

Advancing 21st Century Competencies in East Asian Education Systems

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EXECUTIVE SUMMARY

This research project studied the education reform efforts of five primary and secondary education systems in East Asia—Hong Kong, Japan, South Korea, Singapore, and Taiwan—focused on the integration of 21st century competencies. In these contexts, there is a drive to reform education to reflect fundamental changes taking place in society in the 21st century.

Although the term “21st century competencies” is not always explicitly used in East Asia (with the exception of Singapore and Taiwan), the reforms do involve similar expectations for national education systems as they try to meet today’s changed social context. Such reforms are not only about an addition of new competencies to an established set of expectations, but rather a comprehensive reconceptualization of education and its role in society.

The five systems largely share similar cultural heritages, and share similar philosophies of education, despite differences in polity and ideology. All five societies are among the more advanced economies and hence are among the first to feel the challenges of the 21st century. With no exception, all five systems have experienced significant, substantial, and comprehensive education reforms, which are ongoing.

All of the education reforms in East Asia started with changed expectations of society in the new era. They began by trying to identify the characteristics of a successful young person in the 21st century, and therefore define the expected competencies that would be required and link them to the core values of the society. The notion of “21st century competencies,” though interpreted rather differently in the different systems under study, showed significant commonalities across the systems. There is a tendency in all the reforms to regard knowledge and skills as just one dimension of the target goals, in addition to attitudes and other attributes in the affective domain. There is therefore also an emphasis on social and emotional learning, which is attained largely through experiential learning.

The reforms described in this paper come with rather comprehensive plans for implementation, often starting with dramatic curriculum reforms and related changes in the role of teachers and the school. All the reforms echo contemporary findings of the science of learning, and hence emphasize active learning, experiential learning, and diverse learning paths and outcomes for different students. Assessment, which is crucial, often poses the most serious challenges to implementation of 21st century competencies, and presents barriers to related reforms. University admissions also play a critical role in continuing unfavorable examination pressures. However, all the education systems under study are actively working on these challenges because society at large is increasingly aware of the obsolescence of the present system.

INTRODUCTION

METHODOLOGY

The study was started in September 2015 with a group of research teams assembled from each of the five jurisdictions. The process of research varied according to the context of the systems, as well as the partner researcher. Most of the researchers come from respected academic institutions, are knowledgeable about the recent reforms in education, and have relationships with decision-makers in their jurisdictions. Policy documents and implementation plans provided the main source of data in this study, although all the researchers also have firsthand experiences working on the implementation of the reforms in their jurisdictions. Apart from policy statements and implementation plans, there was also an effort to analyze the historical context, and to identify and explain any gaps between the stated policies and their implementation.

The first meeting of the research team was convened on November 12–13, 2015, in Shanghai, sponsored by Asia Society. The team discussed the theme and focus of the research at the meeting, after which they completed a first paper with initial background and an initial case study from each jurisdiction. A second meeting of the research team was held on April 23, 2016, in Taipei, sponsored by the National Taiwan Normal University. The second meeting, held in conjunction with a relevant conference on the topic, allowed the partner researchers to present their cases, and to consolidate their findings in the first phase. At the meeting, they also discussed and decided on the framework for the final case studies, including the background and context of policy reforms, the evolution of concepts, and in particular, the actual implementation as reflected in schools, and the issue of scaling up where appropriate.

With the exception of Hong Kong and Singapore, it should be noted that English was not the working language for most of the research teams. Since the case studies focus on abstract concepts where the nomenclature matters, there are issues of translation when the originals are in the native language. The researchers, bilingual as they are, are conscious of the differences in languages, and have tried very hard to present the most accurate translations.

BACKGROUND

All the five systems in East Asia are commonly known as belonging to the same cultural heritage. Although there are distinct differences among the societies, the shared characteristics are identifiable when compared to societies outside the region. Such characteristics include shared values of community, productivity, and efficiency, which are sometimes critically discussed within these societies.¹

However, despite these established cultural norms, all these jurisdictions have undergone rather dramatic changes in their economies and societies in recent decades. Japan was seen as the leading economy in the 1970s.² Singapore, Taiwan, Hong Kong, and South Korea were identified as models of newly developed economies called the Four Little Dragons³ (sometimes known as the Four Asian Tigers) in the 1980s. Tremendous changes in the Chinese economy and society started in the 1980s, and China became a major player on the global stage in the 21st century. These are the societies that were among the first to feel the pressure of change in the 21st century. The expansion of the tertiary sector of the economy, the collapse of huge organizations with pyramidal bureaucracies, and the explosion of technological innovation have all caused changes not only in the economy, but also in social lives, in families, and in human relations, and have caused changes in social norms and values, especially among young people.

While the economic success of these societies can be attributed to many factors, it is undeniable that the quality of the education system plays an important role. All five jurisdictions have demonstrated impressive performances in international comparisons of education. For basic education outcomes as measured by PISA, TIMSS, and PIRLS, there is no question that these education systems are at the top of the global rankings. However, this presents an interesting paradox. All of these systems have been trying to carry out fundamental changes to their education systems, whereas the rest of the world seems to admire their existing systems as the pinnacle of educational success. This report does not seek to resolve this paradox, but will help readers to understand a more comprehensive picture of these education systems. Rather than resting on their laurels, they are relentlessly focused on evolving and improving to meet the changing demands of the 21st century.

¹Cheng, K. M. (2011). "Education in Confucius society." In J. Banks (ed.), *Encyclopaedia of diversity in education*. Thousand Oaks, CA: Sage. 439–441.

²Vogal, E. F. (1979). *Japan as number one: Lessons for America*. Cambridge, MA: Harvard University Press.

³Vogal, E. F. (1991). *The Four Little Dragons: The spread of industrialization in East Asia*. Cambridge, MA: Harvard University Press.

Throughout all five education systems, there have been comparatively early efforts toward dramatic reforms in education in order to face the new 21st century economies and societies. Most efforts seemed to have started around the turn of the century in the late 1990s or early 2000s.⁴ However, the conceptions, target goals, substances, and processes of these reforms have evolved significantly over time. Repeated campaigns of reform have taken place over the past 15–20 years, and the pace of these reforms seems to be increasing.

The Rationale for Reform

The continuous reforms in East Asian education systems are prompted by the awareness of rapid and fundamental changes in society. The actual changes in society are often implicit in the reform documents, but the common belief is that education has to change. In Taiwan, the Ministry of Education references the “new economic era” and today’s “information society” as the backdrop for reforms. The challenges from society are made even more explicit in Hong Kong’s new initiative:

Society has changed! The World has changed! Globalization, economy transformation, technology advancements, social disparity, generational difference, a rising China, . . . have all contributed to a future which is volatile, uncertain, complex and ambiguous.

The change in the economic dynamics, unpredictability of careers, rapid changes in family relations, lightning breakthroughs in technologies, infiltration of the new media, and so on, have posed unprecedented challenges to human lives, and indeed has caused changed values and norms in the new era. Meanwhile, the changes have also brought about new horizons and new hopes for life.

