4. Case Study of Education Practices

Subsequent to arranging policy issues of strategy, priority or committee, it will be the time to sketch and realize education programs. This Chapter 4 is exploring the education practices in order of general activities by primary/secondary education, higher education, and finally professional education, and some general education activities by international organizations

4.1. General Activities Mainly by International Organizations

This chapter shows that international organizations have been more and more paying attention to higher education, and trying to reach out universities and academia. It is worthwhile to recognize that ICES, the first international forum on standardization education is now discussing formalization. Some of them are summarized below, and detailed information can be found in Annex C. #104 to #118 or Annex D81 to D88.

- ✓ ISO award for Higher Education in Standardization (2007) - SO created this award to encourage and recognize successful programs in higher education on standardization. ***– ISO (Annex C#114)***

- ✓ IEC Lecture Series I(2005) and II (2007) ***– IEC (Annex C#114, #115)***

- ✓ IEC Challenge – 'International Standardization as a Strategic Tool', comprising the commended papers from the IEC Centenary Challenge. ***– IEC (Annex C#112)***

- ✓ Cooperation between ITU-T and Universities - Regular Consultation Meetings and online Information Exchange ***– IEC (Annex C#112)***

- ✓ IFAN WG16 Education and training - To support and promote initiatives in education and training in the standardisation field at international, regional and national levels ***– IFAN (Annex C#113)***

- ✓ COPRAS website is providing education-like information about ICT standards-making to European Union-supported research projects ***- CEN, W3C, et al(Annex C#106)***

- ✓ APEC Strategic Standards and Conformance Education Project – Phase I – Case Studies and Curricula Development, Phase II – Textbook Development ***- APEC (Annex C#103, #104)***

- ✓ UNECE Recommendation "I" Methodological studies and education ***- UNECE WP6 (Annex C#103, #104)***

- ✓ Standards Engineering Society (SES) has established a certification program to recognize persons who have demonstrated a high degree of professional competence in different areas of standards. ***- SES (Annex C#117)***

- ✓ EURAS wants to help change this situation and supports the development of standardization curricula by providing a platform and opportunities for the discussion, development and exchange of teaching material. ***- EURAS (Annex C#107)***

- ✓ International Committee for Education about Standardization - The first international forum about standardization education. *Formalization is under discussion in 2008. ***- ICES (Annex C#108)***

4.2. Primary/Secondary Education

Starting from the cases of educating children; we identified ten cases from six economies – Japan, Korea, Philippines, Thailand, Turkey and UK as listed in <Table 3>. The METI (Japan)'s case is unique in the way of providing a short special lecture program for schools 'on demand'. Per request, they do provide lecture of 100 minutes or less about importance of standards in daily life and in society. In 2006, 1,351 students from 25 schools took the class.

In Korea, there are two different activities are ongoing. The 'Standards Olympiad' of KSA is a two day camping program consisting of lectures and group contest activities, participated by 300(100 groups) children in 2007. Also, a sub-chapter for secondary school textbook is under development; the chapter will be taught in class from 2010 nation-widely.

In Philippines, BPS in DTI operates a campaign called '*Standards Blitz*' and introduced a few programs in primary/secondary education. They have developed four modules/products for mobile learner, and also seven lesson plans on four products to teach students. In total, around 1,000 teachers, industry experts, and students were educated. The BPS organized a 'Standards Essay Writing Contest' to celebrate World Standards Day in 2006.

In Thailand, TISI had successfully completed an outstanding nationwide education project '*Integrating Standardization in Education*' from 2003 to 2006. The project focused on training of teachers, and operated several types of contests. In total, there were 2,354 teachers from 2,202 schools trained and 444,600 students participated by the triumphant project.

In Turkey, almost 15 year ago TSE initiated and then Ministry of Education took over an education project primarily given to high school students. This has been a part of the Turkish education system by now as a part of current official curriculum.

In UK, BSI provides various modules for primary and secondary school class via website. BSI promoted the website to all primary and secondary schools in the UK. The website recorded around 45,000 page hits per month in average in 2006.

