondary education levels, a new curriculum adopting the Outcomes Based Education (OBE) model, and elementary education with vernacular as the language of instruction (in an economy of approximately 860 languages).

OBE identifies knowledge, skills, attitudes and values that all students should achieve at all levels in all subjects. OBE is developed to ensure teaching and learning is targeted according to the needs of the students. The values shape the direction and orientation of the curriculum in seven core areas – (i) Integral Human Development, (ii) Equality and Participation, (iii) National Sovereignty and Self-Reliance, (iv) Natural Resources and Environment, (v) Papua New Guinea Ways, (vi) Rights, and (vii) Responsibilities. These values are central to the idea of ensuring the people of PNG are given the requisite skills and values to meet the needs of the economy and the demands of a globalized world.

Box 5.4. Thailand: The Scheme of Education

Thailand's education reform is based on its short- and long-term human capital development and knowledge needs. The 20-year strategy operates in parallel with the 12th National Economic and Social Development Plan (2017-2021) to prepare the economy's human resources to compete in the global society of the 21st century. The economy is taking steps to improve education development in all areas by utilizing sciences, technology, innovation, and creativity in order to enhance the economy's competitiveness and upgrade the quality of life of Thai people. STEM is integrated into school curriculums to help learners apply what they've learned in everyday life, as well as find new processes to benefit their lives and occupations.

The Thailand's Scheme of Education B.E. 2560-2579 (2017-2036) was introduced to provide all Thai people with access to quality education, encourage them to engage in lifelong learning and to live happily under the principles of "sufficiency economy". The Scheme of Education covers four objectives: 1) to develop a quality and effective education system and process; 2) to produce quality Thai citizens with qualifications, skills, and capabilities as required by the Constitution of the Kingdom of Thailand, the National Education Act, and the National Thailand Strategic Framework; 3) to establish Thailand as a society of high quality learning, morals, and ethics as well as to promote the economy's harmony and cooperation for sustainable development on the principles of sufficiency economy; and 4) to free Thailand from the middle-income gap and income inequality.

The Thai government is now prioritizing vocational education and training to support the economic and social modernization of the economy. In cooperation with the private sector, learners are being equipped with the necessary skills to meet labor market needs, particularly in the Eastern Economic Corridor (EEC). Apprenticeships are available to equip learners with practical skills. TVET career centers are opened to produce a high quality technical-workforce that can drive the economy forward as per the technology and innovation-oriented Thailand 4.0 policy.

Box 5.5. Japan: Education reform in response to technological innovation

The development of technological innovation in Japan such as Internet of Things (IoT), big data and artificial intelligence (AI) in recent years has led to the new era of the "Society 5.0", or "Ultra Smart Society". These changes have had a tremendous impact on the economy's existing industrial structures, labor markets and even lifestyles. In addition, Japan is now one of the world's most aging societies with a long healthy life expectancy. To respond to these changes, the government has developed several educational reforms and initiatives, such as the new National Curriculum Standards and the system of Articulation of High School and Universities, and so on.

The new National Curriculum Standards were announced in 2017 for primary and lower secondary schools and, in 2018, for upper secondary schools. They aim to develop competencies that will be needed in the future, such as the "Cultivation of motivation to learn, and humanity, so that one strives to apply learning to life and society", "acquisition of the knowledge and skills that can be utilized in a real life context", and "developing the abilities to think, make judgements, and express oneself so as to be able to respond to unprecedented situations". Lesson improvement from the perspectives of proactive, interactive and authentic learning (active learning), as well as enhancing curriculum management and learning assessments are thought to be key aspects of the new National Curriculum Standards.

Japanese education has been taking a holistic approach, with character building as a main focus. Hence, teaching and learning are carried out through well-balanced educational activities that focus on the intellectual, moral and physical development of students. To implement the new Curriculum Standards, MEXT promotes partnerships and cooperation between school and community to carry out educational programs and learning activities. Also, MEXT is currently working on the reform on the System of Articulation of High Schools and Universities, as well as the university admission system. These integrated educational reforms aim to transform high school education, the university entrant selection process and university education in Japan. The purpose of these strengthen is to restructure Japan's secondary and higher education systems, equip students with the 21st century competencies needed for their full participation in a globalized and knowledge-based society, stress independent thought and creativity, and select students who show initiative to think about things rather than just know them. This reform in policy will also include changes in the entrance examination system.

In addition, the 3rd Basic Plan for the Promotion of Education has been developed, and university reforms and other educational reforms are ongoing. The aim of these policy reforms is to cultivate Japanese students with the capabilities necessary to take on challenges, and to realize their aspirations and ambitions for sustainable growth.

Box 5.6. China: Quality-oriented education reform

There have been three phases to the China's education reform. The first coincided with the economy's opening-up policy which originated in 1978. One of the government's most significant reforms was the Compulsory Education Law enacted in 1985 – it requires all children to complete at least nine years of compulsory education. The second phase – which took place during the 1990s and early 2000s – focused on improving and ensuring access to basic education. Priorities included reducing the education disparity between urban and the rural regions. The third phase – which was introduced in the early 2000s and is still ongoing – aims to equip Chinese students with the knowledge to function in the modern economic-driven world (Huang, Wang, & Li, 2016). It is believed that the educational reform will result in higher quality education and better student achievement and this will ensure a higher quality labor force that can benefit the economy's modernization, development and economic growth and lead to China's achievement and competiveness (Li, 2017).

It was also during this third phase that the Chinese government shifted from its examination-oriented approach to quality-oriented education approach. The latter is reinforced through the 2001 New Curriculum Reform in which six objectives were specified:

i. Change from a narrow perspective of knowledge transmission in classroom instruction to a perspective concerned with learning how to learn and developing positive attitudes;
ii. Change from a subject-centered curriculum structure to one that's balanced, integrated and selective to meet the diverse needs of schools and students;
iii. Change from partly out-of-date and extremely abstruse curriculum content to essential knowledge and skills that are relative to students' lifelong learning;
iv. Change from a passive-learning and rote-learning style to one that's active and centered on problem solving so as to improve students' overall abilities to process information, acquire knowledge, resolve problems and learn cooperatively;
v. Change the function of curriculum evaluations from narrowly summative assessments so they have more formative purposes, such as the promotion of student growth, teacher development and instructional improvement as additional functions.
vi. Change from centralized curriculum control to a joint effort between the central government, local authorities and schools to make the curriculum more relevant to local situations.

The six objectives signal the Chinese government's intention to emphasize and develop students' creativity, innovation, problem-solving and lifelong learning capabilities (Huang, Wang, & Li, 2016). The objectives also adhere to the concept of 21st century competencies.

The curriculum reform has also seen an increase in the number of new subjects on offer. Through this expansion and the introduction of integrated content, the Chinese government is hoping students will have

a greater interest in what they're learning and the curriculum is more relevant to the needs of the economy, while at the same time instilling Chinese values and attitudes (OECD, 2016).