The implications of such changes to society and the resulting expectations for the younger generation are always at the core of the reforms. Typical of the systemic approach to issues in East Asia, the Hong Kong reforms formulate a framework that is rooted in larger social and economic changes and place the individual students in this framework. As is also expressed in the Hong Kong case study:

[T]o the younger generation, all these have created new opportunities to breaking away from the conventions, find their own selves, explore new possibilities, and identify new ways of serving society. They are emerging as a new generation with new meaning of life, living with new aspirations. They face tasks of learning apt to the new era. They look forward to education of a different kind.

It is noticeable that the reforms did not take a “deficit model,” which starts with the identification of problems, and therefore the reforms were not designed to fix problems. They start with understanding the ongoing changes in society, look into the future, and develop aspirations for the future. In this way, the reforms present a particular model that could be called an “aspirational model” of education reform.

Although all five jurisdictions start their reforms with the changes in society, their reform goals are presented in rather diverse ways, representing the different philosophies of education in the five societies. In other words, although they are driven by a common vision of the new era, there are diverse perspectives on what a young person should aspire to in this new era. This perhaps also reflects diverse perspectives about the function of education within society. The following table shows the different presentations of the goals of education reform, although they largely move in the same direction.

⁴In some systems, the reform in education could be traced back to the 1980s. However, it could be argued that the proposed changes are not as fundamental as the recent reforms.

Table 1: Reform Goals

Despite their seeming differences, all the reforms in these systems try to define the relationship between four dimensions: aspired persons, reform objectives, expected competencies, and core values. Different systems have different ways of positioning the four, and may have different sub-categories within each dimension. In particular, the demarcation between competencies and core values may be different in different systems, but all are concerned with both.

SYSTEM	GOALS
Hong Kong	People qualified for a new era, so that they can survive, lead, and change in a society that is volatile, uncertain, complex, and ambiguous (VUCA)
Japan	Intellectual, moral, and physical prowess
South Korea	<ul style="list-style-type: none"> • An independent person who establishes one's identity and carves his/her future life, based on holistic growth and development; • An ingenious person who creates new things by applying various ideas and exercising indomitable spirit, built on basic knowledge and skills; • A refined person who relishes and develops human cultures, grounded on cultural literacy and pluralistic values; • A democratic citizen who interacts with the world with a sense of community and lives together with other people in the spirit of caring and sharing
Singapore	A confident person, a self-directed learner, a concerned citizen, an active contributor
Taiwan	Spontaneity, Interaction, Common good (1) ignite students' motivation and passion; (2) guide them to develop interactions with self, others, society, and nature; (3) help them apply learning in practice, experience the meaning of life, develop commitment to a sustained development of society, nature, and culture; and (4) achieve common good

As can be seen in Table 2, each system is attempting to include the following:

- (a) development of the self
- (b) interpersonal relations
- (c) thinking skills
- (d) good citizenship and social participation
- (e) contribution to the global world
- (f) basic knowledge and new knowledge



Table 2: Competency Categories and Sub-Categories

SYSTEM	CATEGORIES	CONTENTS
Hong Kong	Knowledge and skills	Trilingual and bilingual competency; T-shaped knowledge; knowledge to master and go beyond technologies; knowledge of the geography, economy, history, and culture of society, the nation, and the world
	Attributes	Critical thinking, team spirit, appreciation of differences, perseverance, creativity, humility, self-confidence, self-management, and self-control, ...
	Values	Integrity, responsibility, commitment, caring, respect of different values, tolerance of diversity, justice, rule of law, peace, ...
Japan	Basic literacy	Literacy, numeracy, and information/communication technology literacy (and manners and morals for ICT)
	Thinking ability	Finding and solving problems, creativity, critical thinking, logical thinking, metacognition, and adaptive learning skills
	Practical ability to act for the world	Independence and autonomous action (self-understanding and self-responsibility, promotion of health, decision-making skills and life-planning skills) Relationship building (collaboration and responsibility, sensitivity/expression, good relationship with others) Responsibility for building a sustainable future (responsibility, rights, and work, understanding of society, culture, and the natural environment, application of language and information, application of knowledge and technology, and problem-finding and problem-solving skills)
South Korea	Self-management competency Knowledge/information processing competency Creative thinking competency Aesthetic-emotional competency Communication skills Civic competency	
Singapore	Self-awareness Self-management Social awareness Relationship management Responsible decision-making	Communication, collaboration, and information skills Critical and inventive thinking Civic literacy, global awareness, and cross-cultural skills
Taiwan	Self-directed action	A sound body and mind and self-improvement Systematic thinking and problem-solving Planning, implementing, and creative flexibility
	Social participation	Use of symbols and communicative expression Technology, information, and media literacy Arts and aesthetic competence
	Communicative interaction	Interpersonal relations and teamwork Multicultural and international understanding Moral practice and civic consciousness

There have been very serious deliberations (even debates) about the definition and meaning of the notion of “competencies.” This is perhaps typical of the cultures of East Asia, where educators and academics evaluate theories thoroughly before they can be translated into policies and practices. This is described in detail in the Taiwan case study, where there is a strong civic society, but is also implicit in the South Korean and Japanese cases. Such debates are not as visible in the cases of Singapore and Hong Kong, which are perhaps the two most Westernized societies among the group. However, these theories were seriously deliberated within the government and among the reformers in these jurisdictions as well.

Such a strong theoretical underpinning may explain the thoroughness of the implementation of these reforms. In other words, educators do not only receive directives about concrete tasks and practical measures, but are given the bigger picture of the concepts and rationale behind the design of the reform. In the ideal case, the strong theoretical underpinning gives more room for educators to act autonomously.

The Orientation of Reforms

In all the jurisdictions studied, there is a common strong message of change from *knowledge* to *competencies*. As is expressed in the Japanese reform, the change is from “what do students know” to “what can they do with what they know.” This is often known as competency-based education. However, as can be seen below, the reforms have also gone beyond the competencies related to “doing” to include attitudes, attributes, and values that are very much in the affective domain in Bloom’s taxonomy.

The reforms are fundamental, and sometimes overhauling. In all of the jurisdictions, it is made clear that the reforms are not exercises in improvement, such as improving test scores, enhancing student motivation, or reducing dropouts. Those were the general concerns in education before the recent waves of reform. The reforms are indeed *reforms*. That is, they are about doing education in a different way. Hence all the reforms start with a renewed set of target goals, a new format for the curriculum, and a different preferred pedagogy.

In order to indicate that the changes are meant to be fundamental, there are efforts to change the discourse in education. In Japan, this is done through the introduction of the framework of “zest for life,” followed by a revised course of study. In Taiwan, this is done through the introduction of a twelve-year curriculum to replace the previous nine-year curriculum. In Hong Kong, the previous reform has changed the traditional academic subjects into “key learning areas.” Singapore is perhaps the champion in creating such discourse changes, with the most striking slogan to capture the core of the reform: “Teach less, learn more.”

In most cases, the term “competencies” is interpreted according to the local culture, and therefore it has taken on diverse presentations. However, there is a tendency within the notion of competencies to distinguish “knowledge and skills” from “attitudes and/or attributes.” The latter is often known in the West as “soft skills” or “non-cognitive skills.”

In addition, the jurisdictions prioritize an added dimension of *values*, which certainly moves beyond competencies but is included in almost all of the frameworks of these systems. However, the dimension of values receives two rather different interpretations. In Singapore, the values are what underpin the competencies. In Hong Kong, the values are what students acquire through the course of their education.

A Focus on Learning

All of the reforms, without exception, center on learning. Almost all the cases are influenced by the international trend of replacing education (an institution) with learning as the core of education reforms. In the education policy arena, the economic discourse has predominated, and policy considerations are underpinned by a rationale

of economic growth or global competitiveness at the society level, and employability at the individual level. There are still tangential mentions of such in the reform documents, but the rationale of reform has shifted from economic benefits to aspirations for the future of society. It is in this context that learning has taken center stage in these reforms. In a way, the reforms are trying to achieve a “learning shift,” as the Japan case study puts it.

It is visible in the case studies that the aspirations for young people have gone beyond expectations of the workplace, which is now understood to be only part of the challenge. This is made very explicit in the Japan case study: “Current proposed 21st century competencies [elsewhere] tend to focus on employability (and skillsets), but should pay more attention to personal attributes and formation of personal values.” This perhaps also explains why the notion of skills is less frequently mentioned, and even the use of the term “competencies” is under debate, because both of these refer to performances, presumably reflected in one’s work, rather than dispositions that are reflected in one’s mind.

Although the report in this study refers mainly to basic education, the trend is also reflected in the sectors beyond basic education. Vocational education, for example, has experienced or is undergoing transformation, from training for specific skills to personal development (often still with reference to one or two specific jobs). This is particularly significant in Singapore and Hong Kong, where the vocational institutions are transformed into attractive institutions with state-of-the-art facilities, whole-person development programs, experiential learning projects, as well as overseas opportunities. In Singapore, there are special schools at the secondary level to cater to students with special talents in sports and arts, who are not necessarily strong in academic studies. In Taiwan, the traditional vocational schools have all been transformed into alternative types of higher education.⁵ There is also a dilution of vocation-specific education in Japan and South Korea. All these reflect the workplace reality—the rapid obsolescence of vocational skills, the frequent change of jobs and occupations, the instability of jobs, and the growth of the tertiary sector of the economy—which demands higher educational qualifications. At higher education levels, all reforms tend to increase the general education or common dimensions of the curriculum, in addition to specific professional knowledge.⁶

Almost all the case studies mention two documents: the UNESCO Four Pillars of Learning—“Learning to Be, Learning to Know, Learning to Do, Learning to Live Together,”⁷ and the OECD DeSeCo Key Competencies,⁸ a sophisticated framework with broad categories of competencies related to “interacting in heterogeneous groups,” “acting autonomously,” and “using tools interactively,” referring to human relations, self, knowledge, and skills. Traces of influence from these frameworks could be found in each jurisdiction, either explicitly or implicitly, as well.

All the reform deliberations in the cases seem to reflect a profound knowledge of the *science of learning*.⁹ Three principles of the science of learning are particularly observable in the reforms: (a) students are active learners, (b) learning is achieved through experience, hence experiential learning (in the broad sense of the term) is required, and (c) different students may achieve differently and hence should be allowed diverse learning paths and diverse learning outcomes. Singapore, Taiwan, and Hong Kong have all turned to the

⁵In particular, about 15 years ago Taiwan phased out five-year vocational institutions, which ran from grades 13 to 17 (postsecondary).

⁶Typical examples are components of humanities in medical studies, and the non-engineering requirements in engineering studies (according to the Washington Accord, since 1998).

⁷Delors, J. (1996). *Learning: The treasure within*. Paris: UNESCO.

⁸*The definition and selection of key competencies*. A program conducted by OECD, published 2005.

⁹The National Science Foundation (US) has recently developed Educational Neuroscience to indicate the science of learning when applied to student learning.

science of learning in recent years. For example, there is a national effort in Singapore to capture the most recent findings from research on the science of learning. The most significant development, which is not covered in this study, is the creation of technologies for collaborative learning. There is a Center for the Science of Learning at the National Tsing Hua University in Taiwan with prominent researchers who work to translate the basics of the science of learning into effective pedagogies, and to actively disseminate them to teachers and parents.¹⁰ In Hong Kong, there are two networks of researchers focused on the science of learning, also emphasizing the translation of research into practice.¹¹

The most obvious reform goal in all the jurisdictions is to facilitate students to become **active learners**. In Singapore, self-directed learners are one of the four major goals of the reform, symbolized in the “Teach Less, Learn More” title of one of the recent reforms. In the Japanese reforms, the emphasis is on active learning in interactive classrooms. Active learning is also a notion used to underlie Hong Kong’s earlier reforms and its most recent campaign. In the South Korean case, although the phrase “active learner” is not used, there is emphasis on developing independence, self-regulation, and self-management, which places students at the center of learning. As will be further discussed below, the concept of active learning is easily accepted in these societies, but is of particular importance where examination pressure prevails.

Experiential learning is another major theme and essential element in all of the reforms. As is made explicit in the Hong Kong reforms, the distinction between competencies and attributes not only is a conceptual matter, but also pertains to different modes of learning. In the Hong Kong perspective, knowledge and skills are learned mostly through the formal curriculum, and are now also learned individually through other media. Attributes, which refer to attitudes, interpersonal relations, sense of responsibility, and so forth, can be learned only through experiences, or through experiential learning¹² in the broad sense of the term. This is echoed implicitly in all the other systems, where extracurricular activities and out-of-school experiences are emphasized. The related curriculum reforms all aim at compression of disciplinary learning in order to give way to experiential learning. This is the case in Japan (reduction of 30% of the formal curriculum), Singapore (33% reduction), and Hong Kong (reduction of formal curriculum to four key learning areas).

In a way, these systems of education are already known for their richness in **extracurricular activities**. It is not unusual, for example, to have 40–50 student clubs or associations in a school of 1,000 students in Hong Kong, and there are also numerous student activities in the other education systems in this study. So where is the reform? The reform is to reposition these activities as learning experiences that are essential for the holistic growth of the students. Hence, these activities are no longer taken for granted as “extra.” Space, time, and resources have to be allocated, teachers’ roles in these activities have to be redefined, more activities (e.g., service learning) have to be designed, the curriculum has to be restructured, and the assessment of such learning outcomes has to be totally reconceived.

In Taiwan, much of these experiential learning opportunities are provided by civil society. In Hong Kong, a recent study of a random sample of 228 schools reveals an average of 9.8 projects per school of experiential learning, where schools partner with the business sector, NGOs, and other non-education bodies. One of

¹⁰Professor Daisy Hung and Professor Ovid Zheng, both prominent neuroscientists, lead a team on dissemination of the science of learning to non-academics.

¹¹There is a campus-wide Strategic Research Theme of the Science of Learning at the University of Hong Kong, which comprises more than 60 members who work on learning in different disciplines. It is closely associated with NSF (US). Most recently, a team was established on educational neuroscience at the Hong Kong Education University.

¹²“Experiential learning” is sometimes given a specific definition, such as learning experiences with a structured design. Here it is used in the broad sense of the term to indicate all learning through experience, or “learning by doing.”

the major suggestion is to construct a “Big Education” platform to accommodate, facilitate, coordinate, and economize the mushrooming partnership projects between schools and the community organizations (both for-profit and non-profit organizations).