The curriculum reform had also transformed the assessment and evaluation approaches. OECD (2016) reports that the new evaluation system is a departure from the old assessment-oriented approach which only counted students' grades. The new system relies on diverse criteria in assessing and evaluating students' performances.

Despite the differences in the levels and components of the structural reform in education, there seems to be some commonalities in the four categories as summarized in Table 5.3 below:

Table 5.3. Components of education reforms

System	Goals of Reform	Process of Reform	Student Outcomes	21st Century Competencies
Malaysia	To equip children with the needs of the 21st century so that they are competitive and resilient with the emerging challenges of the changing globalized world.	Participatory Approach	Knowledge Thinking skills Leadership skills Bilingual proficiency Ethics and spirituality National identity	• Critical and creative thinking, cooperation, compassion, communication and collaboration • ICT literacy
Singapore	To prepare the economy for future sustainable economic growth and social well-being through the provision of diverse learning experiences by embedding the development of 21st century competencies in the teaching and learning processes.	Participatory Approach	Confident person Self-directed learner Active contributor Concerned citizen	• Core Values (Responsibility, Respect, Resilience, Integrity, Care, and Harmony) • Social and Emotional Competencies (Self Awareness, Self-Management, Responsible Decision-Making, Social Awareness and Relationship Management) • Emerging 21st Century Competencies (Critical and Inventive Thinking, Civic Literacy – Global Awareness and Cross-Cultural Skills and Communication, Collaboration and Information Skills)
Papua New Guinea	Competent workforce	A Review Commission	Students with knowledge, skills, attitudes and values for the future needs of the economy	Seven core areas focused on values: (i) Integral Human Development (ii) Equality and Participation (iii) National Sovereignty and Self-Reliance (iv) Natural Resources and

System	Goals of Reform	Process of Reform	Student Outcomes	21st Century Competencies
				Environment (v) Papua New Guinea Ways (vi) Rights, and (vii) Responsibilities
Thailand	To develop knowledgeable human capital	Partnership and cooperation with various agencies	Qualified, skillful, capable citizens with good morals and ethics that promote harmony and cooperation for sustainable development on the principle of sufficiency economy	Higher order thinking processes, ethics and desirable Thai characteristics and lifelong learning
Japan	Fostering competencies necessary for the new era and enhancing learning evaluations	Participatory approach	Well-balanced citizens who are intellectually, physically and morally sound	Self-directed learning, able to contribute learning to real-life context and society, and able to think and make informed decisions - motivation to learn, and humanity - knowledge and skills that can be utilized in real life context - ability to think, make judgement, and express oneself
China	To provide students with equitable access to education and prepare them for economic development	Centrally determined but implementation is decentralized at provincial level	Students who possess creativity, innovation, problem-solving and lifelong learning capabilities.	• Positive attitudes • Essential knowledge and skills that promote lifelong learning • Active and able to process information, acquire knowledge, solve problems and learn cooperatively

One commonality found in the case studies is how much focus is placed on growth as a key component in the education reform. On the other hand, there are also distinctive aspirations – unity in the case of Malaysia; Singapore wants confident people, self-directed learners, active contributors and concerned citizens; the development of students in the "Papua New Guinea way"; desirable Thai characteristics; and, in Japan, the development of a well-balanced society in response to globalization and the economy's ageing society. Also observed is the change from knowledge to competencies which demands shifting education from disseminating knowledge to creating knowledge. The table also indicates that "competencies" is translated according to the contextual needs of the respective economy but, in principle, the ones described distinguish **knowledge and skills** from **attitudes and attributes,** commonly known as soft skills and non-cognitive skills. The case studies also indicate that 21st century skills are "not new, just newly important" (Silva, 2009). Soft skills such as communication, collaboration and compassion are becoming more important now than in the past. All these skills are essential in the 21st century and lifelong learning and also play a significant role in ensuring people are constantly prepared to meet the emerging challenges of the globalized world.

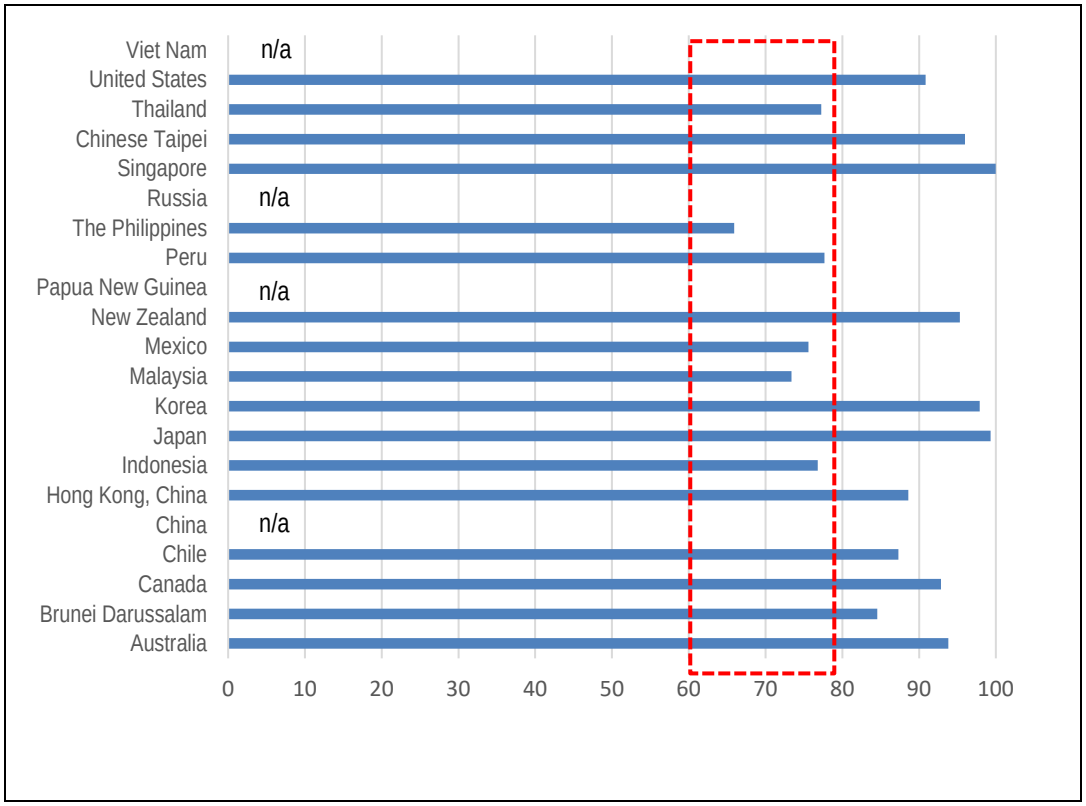
Challenges

Whilst 21st century skills and competencies are emphasized in the above examples, and also in the literature as discussed the earlier section, there are several challenges that might have an impact on how economies envision and deliver 21st century competencies in their structural education reforms.