A general issue about learning beyond the formal curriculum is the matter of equity. Students from economically deprived families are often also deprived of resources to engage in learning experiences beyond schools. In Hong Kong, the recent initiative has discussed this, and hence one of the aims of the “Big Education” platform of school partners is to channel privileged resources to students of deprived families, as a matter of positive discrimination. The argument is that students of deprived families should not be doubly deprived of other learning opportunities, because the better-off students are able to enjoy such opportunities regardless of what schools do. The inequity is even greater, but it does not show in schools. In Taiwan, the civil society has advocated that innovation is the key to survive and succeed in the contemporary society, hence they pay special attention to the creative capability of deprived children, develop numerous programs to facilitate students’ innovative productions outside schools, and often see them through paths of success in such programs (e.g., through entrepreneurship).

It is noticeable that in these systems under study, learning in the affective domain and learning in the cognitive domain are seen as two rather different dimensions in education. In the school tradition in the past, school report cards have special boxes for conduct and/or application, in addition to many other boxes or scores. Teachers are supposed to write narrative statements in these boxes, as an appraisal of the student’s performance in the affective domain. Following such a tradition, there are rarely discussions about learning outcomes in this domain. Appraisal of such learning seldom enters the formula of scores or grades. In other words, the appraisal of learning in the affective domain is about “what they do” rather than “what they know,” and is appraised in a way but is not measured quantitatively.

Allowing for **diverse learning outcomes** among different students poses a challenge to these systems of education. In a culture that is comparatively collective in nature,¹³ conformity is perhaps a special feature of the school system. This is reinforced by another cultural characteristic: the emphasis on effort over innate ability.¹⁴ All of the reforms signify a readiness to do something to change the status quo and enable more personalized learning pathways and opportunities.

For example, in almost all these societies under study, there is an emphasis on project-based learning, which requires students to define their own objectives, plan their own activities, sometimes in groups, and present their results to a larger audience. Although more common in Western systems of education, until recently, such activities were rather rare in these systems of education under study. Hong Kong has included project-based learning as one of its four areas of emphasis in the last reform. Singapore has included “project learning” as a compulsory dimension of its university entrance A-level examinations. In Singapore, special technologies are designed to facilitate group collaboration on student-initiated projects. In the exam-free semester in South Korea, there is a requirement that students should be asked to design and plan their own study during that semester.

¹³The most convincing evidence-based argument on this observation is perhaps the work by Geert Hofstede, as represented in the classic G. Hofstede (1997), *Cultures and organizations: Software of the mind*. New York: McGraw-Hill.

¹⁴A seminal work on this effort/ability dichotomy is H. W. Stevenson and J. W. Stigler (1992), *The learning gap: Why our schools are failing and what we can learn from Japanese and Chinese education*. New York: Touchstone.

A Shift in Knowledge and Skills

It is noticeable that in almost all of the jurisdictions, there is not much new about how the reforms approach the development of knowledge and skills. In other words, the concept of 21st century competencies is not so much about new competencies, but rather, competencies that were ignored in the past, or that were only made available to (and thus acquired by) the few elite. As is mentioned below, many of the reforms under study revert to their cultural traditions in order to arrive at a comprehensive framework. In all these reforms, there is a general and implicit sentiment that the existing education paradigm is too technical, if not mechanistic. Therefore, there is a general tendency to emphasize the **affective domains** of learning, i.e., social and emotional learning. This is perhaps why the term “skills” is not used as a category in the reforms under study. For example, in Singapore, it is made explicit that “primary education is to focus on enhancing social-emotional development, non-academic curriculum, and lifelong learning in young students.”

In this context, Science, Technology, Engineering, and Math (STEM) education, for example, is not given prominence, and is mentioned only as part of the spectrum of knowledge. It is perhaps the general belief in those societies that STEM is important, but it belongs to the realm of knowledge, and as such, it does not pose particular difficulties. Indeed, young people in these societies have rarely struggled to adapt to **STEM and new technologies**. “They will learn, regardless,” is the comment by some teachers. However, there are indeed the introduction of very advanced studies in science and technology, such as biochemistry in Singapore, and advanced scientific research and state-of-the-art technologies in some schools in Hong Kong. These are again taken as normal in schools and are often not reported as a major part of the reform.

The challenge that is perceived from **technology** is not so much about mastering the technical aspects, but how to handle them, e.g., how to handle information, how to deal with relationships over social media, how to analyze social issues raised by new technologies, or how to face the changing norms and values because of new means of communication. This is explicitly expressed in the Japan case, where technological literacy is immediately supplemented by behavioral and moral aspects of education. In Taiwan, Information and Communication Technologies (ICT) are placed as part of the “communication competency,” under “technology, information, and media literacy,” but this also is connected to “arts and aesthetic competence.”

It is noticeable that in these reforms under study, innovation is not always mentioned in the reform literature. South Korea is a typical case where innovation is a major part of the national policy, and education is meant to play an essential part, but innovation is not significantly mentioned in the reform documents. Taiwan is another example, as mentioned, where the civil society is very keen to use innovation as a pivot to turn around the future of deprived children, but this is again not quite visible in the reform documents. In Singapore and Hong Kong, innovation is again very much emphasized in society, but it does not significantly enter the reform documents. It can only be explained that “reforms” in education in these societies use a discourse that is rather different from that of Western systems, and English-speaking societies in particular.

Nevertheless, as part of the reforms, there are indeed **new areas of learning** in the formal curriculum, in order to fill the gap of necessary but ignored areas. For example, career education is introduced in Japan. Local language education is added in Taiwan. There are also new models of learning introduced in “Integrated Study” in Japan and “Liberal Studies” in Hong Kong. Both try to blur the disciplinary boundaries and allow students to learn how to tackle issues or problems with integrated knowledge.

In the same context, the move toward 21st century competencies often refers back to the **traditional philosophy** about education. In Taiwan and Hong Kong, the reform framework refers to the traditional five dimensions: moral, intellectual, physical, social, and aesthetic. The Japanese course of study refers to three

dimensions, again in the tradition: *chi-toku-tai* (academic-moral-body, or intellectual-moral-physical). In South Korea, the overall ideal of education returned to *Hongik Ingan* (contributing to the overall benefit of humankind), which is the founding spirit of the first kingdom in Korean history. Hence, the so-called new competency frameworks are also old.

It is also noticeable that in almost all the jurisdictions, there is always an element of **service and a global outlook**. As mentioned above, the South Korean reforms started with the tradition of “contributing to the welfare of humankind.” The Hong Kong initiative mentioned “knowledge of society, the nation and the world.” The Japan reform aims at “motivation for social participation” and “practical ability to act for the world.” The Taiwan reform places “common good” as one of the major goals, and aims at “multicultural and international understanding.”

These are major concerns among educators in particular and society at large in general. In the case of Taiwan and Hong Kong, political turmoil has caused political confrontation and an ideological split in the community. While a similar split is emerging in Japan, there are other concerns about young people who prefer to stay at home after leaving school. There are non-governmental organizations like Global Incubation x Fostering Talents (GiFT), which is devoted to advancing global citizenship among youth. In South Korea, there are concerns about bullying among young students. Perhaps with the exception of Singapore, there are also concerns about the number of student suicides. Instead of trying to fix the problem from a deficit model, the reforms take a positive attitude and aspire to cultivate among young people a service culture and a global outlook.