Access to quality education

Ensuring access to quality education will help APEC economies to develop a skilled workforce (APEC Economic Committee, 2017). The net enrolment rate (NER) of primary education is close to universal. However, six economies have an NER for upper secondary education of less than 80%. The NER of upper secondary education is usually a sound indicator of how well an economy can educate its young people and equip them with the basic skills needed to enter either tertiary education or the labor market.

Figure 5.3. Net Enrolment Rate at upper secondary level (2015)



Source: StatsAPEC.

Access to basic education at primary level ensures that students acquire basic numeracy and literacy. Nonetheless, many students leave the education system without even reaching the lowest levels of literacy and numeracy (OECD, Hanushek, & Woessmann, 2015). While the majority of the students participate in primary education, the high level of attrition at secondary level has resulted in close to 35% of students in APEC economies leaving school with just basic literacy and numeracy gained at the primary level. This would suggest that, their skills would limit their opportunity in the future workforce, which requires a multitude of skills that can only be harnessed through completing basic education at the secondary level. Their skills and competencies would be amplified and strengthened if they receive tertiary education or further education and training. Also it also involves the added financial implication for economies to re-skill students or adults who leave school at primary level so that they could function better in the workforce.

Unemployment

There were an estimated 22.6 million unemployed youth aged 15-24 years old across APEC economies (APEC Economic Committee, 2017). Figure 5.4a indicates the percentage of youths

in this age bracket who are unemployed, and Figure 5.4b shows the percentage of youth who are neither employed, nor in education or training.

Figure 5.4a. Unemployment rate (2016)

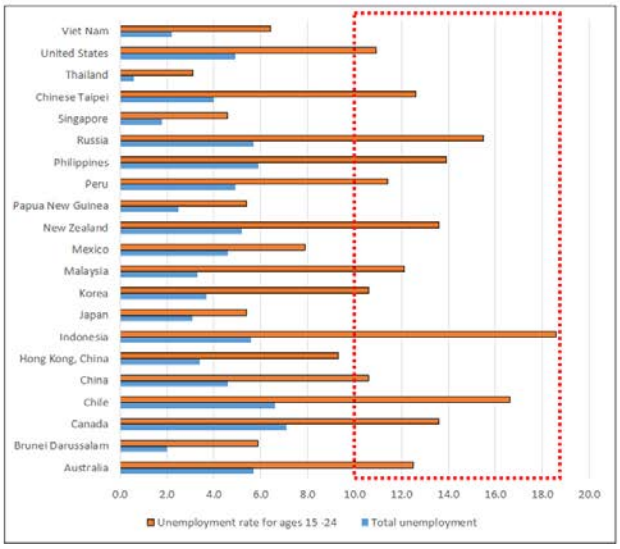
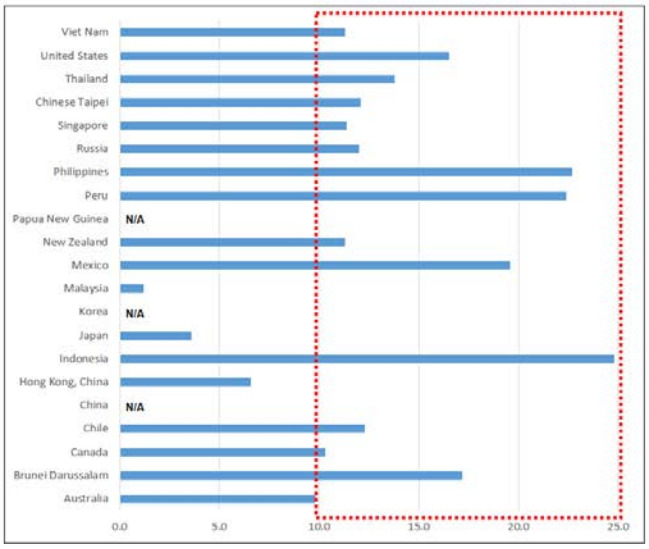


Figure 5.4b. Youth not in education, employment, or training, latest available year



Source: APEC Economic Committee, 2017.

Note: Youth refer to population aged 15-24.

The figures above show that more than half of the APEC economies have a rate of 10% or more of youth unemployment. In addition, in 14 economies recorded a 10% or more of youth who are not employed, in education or training. The advances in current and future workforce would only make it more difficult for them to enter the labor market. In addition, assuming that this group of youth is only equipped with basic skills, it implies an oversupply of low-skilled workers and an undersupply of medium-skilled or highly-skilled workers.

Technology is advancing at a very fast pace

As aforementioned, technology has had a tremendous impact on how the current and future workforce is, and will be shaped. While some argues that technology has caused disruption, it has nonetheless increased efficiency and simplified the processes that many things are carried out. Students and adults should be equipped and updated with technology-related skills such as information and media literacy skills as well as digital citizenship. Technology-intensive industries increasingly rely on employees to engage in cognitive and analytical tasks in which

communication and interpersonal skills are particularly in high demand (The World Bank, 2018).

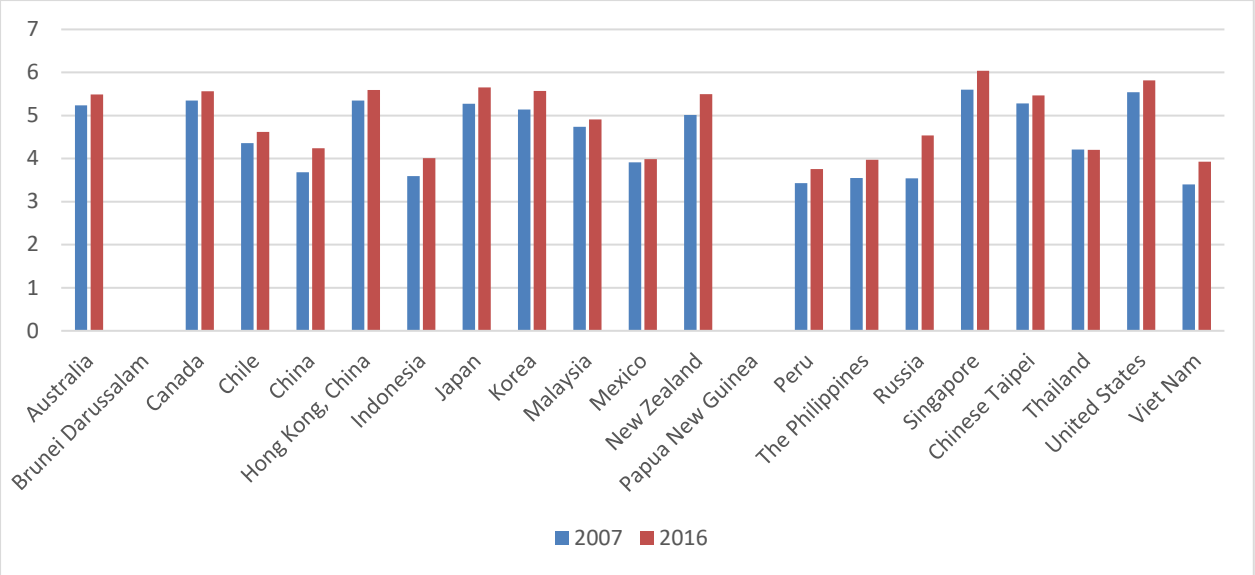
The speed and scope in which people, cities, economies and organizations (including those within the education sector) absorb and adopt technology will determine their ability to cope with the demands of the future workforce (Schwab, 2016). Nonetheless, technology is changing so quickly that people are either slow to grasp which skills they need, or they do not understand the demand for skilled labor that will only grow in the near future (Rotman, 2014). Similarly, the fast pace of technological developments is creating a problem for education providers (basic and tertiary) to keep pace with the development of technology and in turn provide the knowledge and skills that are constantly current with the development. For example, the syllabus and subjects related to information technology offered at the first year of a degree program might be deemed obsolete by the time the students reached their fourth year. The same can be said with university or TVET institutes that offer courses related to artificial intelligence or the mechanics of hybrid. Hence, this is proving to be a significant problem for tertiary education and training institutes who are trying to provide students with the most current hard skills in line with the needs of the workforce.

Digital gap between economies

The Networked Readiness Index (NRI) assesses the preparedness of economies in leveraging technologies in many aspects including skills, individual usage, government usage, economic impacts and social impacts. In essence, The NRI "has proven critical as a tool to identify gaps and to track progress in ICT readiness over time" (Baller, Dutta, & Lanvin, 2016, p.6). The NRI of each economy is measured on a scale of 1 (worst) to 7 (best).

The figure below compares APEC economies' NRI between 2007 and 2016.

Figure 5.5. Comparison of Network Readiness Index Scores of APEC economies (2007-2016)



Source: StatsAPEC

Singapore is the only economy that registered a rating of six. Other advanced economies including Australia; Canada; Hong Kong, China; Japan; Korea; New Zealand; Chinese Taipei and the United States scored five in 2016. It is noticeable that these economies are characterized as having adopted digital technology at a very high level. Based on the graph, all the economies, with the exception of Thailand, showed improvements in how the adopt technology compared to 2006. The data also shows that none of the economies (apart from Brunei Darussalam and Papua New Guinea where data is not available) had a score of below three, while only four economies were between 3 and 4.

While the NRI reveals the competitiveness of APEC economies, and how they making progress in terms of capitalizing on digital technology, the gaps between the advanced economies and the less advanced economies are quite apparent. For example, only 10 economies are ranked in the NRI's top third in leveraging digital technology, while Peru is the only economy ranked in the bottom third. On average, the economies progressed by 0.35 points during the period, with only seven of them making an advancement that was deemed above average.

While high-income and advanced economies might have the means to constantly upgrade and invest in cutting-edge digital technology, the same might not be said for low-income economies.

The gaps between advanced or developed APEC economies with other economies remained steady between 2007 and 2016, and do now show any signs of narrowing. Despite the improvement, developing economies are not growing their digital and ICT sectors fast enough to catch up with the advanced economies. As such, it reflects on the extent to which technology is being adopted by each economy. For example, many advanced economies are constantly upgrading their schools and universities with the latest ICT tools that has played a big part in developing crucial skills (such as ICT and analytical), meanwhile, there are many developing economies still trying to secure stable internet access for their schools and universities.

Digital natives vs digital immigrants

Digital natives represent a generation of young people born into the digital age who are inherently technology-savvy, whereas those who learnt to use computers in their adulthood are digital immigrants (Wang, Michael, & Sundaram, 2012). The concepts of digital native and digital immigrant originated in the education field. Therefore, the digital divide between the two generations often focus on how ICT is integrated into the classroom (Wang et. al., 2012). Typically, the ICT-related knowledge and skills of teachers is often insufficient to really impact their students who are digitally native. Unless the teachers can constantly keep up with ever changing technological advances, the technology could hardly be accepted and adapted in classroom practices. Teachers are now expected to manage technological equipment, change their teaching approaches, integrate technological tools into their lessons and outsmart a class of technology-savvy students who may actually know more about technology than them. Hence there is a demand for teachers to be more flexible and skilled in managing teaching tools and students in the classroom (Choy & Ng, 2015).

Revisiting APEC's Vision for 21st Century Skills and Competencies

Three pillars are identified in the APEC Education Strategy: (i) enhance and align competencies to the needs of individuals, societies and economies, (ii) accelerate innovation, and (iii) increase employability. The three pillars are further supported by nine priority actions, several of which are highlighted in Table 5.4 by linking 21st century skills and competencies into the objectives.

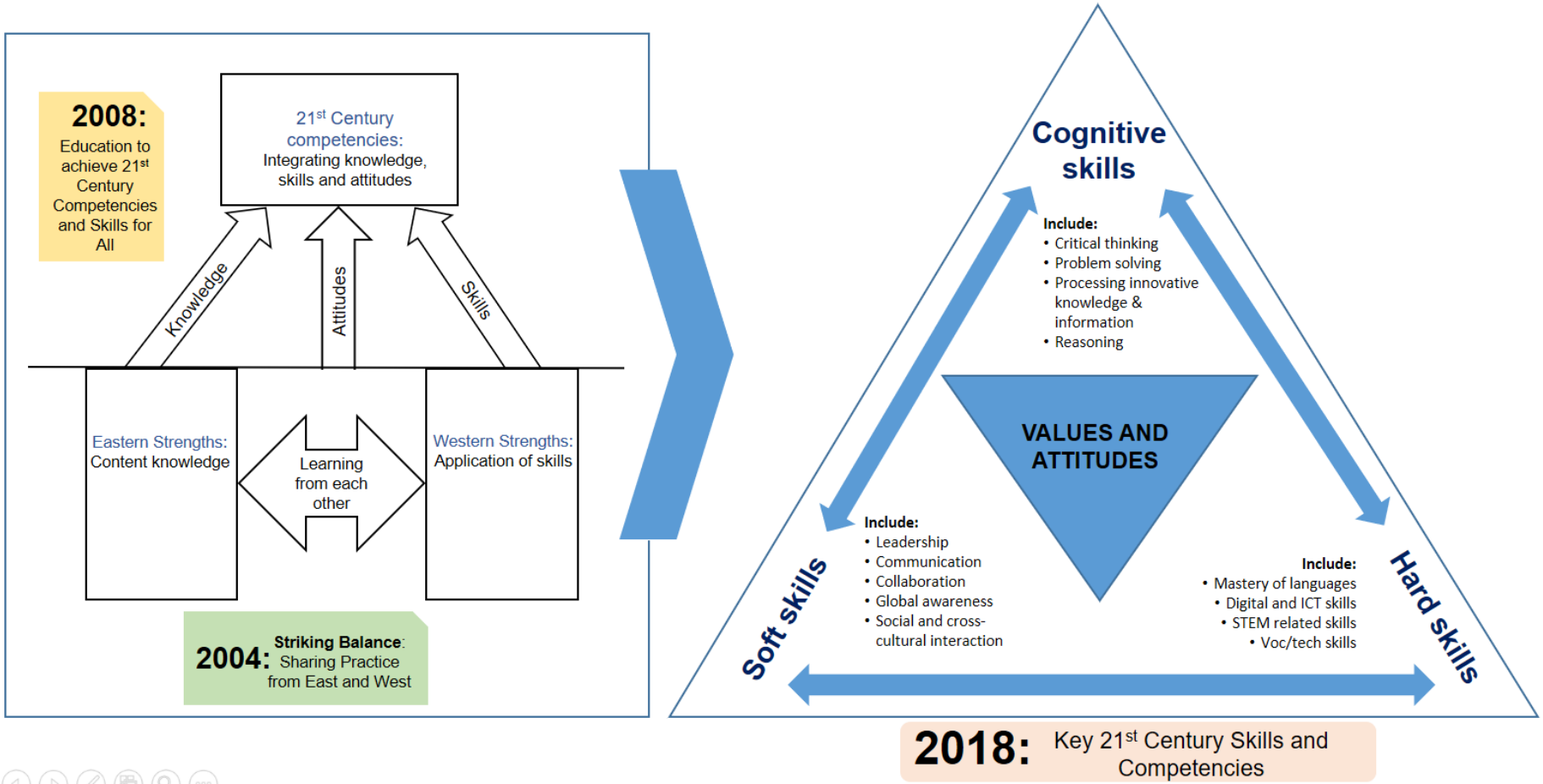
Table 5.4. Linking specific actions to the three pillars of the APEC Education Strategy