IMPLEMENTATION AND CHALLENGES

The reforms in these societies cannot be fully understood unless we also look at how they are being implemented. It must be acknowledged that all the systems have made tremendous efforts to ensure effective implementation, and the implementation measures are comprehensive.

Fundamentally, the new role of students as active learners is accompanied by the changing role of teachers as facilitators of self-directed learning, coordinators of experiential learning, and mentors of youth development in the affective domain. Such changes would not happen naturally. In many systems, reforms stop at designs, with the assumption that a good design would be automatically implemented. In reality, real changes are achieved through complex processes.

Almost all the systems under study understand implementation as an important factor for success in the reforms. In particular, teacher preparation is very much emphasized in almost all the reports. However, the implementation processes are not always explained in detail in the case studies. In Singapore and Hong Kong, the reforms are in theory “top-down,” as they are initiated and planned by the government. However, tremendous efforts were spent on training principles and preparing teachers for the reforms. In Singapore, where teachers are basically civil servants, there are structured teacher professional seminars and principals’ circles where plans of reform are implemented.

An example is in Singapore, when the First Masterplan for ICT in Education was introduced in 1997. At that time, 60 expert teachers were invited to interact with Israeli experts for six months, so as to explore how IT could be integrated in pedagogy. Each teacher then disseminated what they had developed to six other schools. Another example is in Hong Kong, four years before the implementation of the new curriculum, when schools in groups of 12 were invited to a workshop with six people from each school (including the principal and board chair) to brainstorm why, what, and how to make the curriculum changes required by the reform.

Schools are also expected to play a new role as a hub of learning rather than the primary institutions of formal education. Parents are expected to create favorable environments for students' autonomous learning. In Taiwan and Hong Kong, in particular, as mentioned above, a large number of businesses and community-based organizations are creating partnerships with schools for experiential learning.

The changing expectations for education have also posed new challenges to teachers. Teacher professional learning has become of prime importance. Teacher professional learning takes place in these societies mainly as group work, through the collective preparation of lessons, and in collective decision-making on curriculum and pedagogy matters. In Hong Kong, there is an expectation of 150 hours of “continuous professional development” (CPD) for each teacher.

Professional Autonomy

One particular feature in all the reforms in this study is the trend toward **decentralization and deregulation** of the school system. In some of the systems under study, the structural centralization is felt to be inappropriate and unnecessary, but it may take time to go against the tradition and gradually develop school autonomy.

The Hong Kong system has long developed a school-based model, which was further reinforced in the last reform, where curriculum reform was achieved through deliberations in schools at the grassroots. The new initiative in Hong Kong suggests greater autonomy for schools and teachers as a professional necessity. Singapore, in its “tight-loose” approach, introduced incremental yet progressive deregulation of schools, so that in the end, schools have now moved away from uniformity, and diversity is prominent. In South Korea, there is a built-in call in the reform for “autonomy and flexibility to each school in organizing and implementing the curriculum, enabling each school to meet its specific needs.” In Taiwan, there is almost an identical call for “flexibility and autonomy for schools to develop school-based curriculum according to their local needs.”

There seems to be a common challenge in that **teachers are overwhelmed** with a heavier workload, due to the increased learning experiences undertaken by students and due to the school autonomy that expects teacher participation in curriculum decisions. Teachers are also overloaded by administrative chores. The figures presented in the Japan study are terrifying, but the phenomenon is by no means unique. It is not uncommon for teachers in all these systems to leave school at 7 or 8 in the evening. This is also because teachers in these societies do not see themselves only as classroom teachers. In a recent reform document for teachers in Hong Kong, it is specified that there are three roles for teachers: “caring cultivator of students' all-round growth, inspirational co-constructor of knowledge, and committed role models of professionalism.” One of the suggestions in the recent Hong Kong initiative calls for a fundamental review of human resources in schools, hinting at a substantial increase in the number of teachers, paraprofessionals, and supporting and administrative staff. Such suggestions, though valid for the changed role of schools and teachers, often met with political oppositions because of government budgetary constraints.

What is not easily detectable is the role of **teacher education institutions**—the faculties and schools of education, in particular the teacher education programs—which do not always play a role that matches the call for reform in education. In many of such institutions, teacher education is still carried out in the conventional mode, with little awareness of the changing environment. There are efforts in only isolated institutes that are conscious of the tide of change—for example, in Singapore, where the National Institute of Education is part of the research and training arm of the Ministry of Education and plays a pivotal role in providing state-of-the-art research support to the reforms.

Assessment and Learning Outcomes

The changes in the curriculum and the emphasis on experiential learning pose serious challenges to **assessment and examinations**. As mentioned earlier, the Japan reform calls for a change of testing from “what students know” (knowledge acquisition) to “what they can do with the knowledge” (knowledge application). In other words, there has to be a shift from testing the substance of knowledge to testing the use of the knowledge. This is similar to how the PISA exam assesses students’ ability to use knowledge rather than the amount of knowledge they possess.

However, a real assessment of the students’ ability to **use their knowledge**, as in the science of learning, should be the students’ ability to apply what they have learned to real-life situations and in collaborative groups. Hence, the ideal assessment should be creative, integrative, practical, and collaborative. This is rare. As described in the Japan case study, the public examination (the National Center Test) that is used by the majority of universities for admissions purposes is basically multiple-choice questions. The questions are designed with the criteria of simplicity and rigor.

The strong emphasis on **learning in the affective domain**, which is now occupying a large part of the reformed curricula, poses another challenge to learning outcomes. Much of the learning in the affective domain, predominately experiential learning, does not lend itself to immediate and visible outcomes that can be measured by traditional tests. The outcomes are often detectable only in the long run and often in settings outside of the formal testing environment. New assessments via technology (such as interactive portfolios) may solve some of the difficulties, but there is still a long way to go before they are widely accepted in school systems and for university admissions.

As is reflected in the cases of Hong Kong, Taiwan, and Japan, the high-stakes exams for university entrance are often the fundamental obstacle to these reforms. In Hong Kong, the recent reform campaign sees public exams and university admissions as the first and foremost barriers to expanding students’ learning experiences, because preparations for public examinations occupy all of students’ time. Hence, reduction of unnecessary examination pressure and broadening of university admissions criteria are seen as the most urgent points of reform, and there are concrete proposals.

As is reflected in the Taiwan case study, the public examinations and university admissions pose the major obstacle to reforms there as well. There are two entrance examinations at the end of junior high school and senior high school, respectively. “The entrance examinations were paper-and-pencil tests on factual knowledge, which therefore shaped junior high school and senior high school pedagogical practices into knowledge acquisition and memorization. The teacher transmitted knowledge from textbooks to the students, who learned by rote learning and drills, and sometimes had to teach students to the test.”

In Japan, there are very rigorous procedures for university entrance, which include a public examination, the National Center Test, as well as school recommendation and admissions office tests conducted by the individual universities. For the sake of rigor in testing and for reducing the administrative burden on university admissions, the tests are basically multiple questions requiring simple answers. The case study has a very vivid explanation of how all these have led to rote learning, and have led to the research finding that “there were few changes in classroom teaching styles” between 2002 and 2010, despite the promotion of reforms. Therefore, proposed changes to the exam will be implemented in 2019.