Pillars	Relevant actions linked to 21st century skills and competencies
i. Enhance and align competencies	Action 3: Modernisation of education systems
ii. Accelerate innovation	Action 1: Improving the use of educational and technological capabilities in teaching and learning processes
	Action 2: Promotion of science, technology and innovation in education and pedagogical practices
iii. Increase employability	**Action 2: Development of 21st century competencies for work and entrepreneurship**
	Action 3: Smoothing the transition from education to work

The following section will build on the 21st century skill framework introduced at the 4th APEC Education Ministerial Meeting in 2008, in particular, by incorporating key skills and competencies arising from the review of existing frameworks.

The proposed framework is essentially an expansion to the framework agreed by APEC education ministers in 2008, containing the skills and competencies that are a) transversal (i.e. they are not directly linked to a specific field but are relevant across many fields), b) multidimensional (i.e. they include knowledge, skills, and attitudes), and c) associated with higher order skills and behaviors that represent abilities to cope with complex problems and unpredictable situations (Voogt & Roblin, 2012, p. 300).

Figure 5.6. Revised 21st century skills and competencies framework



The 2008 APEC Ministerial Meeting proposed that the 21st century skills and competencies framework must integrate knowledge, skills and attitude. In proposing a revised framework, the list of 21st century skills and competencies should never be exhaustive. The proposed framework acknowledges that both knowledge and attitude are important. In addition, the framework must also include the dimensions of cognitive skills, hard skills and soft skills. Cognitive skills refer to how a person is able to process knowledge, think critically, and solve problems. Hard skills include all teachable knowledge, skills and competencies such as second language acquisition and technical knowledge, especially ICT and digital skills. These are considered as important elements of hard skills need to be acquired and mastered by current and future students. Soft skills, on the other hand, include elements like leadership, communicative skills, collaborative skills and positive attitude.

Therefore, in addition to traditional technical, business, and interpersonal skills, employers in the globalized economy require new hires with sophisticated linguistic and cultural skills and experiences. Taken together, these have become prerequisites for international growth, global operations, and the efficient functioning of diverse workforces. Recognizing and promoting such skills and competencies will increase people-to-people connectivity, improve the provision of services across APEC economies, and promote regional economic integration through increased SME access to international markets, as such access depends on globally capable talent streams.

Box 5.7. United States: Striving for global and cultural competencies

To work toward a clear definition of global and cultural competencies and acquire and analyze data on the gap in global talent, the United States oversaw the APEC project on Global Competencies and Economic Integration (HRD 02-2015), which convened a workshop of experts in education policy and global competencies who shared promising practices and recommendations for regional policymakers and APEC member economies who seek to enhance their economic wellbeing through improved competencies. Global Competencies and Economic

Integration project outputs and other helpful resources around global and cultural competencies and global talent needs are hosted on the project website at www.apecglobalcompetencies.com.

Moreover, the United States Department of Education worked on the economy-level to develop the Framework for Developing Global and Cultural Competencies to Advance Equity, Excellence and Economic Competitiveness (sites.ed.gov/international/global-and-cultural-competency). The Framework is designed as a guide to consider how such competencies are developed from early learning to elementary and secondary to postsecondary education levels across four dimensions: Collaboration and Communication, World and Heritage Languages, Diverse Perspectives, and Civic and Global Engagement. The Framework illustrates that training in such competencies rests on the foundation of discipline-specific knowledge and includes a detailed description of a globally and culturally competent individual, who is prepared to enter the multilingual, multicultural globalized workforce.

Taking into consideration the ever-changing nature of the future workforce, the list of specific skills that falls within the three broader skills will remain non-exhaustive and be expandable. As for now, the specific skills for each of the three broader skills are based on the most cited skills and competencies offered by the six frameworks presented earlier in this chapter.

The difference between the 21st century skills and competencies examined earlier in this chapter, and that of the newly proposed framework suggested by APEC in Figure 5.6 above is the inclusion of two elements that bind the three skills together – "values" and "attitude". The latter was identified at the 2008 APEC Ministerial meeting as an important element, together with knowledge and skills. Nonetheless, in the revised framework, the skills and competencies acquired by students must adhere to the values and attitudes that are contextually specific to every economy. Specifically, the emphasis on each of the skills and competencies should be aligned with the values of the respective economy. In order for the skills and competencies to be successfully understood, acquired and applied by students and future workers, attitude is equally important. Attitude contains the elements that affect the formation of character and

willingness, as well as readiness to adopt to changes, including acquiring new skills and competencies.

The right values and attitude are also required to apply the skills and competencies for the well-being of oneself, community and economy. Hence, the inclusion of values and attitudes within the framework allows policy makers and key stakeholders (school leaders, teachers, parents and communities) to understand and formulate the skills that work within the context of each economy's set of values. Singapore, for instance, provides a good example. They adopt a values-centric framework that incorporates 21st century competencies, including civic literacy, global awareness, and cross-cultural skills; critical and inventive thinking; communication, collaboration and information skills; as well as social and emotional competencies (Care, Kim, & Vista, 2017). A set of values (Respect, Responsibility, Resilience, Integrity, Care and Harmony) form the core of the framework as they provide the foundation for students to act on their competencies. Given that attitude and values vary within different APEC economies, one important issue is how students, teachers, and other stakeholders negotiate in pursuit of global competencies gained through cross-border education.

Conclusion

The future of work requires students and people generally to be equipped with a broader set of skills that complement both manual and physical skills. The future workforce calls for higher cognitive skills and digital skills. On the basis of various frameworks offer different elements and dimensions of skills that are deemed essential in the 21st century, an integrated framework of key 21st century skills and competencies is proposed. In particular, the framework considers values and attitude as two additional elements that bind the three overarching skills: cognitive, soft and hard skills.

In moving forward, first, the essential skills and competencies should always remain relevant, not only today, but more importantly for the future. Furthermore, it's important to recognize the changing requirements expected in the future workforce and

continue to adapt to those requirements. Thus, in order for all APEC economies to understand the exact skills required for the current and future workforce, collaboration is vital. Continuous collaboration in providing support to other less advanced economies through technology and knowledge transfer would reduce the likelihood of a “skills and competencies” gap amongst APEC economies. Finally, the policies and priorities introduced by APEC are encouraged to be prioritized and localized according to the needs of each economy.

Last but not least, the 21st century skills and competencies are most effectively infused at the basic education level rather than tertiary education, hence many of the reforms in the education system involve embedding key skills and competencies that prepare students for the 21st century workforce. These skills and competencies can be strengthened and renewed beyond school. Education is highlighted in the APEC Education Strategy (APEC, 2017a, p. 1) as an “important driver” in developing “better educated” citizens who are more “innovative, flexible, and able to adapt to structural changes in the economy as its skills can be more readily transferred across sectors”. Hence, the skills and competencies which are relevant not only for the present but, more importantly for the future, would allow “better educated” citizens to contribute more actively to the development of their respective economies. There is a need for various stakeholders not only to better understand what skills are readily available within the population of each economy but also to understand where the greatest skills gaps exist (World Economic Forum, 2017). This requires further collaboration across many areas of policy, including education, employment and business development.

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Chapter VI Policy Recommendation

The following policy recommendations are proposed for APEC member economies' reference, where relevant and appropriate:

- **Enhance cooperation on cross-border education and academic mobility and recognize the role of qualifications frameworks in building trust in the different systems and institutions in the region**. In order to address the challenges and seize the opportunities arising from globalization, interactions concerning education and academic activities across the region should be regularly identified. According to the APEC Leaders' Declaration in 2012, all member economies stand to gain from enhancing collaboration on cross-border education. Qualifications frameworks across the region could be helpful in contributing to trust in the quality and comparability of our different systems and institutions.
- **Ensure the further development of ICT infrastructure and wider access to Internet and ICT-based services**. Responding to the challenges of the Digital Age and recognizing the vital importance of the digital transformation, these are basic but important condition for effective human resource development and increasing connectivity within APEC.

- **Design and implement policies and initiatives aimed at the effective incorporation of new technologies in education processes.** For a greater appreciation of ICTs and more expansive utilization of new technologies in education, it is important to raise awareness around the benefits of digital and information and communication technologies. Meanwhile policies and initiatives on the digitalization of education can help APEC economies develop 21st century skills, whilst adapting to the economic and social transformations brought forth by innovations of the Digital Age, by making education more inclusive, accessible, affordable, flexible, efficient and personalized.

- **Develop the skills and competencies of educators.** As innovation of education continues to change the modes and mechanics of education processes, APEC member-economies are tasked with developing the skills and competencies that are needed for proper use of education innovations being introduced, and organizing the learning environment in an interactive way, engaging students in problem-based and creative learning with the purpose of maximizing the efficacy of education processes and achieving deep learning outcomes.
- **Exchange best practices, technologies, solutions and relevant data.** Bearing in mind the existing gaps in innovation of education in APEC and the challenges related to the introduction of innovations, education cooperation should be furthered in line with the provisions of the APEC Education Strategy and its action plan.
- **Launch joint projects and initiatives in the spheres of online, ICT-based and blended learning.** This will help improve both the quality and credibility of online and blended learning and generally enhance inclusiveness and accessibility of education across the region.
- **Reinforce collaboration both within and across member economies for delivering 21st century competencies.** The essential skills and competencies must always remain relevant not only now but, more importantly for the future. In order for all APEC member economies to understand the exact skills that are required for the current and future workforce, continuous collaboration is vital. Supporting the other less advanced APEC economies through technology and knowledge transfers can reduce the likelihood of skills and competencies gaps amongst APEC economies. Collaboration between relevant stakeholders within the economies is also important in ensuring that the skills required in the workplace are matched with the skills and competencies being taught in basic and tertiary education.

Annex 1 Case Studies

The Philippine Qualifications Framework

Policy Context – Education Reform for Economic Development

The Philippines is one of only three economies in the world and the only one in Asia that still have only ten years in basic education (six years of primary education and four years of secondary education). This antiquated approach has led to issues on international recognition of Filipino students. As an example, the Washington Accord prescribes 12 years of basic education as an entry to recognition of engineering professionals.

Through the enactment of Republic Act 10533 or the Enhanced Basic Education Act of 2013, the new K to 12 education system aims to enhance learners' basic skills, produce more competent citizens, and prepare graduates for lifelong learning and employment.

The K to 12 system covers Kindergarten and 12 years of basic education (six years of primary education, four years of Junior High School, and two years of Senior High School). This enhanced basic education curriculum prepares graduates to acquire middle-level skills that will allow them more opportunities even in the global market.

The Philippine Education System as a whole is trifocalized in nature - three (3) key agencies are involved in the policymaking, administration and management of formal education: The Department of Education (DepED) for basic education; the Technical Education and Skills Development Authority (TESDA) for technical-vocational education and training (TVET), and the Commission on Higher Education (CHED) for higher education.

Role of TVET in Skills Development and Career Progression

With the advent of the 4th Industrial Revolution and other technological advancements in the digital field (i.e. Artificial Intelligence, Internet of Things, etc.), the Technical Education and Skills Development Authority (TESDA) has been the catalyst for

repositioning TVET to be more responsive to the needs of the market and for making its graduates more globally competitive.