High-stakes examinations and university admissions seem to be the Achilles’ heel of 21st century reforms. While there are policy intentions and measures to deregulate and liberalize schools, high-stakes examinations demand all schools to focus on examination requirements at the expense of reforms. While all reforms intend to give

students diverse paths of learning, the high-stakes examinations have a unifying function, where all students have to follow the same curriculum, undergo the same learning process, and prepare for the same tests.

While reforms expect students to be active learners and expect teachers to only be facilitators of learning, teachers are obliged to teach to the test in order for their students to achieve high scores for university entrance. While the ideal is to establish autonomous and school-based curriculum development, the examination syllabuses tend to dictate the contents of learning. While reforms aim to expand students' lives to more experiential learning beyond the formal curriculum, preparation for the high-stakes examinations has fully occupied students' time and energy. While reforms try to move students away from examination scores so they can enjoy broader learning opportunities, university admissions still pay attention mainly to examination scores.

This study does not present many optimistic solutions to counteract the pressure from high-stakes examinations. However, the case studies do present rather diverse views toward the unfavorable situation. In the Taiwan case, there are processes to change the high-stakes examinations, particularly the High School Entrance Examination, from knowledge-based to competency-based, and from norm-referenced to criterion-based, and to move away from standardized tests, in the hope of thus reducing the unfavorable examination pressure. Hong Kong's most recent initiative has high hopes of cracking the examination challenge by (a) changing the modes of examination, so as to reduce unnecessary pressure and competition and (b) lobbying universities to take a broader view of admissions beyond exam scores.

The South Korean reform presents an interesting innovation, which is to create an exam-free semester within the junior secondary school years. This is a very thoughtful and positive move, because the exam-free semester is designated for students' self-directed learning. This is a bold attempt to detach students and schools from examinations, and could fundamentally prompt educators to rethink the genuine meaning of school and of learning. The Singapore authority is perhaps more conscious of the situation than many others. Their approach, again in the "tight-loose" methodology, is to gradually ease examination pressures and reduce the high stakes by, for example, creating exam-free tracks during the transitions into secondary schools and junior colleges. There are also experiments underway to use "student learning profiles," which may replace one-off paper-and-pencil tests. In any case, any positive breakthrough in the realm of high-stakes examinations and university admissions will bring new hopes to all the well-intended and well-designed reforms.

CONCLUSION

Observing the sweeping education reforms taking place in East Asia, one cannot help but notice a holistic perspective on education. This is rather different from what may be called the existing analytic perspective.

This is reflected by the general acceptance that the growth of an individual is a holistic process, rather than an accumulation of separate skills or competencies. A person's knowledge is now understood to be the holistic integration of many learning experiences, rather than adding all the academic subjects together in a patchwork fashion. School lives have to be holistic. Teaching and learning in classrooms have to be an integral part of comprehensive learning experiences inside and outside of classrooms and schools. Schools must become holistic learning hubs, where effective learning is not only a matter for the principal, the teachers, and students, but the concern of all stakeholders, including parents, alumni, and different partners from the community.

As a result, education reforms can achieve only when there is a holistic coordination of change in all sectors related to education. Shifts in students' learning have to be supported by shifts in the role of teachers and even parents. Reforms in teaching can happen only when there is a change in the examinations and university

admissions, and so forth. Education reform requires coordinated efforts within the government, so that it is not only the responsibility of the Education Ministry or its equivalent. Education development should be the concern of all sectors of society and requires an alliance of businesses, non-profit organizations, religious bodies, and political parties, among others.

All of these aspirations seem rather difficult to achieve. However, this is exactly what the education systems in East Asia are trying to do. The progress may be incremental, and sometimes with setbacks, but there is a belief that the effort will pay off. In some ways, there is evidence it already has. Educators in all these societies would argue that their country's high performance in international comparisons such as PISA, TIMSS, and PIRLS is due to recent reforms that have shifted away from the traditional pedagogy. Indeed, in most of these societies, despite all kinds of ups and downs in reforms, there have been incremental but significant changes in education in the past decade or two to move away from rote learning and meaningless memorization.

It is noticeable that in these societies, the respective governments play different roles. This is a matter of the political system as well as the political culture. There are different expectations of the government in developing education, and the government takes on different functions. The study surveys a wide spectrum of governance among the jurisdictions as it relates to education. For example, Hong Kong and Singapore are both city-states¹⁵ with no sub-level governments. In both cases, education funding is from the central government. However, while all schools in Singapore are coordinated by the government, Hong Kong operates a school-based model where school sponsoring bodies, which are non-government voluntary agencies, exercise autonomy over their respective schools. Meanwhile, in Japan, South Korea, and Taiwan, there is local funding and local governance, but the Ministry of Education has a relatively high degree of regulation over the prefectures (or their equivalents) and over the schools. This demonstrates that regardless of the government capability and the administrative structure, there is always a way to move education forward.

CASE STUDIES

Below are brief introductions to the case studies prepared by researchers in each of the five jurisdictions.

HONG KONG

The Hong Kong case presents a sustained exercise in education reform that was launched in 1999. The first cycle was completed only in 2016. This continuity is perhaps because changes in government leadership did not affect education development very much, and Hong Kong is blessed in this respect. However, as the society continues to open up and suffer from political confrontations, it is not certain whether the context will become more favorable.

It is also noticeable that the discourse of the last reform and recent initiatives do not hinge on an economic discourse. The concepts of global competitiveness (of the whole society) and employability (of individuals) are not part of the rhetoric of reform. They are only implicit, and have given way to a much broader concept of change in society. This was made more explicit in the recent initiative (Education 2.1).

Unlike the other country cases in this research, Hong Kong did not start with a delineation of an aspired individual person. It started with the concept of learning and tried to create room for more diverse learning.

¹⁵Hong Kong is not a state. It is part of China under the “one country, two systems” arrangement. However, Hong Kong has its own Basic Law and is a separate jurisdiction.

This continues in the recent initiative, except that it is more explicit about the expected learning and the modes of learning appropriate to different types of learners. This is perhaps based on an implicit understanding that the attention to learning should be on the process, and not on the immediate outcomes. This is perhaps also a reflection of the general approach to macro-policies in Hong Kong—a free market with diverse ideologies, where things are accomplished not by consensus but by agreed-on processes.

The Hong Kong case illustrates how education could evolve through long-term continuous reform. On the one hand, the reform did not stop short at a desirable design, but involved a meticulous process of preparation, which helps explain the rather thorough implementation of the last reform. On the other hand, education reforms do not take place in a vacuum. There are all kinds of social, political, and even demographic factors that can interfere with the reform processes. Teachers also change from generation to generation, and reforms have to be continuous. Meanwhile, new challenges emerge and unintended outcomes occur.

Visitors to Hong Kong are often interested in the wide alliance in society where, despite diversity, the concern about education is unanimous. This may explain the rather swift mushrooming of organizations among students, parents, and alumni. This may also explain the numerous engagements of the business sector and NGOs in committing themselves to partnership with schools for student learning.

In hindsight, the progression of the modes of reform is interesting. The reform first started with discussion about the aims of education. Implementation of the reforms started with a change in the structure, which created an obligatory context for change. The Hong Kong reform, which started at the turn of the new century, changed the school system from a step-wise, selective British tradition (five years secondary, two years matriculation, and three years undergraduate as a norm) to a six-year secondary school before a four-year undergraduate program. The change started in 2009 and the first cycle was complete only in 2016.