The TESDA, through its National Technical Education and Skills Development Plan (NTESDP) 2018-2022, envisions a Vibrant Quality TVET Decent Work and Sustainable Inclusive Growth. The NTESP is implemented under a Two-Pronged Strategy:

- TVET for Global Competitiveness and Workforce Readiness; and
- TVET for Social Equity

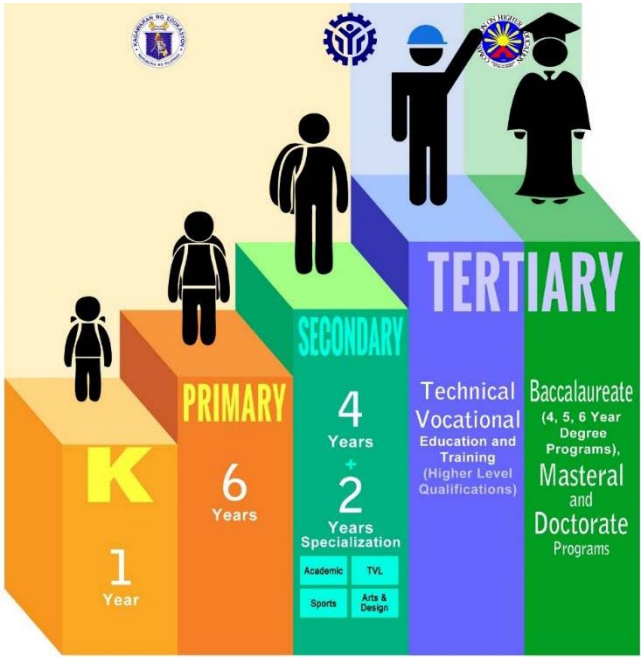

Figure 3.2. The K to 12 program covers the basic education, i.e. the elementary and secondary level. The tertiary education consists of technical vocational education and training (TVET) and higher education

The NTESDP looks to actively promote TVET as a viable course for career progression as it "seeks to establish the image of TVET as a valuable educational and career path at par with baccalaureate degrees and professional occupations." See Figure 3.2.

Philippine Qualifications Framework (PQF)

The PQF describes the levels of educational qualifications and sets the standards for qualification outcomes. It is a quality-assured economy-level system for the development, recognition and award of qualifications based on standards of knowledge, skills and values acquired in different ways and methods by learners and workers of the economy. It has eight Levels of qualifications, each with descriptors of expected learning outcomes in three domains: knowledge, skills and values; application; and degree of independence. It is learning outcomes-/competency based, market-oriented and assessment-based. See Diagram 3.3.

The objectives of the PQF are to:

- Adopt economy-level standards and levels of learning outcomes of education;
- Support the development and maintenance of pathways and equivalencies that enable access to qualifications and to assist individuals to move easily and readily between the different education and training sectors and between these sectors and the labor market; and
- Align domestic qualification standards with the international qualifications framework thereby enhancing recognition of the value and comparability of Philippine qualifications and supporting the mobility of Filipino students and workers.

The benefits of the PQF are manifold, including the promotion of lifelong learning; the alignment of training standards and qualifications with industry standards; promotion of accountability; provides common standards, taxonomy, and typology of qualifications; and ensuring proper coordination and balance of education and employment opportunities for holistic economic growth.

RA 10968 or The Philippine Qualifications Framework Law of 2017 institutionalizes the PQF which shall describe the levels of educational qualifications and sets the standards for qualification outcomes. The PQF is a quality assured economy-level system for the development recognition and award of qualifications based on standards of knowledge, skills and values acquired in different ways and methods by learners and workers of the economy.

The PQF Act mandates five agencies to form the PQF National Coordinating Council and to also include the economy and industry sectors as members.

- Commission on Higher Education (RA 7722 or the Higher Education Act of 1994)
- Technical Education and Skills Development Authority (RA 7796 or the TESDA Act of 1994)
- Professional Regulation Commission (Ra 8981 or the PRC Modernization Act)
- Department of Education (RA 9155 or the Governance of Basic Education Act of 2001)
- Department of Labor and Employment (EO No. 126 or the Reorganization Act of the Ministry of Labor and Employment of 1987)

Although, the PQF Act Implementing Rules and Regulations is yet to be promulgated, the PQF is already in place because it was already institutionalized through an Executive Order in 2012 and the mechanism that is being used in its implementation. The PQF is currently being referenced with the ASEAN Qualifications Reference Framework.

Relevant Legislation and Policies Including Credit Transfer System

Republic Act 10647 or the Ladderized Education Act of 2014 institutionalizes a Ladderized Education Program (LEP) which formalizes a system of accreditation and interface between and among the economy's technical vocational institutions and higher educational institutions. The law allows TVET graduates to proceed to college to pursue a degree without having to take the course program all over. Units shall be credited from a technical or vocational course to a college degree program.***Future challenges***

The Philippine Qualifications Framework is currently being referenced to the ASEAN Qualifications Reference Framework (AQRF), a common reference mechanism that enables comparisons of education qualifications across participating ASEAN member states. This allows the Philippines to benchmark the qualifications of Filipino skilled workers and professionals at the regional level to ensure that its standards are in sync

with ASEAN member states. At the economy level, this would support the Filipino workforce's further mobility and ease of employment, would contribute to improving regional competitiveness and initiate inter-regional benchmarking in the future.

Likewise, there is a need to streamline further the accreditation and credit transfer system to ease transition of TVET graduates to higher education in order to reduce hindrances for moving up the qualifications ladder as well as the transition of K to 12 VTL track graduates into TVET. Recognition of prior learning must also be further developed.

The PQF must be flexible enough to adjust to the rapidly changing demands of the industry. The advent of the Fourth Industrial Revolution, which will accelerate the convergence of industrial technology and information technology and will pervade all facets of human activities, not to mention the growing clamor for 21st century skills by a more sophisticated and advanced education and employment environment, are all challenges that must be hurdled by the PQF.

Republic of Korea: APEC Learning Community Builders

One of the central APEC initiatives aimed at building connectivity in the sphere of education within the region is the APEC Learning Community Builders (ALCoB). ALCoB aims to narrow the digital divide by constructing a human network, which performs education-related activities using both online and offline (blended) measures (HRD 05-2004 Project Monitoring Report, 2018). ALCoB currently represents a network uniting leading teachers, learners, supporters, education administrations, and scholars. It has three main objectives: narrowing the Digital Divide with regard to educational informatization & ICT usage; enhancing cooperative projects with collaborative study in the education & human resource development field; discussing the direction and model of future education & sharing experience and results with each economy (ALCoB, n.d.).

ALCoB unites participants in frames of the three main groups: Teachers, Learners and Supporters (administrative staff that support activities of teachers and learners), and one additional group – ALCoB Entrepreneur Committee composed of IT and e-learning representatives.

As of February 2018, the accumulated number of registered members on the official website has reached 5,700. They were drawn from 20 APEC member economies and three non-member economies, including ones from the Middle East.

Since its inception in 2004, ALCoB has conducted 15 annual conferences. Between 2004 and 2017, a total of 14 rounds 4,986 people participated in ALCoB cooperative projects. In 2017 ALCoB implemented 15 cooperative projects, engaging a record number of 742 participants from nine member economies. The projects addressed various aspects of ICT-related education and promoted opportunities for international cooperation in the sphere (APEC HRDWG, 2018).