The actual reform itself involved dramatic changes of the curriculum, which became a process of revolutionizing the discourse in education, and a process of redefining the focus of education from teaching to learning. While the curriculum change aimed at compressing the traditional subjects and creating space for diverse learning experiences, the new initiatives further pushed the learning frontier into experiential learning. This was achievable only by expanding the organizers and implementers of the reform beyond schools to other sectors in the community.

The Hong Kong case, with its newly launched initiative known as Education 2.1, is a test case for reforms when the government is relatively weak. This test will go beyond the reliance (or not) on the government, because the reforms have created a by-product, which could be even more meaningful than the main product, that moves education forward by mobilizing non-government capacities. Similar to the other cases, except for Singapore, the Hong Kong case demonstrates yet another model of how reforms are carried out in a decentralized system. Here, structural changes, legislation (e.g., for the Incorporated Management Committee for schools), examination, university entrance, and steering funding methods have all constituted a system that could move forward despite the lack of centralized directives.

Please read the full case study entitled “Advancing 21st Century Competencies in Hong Kong” by Kai-ming Cheng and Liz Jackson from the University of Hong Kong and Wing-on Lee from The Open University of Hong Kong for more information about the specific reform initiatives, achievements, and challenges.

JAPAN

The Japanese system seemed to demonstrate a very early awareness of the necessity for change. There have been many waves of reform, and various committees established, at different times in history. The most recent education reform, “Zest for Life,” which began in 1996 and embodied the Japanese conceptions of 21st century competencies, demonstrates how traditional cultural factors, dating back to the Meiji restoration, influenced the heavy emphasis on the affective domain of learning to meet the needs of contemporary society. It is a return to the basics of *chi-toku-tai*, or intellectual, moral, and physical dimensions.

Fundamental to the recent reforms is a shift from what students know toward what students can do with the knowledge that has been acquired, which is reflected in the proposed reforms to curriculum and assessment.

Japan operates a relatively centralized system of education. The government authority governs the overall structure and human resources of schools. However, it is centralized not in the sense of control, but more in the sense of uniformity. Schools in Japan each have their own character and style, but schools follow more or less the same curriculum and the same pattern of operations.

The Course of Study in Japan is a comprehensive framework that encompasses aims, objectives, curriculum content, pedagogy, and assessments. According to the case study on Japan, the basic principles in the revised Course of Study have been integrated into subject syllabuses and the pedagogy. Hence, the Course of Study provides a very powerful vehicle and tool to steer education in the direction of 21st century competencies. The Japan case study illustrates how the course of study combined with extensive teacher professional development on “active learning” pedagogies has moved 21st century competencies from the system level into classrooms.

However, a survey of the implementation of these competencies and associated pedagogies showed that while they are fairly widespread in elementary and junior high schools, they are not in upper secondary or high schools. Similar to almost all the other systems under study, the major obstacle to reform in the curriculum and pedagogy is the university entrance examination, which has not changed for many years. In Japan, the mainstream test is used by 75% of universities and colleges. As is reported, the tests are very traditional, consisting of mostly multiple-choice questions, which encourages rote learning. Hence, against the intentions of the reform, the National Center Test tests the quantity of knowledge rather than the depth of understanding, let alone the use of the knowledge. There are now plans to change the university entrance examination to include a greater focus on critical thinking in order to drive more reform.

As also reported in the Hong Kong case, Japan faces a decline in the student population, but teacher workloads are increasing. This is partly because of the demands of teaching, but also because of the administrative burden. Similar to all the other systems under study, teachers stay late at schools in Japan. The statistics about teachers’ increased overtime hours are alarming, but perhaps are representative of teachers’ lives in the region.

A point about technology: The Japanese case demonstrates an attitude toward technology that could be representative of the entire cultural group of East Asian education systems. In the expectations articulated for students, ICT literacy is listed as parallel to language literacy and numeracy. This is a typical perception about technology, which is taken for granted as a basic competency. However, the reforms add that ICT literacy also includes “the manners and morals for ICT.” This expresses a common concern in this part of the world, which is not quite made explicit in other systems—the fear that human beings will be overtaken by machines.

Please read the full case study entitled “Advancing 21st Century Competencies in Japan” by Daisuke Kimura and Madoka Tatsuno from Global Incubation x Fostering Talents (GiFT) in Japan for more information about the specific reform initiatives, achievements, and challenges.

SOUTH KOREA

The South Korean case demonstrates how a vision for the role of education in society is combined with a creative approach to implementation. The policies and plans are excellent examples of 21st century thinking about education, yet in a culture of long collectivistic tradition. They also demonstrate how a society can make best use of its collectivistic culture, yet develop healthy individuals.

South Korea has undergone multiple revisions of its curriculum in recent years. The most recent national curriculum reform in 2015 is based upon the overarching principle of *Hongik Ingan*, an ancient aim of education, meaning “for the benefit of humankind.” It is an integration of individual development with the wellness of the larger society and the whole world. The South Korean reforms are also an integration of an ancient philosophy of education with the contemporary call for “living together.” This infiltrates into all the new measures of education reform.

The curriculum reform is also based on the desirable characteristics of a person and the key competencies that are expected to be developed in a student. Each of these started with attributes of an individual, yet are connected to a larger social objective. The reforms point toward how to give meaning to students’ lives, and hence fulfill the most fundamental purpose of education. And yet, the reforms seem to have resolved an apparent paradox: How can the meaning of an individual’s life be developed in a highly competitive and communal culture? Instead of trying to eliminate exams and reduce competition, the reforms try to move students away from thinking only about their own achievements to thinking of their individual contributions to society and humankind. Each and every dimension of the reform starts with the student as a person, yet points to a contribution to society. The reforms implicitly define social wellness as the ultimate meaning of life.

The reforms frankly acknowledge that—despite good international test results—the South Korean education system with its heavy emphasis on memorization and competition for college entrance has contributed to students’ low interest and confidence and to adolescent suicide and bullying. At the same time, the reform measures succinctly illustrate a forward-looking perspective. The reforms do not evade current problems, but also do not stop at trying to overcome the problems. It’s a futuristic model of thinking, rather than a deficit model, which stops at fixing existing problems.

Despite the problems identified, which are serious, the solutions all point to building healthier individuals and a healthier society. The problem of student suicides, for example, is tackled not by remedial measures, but by allowing students new space for discretion in designing their own curriculum and by allowing them to engage in innovations. The answer to the crisis of student suicides lies in the discovery of students’ own dreams and talents, self-reflection and self-improvement, and ability to design their future. Hence, it is a proactive way of guiding students to find meaning in their lives.

Innovation is also a fundamental theme throughout the reform. This is consistent with South Korea’s overall national policies of developing itself into a land of innovations. One can see from the reform measures how innovations start with individual students in the context of education. Innovations start with allowing students to have more space, and to design their own learning. Exercising personal discretion is rather foreign to a culture where examinations dominate the education arena, and where students’ time is fully occupied by activities prescribed by schools. Innovation is also identified as “future-orientation.” It echoes the futuristic discourse in the reform policies.