Table 4.1. ALCoB Cooperative Projects

Period	Participants
August 2003 – September 2004	105 persons from 7 economies
August – December 2005	130 persons from 12 economies
March – December 2006	60 persons 7 from economies
May – October 2007	150 persons from 7 economies
May – October 2008	182 persons from 9 economies
August – December 2009	140 persons from 7 economies
May – December 2010	447 persons from 9 economies
May – December 2011	612 persons from 9 economies
July – December 2012	468 persons from 6 economies
May – November 2013	451 persons from 5 economies
May – December 2014	511 persons from 6 economies
June – November 2015	484 persons from 7 economies
June – November 2016	504 persons from 9 economies
April – December 2017	742 persons from 9 economies

Qualifications Frameworks in the US Context

At present, the United States does not have a National Qualifications Framework (NQF) and no plans are currently underway to develop an NQF. More specifically, the United States does not presently have an official economy-level framework that (1) provides a comprehensive list of all US qualifications; (2) establishes a numerical level/hierarchy of US qualifications; or (3) describes all qualifications with regard to admissions requirements, duration, expected outcomes/skills/knowledge or labor-market access, etc.

Education in the United States is highly decentralized, and education at all levels is primarily within the purview of the various state-level governments, while many responsibilities are further devolved to local jurisdictions, various governing boards and individual institutions. Other relevant entities that can influence education policy, as well as the nature of qualifications, include accreditation agencies, state-level licensing authorities and employers.

With regard to secondary-level and adult TVET, state education agencies are typically responsible for establishing standards (i.e., what students should know and be able to do), and this is often done in consultation with employers. Standards for postsecondary TVET (e.g., technical/community colleges) are generally established by individual institutions and their governing boards, although often also in consultation with employers.

Within the US experience, perhaps the most prominent example of an effort related to NQFs is the Lumina Foundation's Degree Qualifications Profile (DQP). The DQP provides a baseline set of reference points for what students should know and be able to do for the award of associate, bachelor's and master's degrees, regardless of their fields of study. (A future edition of the DQP will include doctoral degrees.) The DQP was developed by a private foundation in consultation with the US higher education sector. Its adoption by higher education institutions is entirely voluntary, and it does not propose a numerical level/hierarchy of US qualifications.

Alternative References for Information About US *Education/*US *Qualifications*

Although the United States does not have an NQF, other sources exist for obtaining information about US education, including regarding degrees and other qualifications.

- The US Department of Education does not define degree titles nor does it prescribe the content or duration of degree programs. However, the Department's National Center for Education Statistics developed a glossary specifically intended to assist the collection and presentation of data. The definitions that NCES uses for different types of degrees can be found at https://surveys.nces.ed.gov/ipeds/VisGlossaryAll.aspx

- The International Standard Classification of Education (ISCED 2011) provides a comprehensive framework for organizing education programs and qualifications by applying uniform and internationally agreed definitions to facilitate comparisons of education systems across countries. ISCED is maintained and periodically revised by the UNESCO Institute of Statistics (UIS) in consultation with Member States and other international and regional organizations. The UIS webpage provides access to country-specific mapping documents for ISCED 2011, including for the United States, please visit http://uis.unesco.org/en/isced-mappings for details.

Recognition of Qualifications

With regard to the recognition of academic qualifications (e.g., degrees, certificates), those decisions rest with (1) individual employers (in the case of someone seeking employment); (2) state-level licensing authorities (in the case of someone seeking professional licensure); and/or (3) universities (in the case of someone seeking to continue their studies). Similarly, the recognition of professional licenses rests primarily with state-level licensing authorities. The US government – including the US Department of Education and US Department of State – is not directly involved in the evaluation, validation or recognition of academic or professional qualifications, and there is no other economy-level authority that plays that role.

With regard to the evaluation of non-US credentials in order to determine their comparability to US credentials, the aforementioned three types of recognizing entities can sometimes undertake this task themselves if they have on staff the required expertise. However, in most cases, these entities will request that an applicant obtain a credential evaluation. Such evaluations are carried out by private, non-governmental entities called "credential evaluation services," which charge a fee that varies depending on the level of detail needed.

Mutual Recognition Agreements (MRAs)

Due to the decentralized nature of the US education system, as well as the similarly decentralized nature of professional licensure, it is not within the purview of the US government to enter into MRAs with other economies to assure or facilitate universal recognition within the United States of academic or professional qualifications. However, in the area of professional licensure, there are some examples of MRAs involving state-level and/or nongovernmental interlocutors on the US side. For example, in the field of accounting, an MRA was developed in order to help qualified professional accountants from selected economies (AUS, CAN, HK, IRE, MEX, NZ and SCO) obtain licensure to practice in the United States, while similar recognition is given to US Certified Public Accountants (CPAs) who wish to practice in these economies.

Appendix 2 Glossary

Academic mobility - students/teachers/lecturers/researchers (usually in higher education/tertiary education) moving to another institution (inside or outside of their own economy) to study/teach/do research for a period of time (limited time).

Continuous learning - provision or use of both formal and informal learning opportunities throughout people's lives in order to foster the continuous development and improvement of the knowledge and skills needed for employment and personal fulfillment.

Cross-border education - the educational services going to the student across borders, many economies are receivers and providers of cross-border education, and covering all levels of education – primary, secondary, tertiary education.

Digital age - period in the 21st century characterized by the rapid shift from traditional industry to an economy based on digital, information and communication technologies (Original Definition).

Digital connectivity - mutual accessibility of people via ICT-based services and tools, which enables them to communicate and collaborate.

Fourth Industrial revolution - the fourth major industrial era characterized by a range of new technologies that are fusing the physical, digital and biological worlds, impacting all disciplines, economies, industries, and human beings.

Qualification framework - a formal structure used to organise the levels of learning, using learning outcomes.

Human capital - the stock of knowledge, habits, social and personality attributes, embedded in the ability to perform labor so as to produce economic value (Goldin, 2016)[14]. Schooling, on-the-job training, health care, migration and home activities can

[14] In Oxford English Dictionary, human capital is defined as “the skills the labor force possesses and is regarded as a resource or assets.”

directly improve the stock of human capital. It involves investment in people and these investments increases individual productivity.

ICT - Information and Communications Technology – a set of tools and services used to produce, process, store, distribute and exchange information.

ICT literacy - possession of knowledge and skills needed to use digital technologies, communications tools, and information networks with the purpose of accessing, managing, integrating, evaluating, and creating information in order to effectively function in the Digital Age economy.

Inclusiveness - ensuring equal opportunities and participation of people in all aspects of life, including civic, social, economic, and political activities, as well as participation in decision making processes, regardless differences of race, gender, class, generation, and geography.

Innovation - policy or action aimed at improvement of existing mechanisms or imposed measures with the use of good practices and advanced technologies that help to progress and overcome problems and challenges.

Internet penetration - the number of people (generally expressed in percentage out of the total population of a given economy or territory) which have access to internet.

Rate of return to education - a summary of costs and benefits of the investment incurred at different points in time and it is expressed in an annual (percentage) yield. Mincerian wage equation estimates the percentage change in annual earnings due to one addition year of schooling. It is a measurement for private, monetary benefit of education.