The proposed reform measures all reflect the contemporary frontiers of the science of learning. The suggested “exam-free semester,” for example, is an extremely innovative move to free up lower secondary students’ space from examination pressures, to allow them to focus on self-directed learning and to discover their own talents and dreams, including career exploration. This very positive yet practical initiative serves to cultivate students

as active learners. This is followed by the design of collaborative learning and related assessments, such as portfolios. All these echo the paths to effective learning as identified by the science of learning.

The case study on South Korea does not describe the actual implementation of these reforms, partly due to the fact that they were started only in 2015, and hence it is still premature to do any meaningful evaluation.

Please read the full case study entitled “Advancing 21st Century Competencies in South Korea” by Hyo-Jeong Kim and Jeongmin Eom from the Asia-Pacific Centre of Education for International Understanding (APCEIU) in South Korea for more information about the specific reform initiatives, achievements, and challenges.

SINGAPORE

The Singapore system of education is perhaps the best managed in the world. The system is centralized, meaning the government has full control of the entire system. With few exceptions, all schools are working under government administration. However, this is also a very intelligent government, which has the lowest level of corruption ever known in the world and is perceived by its citizens as fully devoted to the wellness of the nation. It is therefore very open-minded to whatever is good for the nation. It is one of the best learning governments, with a high self-renewal capability. In this context, reform in education in Singapore is a continuous process.

However, the high degree of centralization does not automatically mean tight control. The “tight-loose” notion seems to best reflect the situation. There is tight control of some aspects of education alongside a gradual loosening up of other parts of the system to make room for students’ individual development.

In the early 1980s, the Singapore education system was known for its streaming or tracking process, which classified primary students into streams after fourth grade according to their performance in language. The strongest students were placed in bilingual streams (meaning instruction in English and the mother tongue, which is either Chinese, Malay, or Tamil), some were placed in faster tracks, and the weaker students were placed in monolingual streams (meaning instruction in English). This was seen as an extremely elitist system and gradually shifted to subject matter banding after careful deliberation by the government. Other structural changes included creating a broader range of secondary schools and broadening the entrance criteria for secondary schools beyond just academic scores. The goal, as described in the case study, is to create multiple pathways for students with “bridges and ladders” between them.

The Thinking Schools, Learning Nation initiative in 1997 was a significant step in shifting the philosophy of education toward diverse learning experiences. *The Teach Less, Learn More* initiative in 2004 lowered the center of gravity of reform to the level of pedagogy. In many ways, this is a rather revolutionary movement focused on changing the role of teachers and classroom learning. The *Total Curriculum* initiative in 2009 led to establishment of institutions and other changes that enable multiple pathways (such as arts and sports) that support the development of diverse talents among students.

Singapore is the only system within the five country case studies where the term “21st century competencies” is formally used in policy initiatives. This perhaps is a reflection of the pragmatic nature of Singapore’s society, but it also demonstrates the broader context for education policy reform. However, it is noteworthy that in the Total Curriculum initiative, emphasis is also placed on social and emotional learning, which is also shared by the other four case studies. If we follow the ideology of pragmatism in Singapore, the social and emotional aspect of education is not taken as an ideal, but as a necessity in the 21st century.

Singapore's framework for student outcomes, reproduced in the case study, illustrates the philosophy behind education reform. The outer ring of the framework names the target goals of education, which could be perceived as learning outcomes. These four goals are substantiated by three broad categories of 21st century competencies. In turn, these competencies result from five social and emotional attributes, which are themselves underpinned by core values. The conceptual layers describing the goals of education, the competencies, the attributes, and the core values are very clear.

Perhaps because of a strong government, the development of education in Singapore is often supported by changes in the institutional structure of the education system. For example, one measure of implementing the Total Curriculum involves students' smooth transitions into secondary school, the overlapping arrangement of secondary schools with junior colleges, the establishment of schools for art, music, and sports, etc. With attention to institutional structures such as these, reforms are therefore more sustainable. This perhaps also demonstrates Singapore's consideration of long-term outcomes and its carefully designed tripartite reform process, in which government, education practitioners, and education researchers all consult and collaborate with a view to continuous improvement, a key enabling mechanism that is not always possible in other systems.

It is noticeable that Singapore has been among the pioneers in learning technologies in schools, but it is mentioned only as a part of the reform. The First Masterplan on information technology was launched as early as 1997, and the most recent initiative also includes using technology to facilitate individualized learning and collaborative learning, not only in the classroom but also at a systemic level. Technology is regarded as very important in Singapore, but it is regarded as a tool that is taken for granted, and it is conceived at a more practical level. Therefore, in spite of its high level of technology development, Singapore considers technology as a means to an end, rather than as an end in itself. We can see similar attitudes toward technology in the other countries under study.

Please read the full case study entitled "Advancing 21st Century Competencies in Singapore" by Jennifer Pei-Ling Tan, Elizabeth Koh, David Hung, Melvin Chan, and Pamela Onishi from the National Institute of Education at Nanyang Technological University in Singapore for more information about the specific reform initiatives, achievements, and challenges.

TAIWAN

Almost in contrast to Singapore, the political situation in Taiwan has caused the emergence of a very powerful civic society, which also serves as a platform for forming coalitions in the realm of education. Different political forces compete to play a positive role in education, and their platforms on education point largely in the same direction. However, as is reflected in the case study, many of the government initiatives are prompted by non-government organizations or their coalitions.

Similar to other systems in this study, the call for reform in education in Taiwan has been a continuous phenomenon since the late 1990s. Although there have been changes in government over the past decades, the endeavors to develop and implement education reforms seem to be sustained regardless. The continuous calls for reform may be a response to the sustained effort of the government and society to reform education, but also may partly reflect the difficulties in promoting changes in education where traditional Confucian ideology is so deep-rooted.

Taiwan is in the process of implementing structural changes that involve shifting from a nine-year curriculum to a twelve-year curriculum. Taiwan is a democracy, but there is rather tight monitoring over schools by the

Ministry of Education, and there are standardized examinations at the end of both junior high school and senior high school. The public examinations are double-edged. On the one hand, any change in the examination, either in the content or in the assessment methods, may be used to steer reforms in pedagogy. On the other hand, the high-stakes examinations have exerted unnecessary pressure on schools and students, depriving them of room for fundamental changes that are needed by society.

Of the five countries under study, Taiwan is perhaps the one that has best preserved the Confucian culture, and that has tried to apply Confucian ideology to a modern society. For example, there has been much debate in Taiwan about the translation and meaning of the word “competency.” In response, they have come up with the notion of *sù yǎng*. The difference between “competency” and *sù yǎng*, as it is argued in Taiwan, is that competency is something assessed by performance, whereas *sù yǎng* starts with exploring the self. Whereas competency could be attained by studying and training, *sù yǎng* would require an internal change (often understood as the mindset or disposition) of the person.

Hence, the sense of new expectations from the 21st century reality has come in two phases: from “knowledge” to “competencies” in 2000, and from “competencies” to *sù yǎng* in 2014. These are two large conceptual leaps. Although the Taiwanese authorities have realized the need to support the implementation of such large shifts, and their measures are quite comprehensive and meticulous, the actual impact of these changes is yet to be seen.

Please read the full case study entitled “Advancing 21st Century Competencies in Taiwan” by Hsiao-Lan Sharon Chen and Hsuan-Yi Huang from the National Taiwan Normal University in Taiwan for more information about the specific reform initiatives, achievements, and challenges.



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