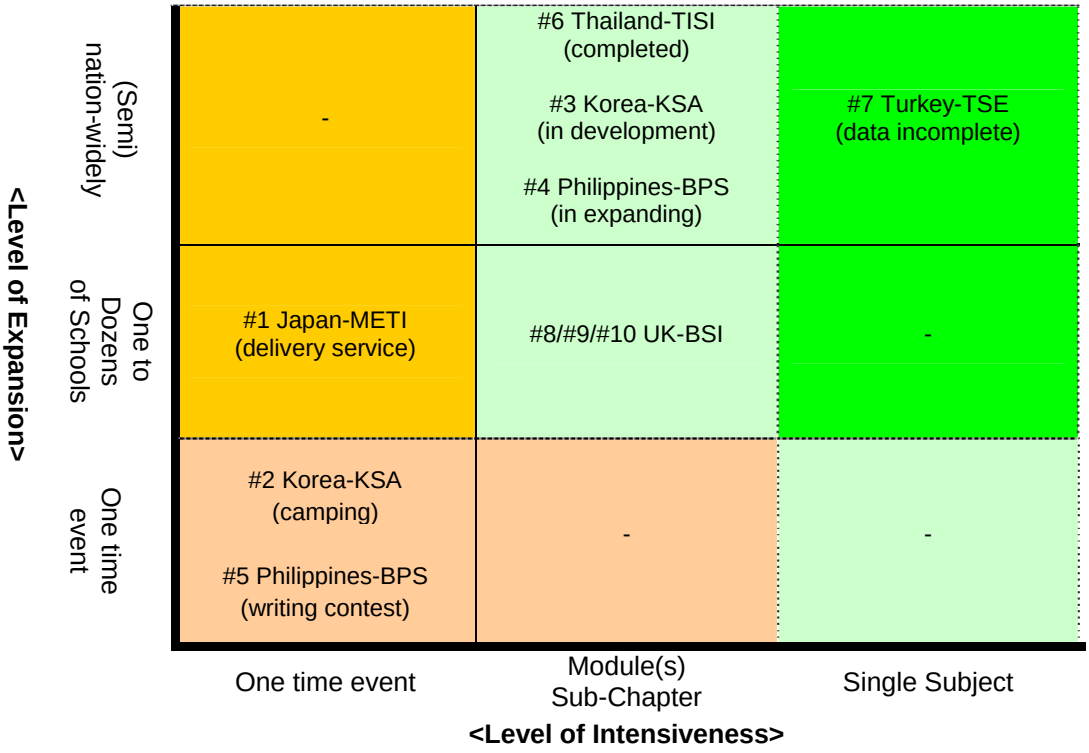
< Table 3 > Cases in/for Primary and Secondary Education

#No	Target	Economy Org.	Operator	Title	Method F.Sheet
1	F1) F2)	Japan	METI	Standards Education Delivery Service (Lectures on Demand)	Survey Annex D1
2	F1) F2)	Korea	KSA	Standards Olympiad	Survey Annex D2
3	F2)	Korea	KSA	Textbook Sub-chapter Development for Secondary School Students	Survey
4	F2)	Philippines	BPS	Standards Blitz – Standards in the Curricula of Secondary and Alternative Learning Education	Survey Annex D3
5	F2)	Philippines	BPS	Standards Blitz – Standards' Essay Writing Contest (including Teacher)	Survey Annex D4
6	F2)	Thailand	TISI	The Project on Integrating Standardization in Education (including teachers)	Survey Annex D5
7	F2)	Turkey	TSE	Standardization and Quality	Research Annex D6
8	F1)	UK	BSI	BSI's Education Programme Primary (Age 7-11) Online Information	Research Annex D7
9	F2)	UK	BSI	BSI's Education Programme Secondary (Age 11-14) Online Information	Research Annex D8
10	F2)	UK	BSI	BSI's Education Programme Secondary (Age 14-19) Online Information	Research Annex D9

<Comparison Analysis of Primary/Secondary Education Practices>

To identify implications of the experiences in primary/secondary education, we categorized the ten cases by two viewpoints and the results are summarized in <Figure 8>.

- Level of intensiveness: How intensive? One time event or modules for a subject?
- Level of expansion: How many schools? One school or nationwide?



<Figure 8> Analysis of Primary/Secondary Education Cases

Exceptional is Turkey (#7) as they developed a textbook for a single subject. Verification about detailed operation is needed as the information in gained in phone conversation.

Outstanding is Thailand (#6) as they operated nationwide program for four years, and around half a million secondary school students participated in the program. Its detailed operation methods and various types of contests are good practices for all. This program is considered as best practice of leadership and cooperation between standards institution and education ministry. For details, please see Annex D5.

Like the cases of Korea (#3) and Philippines (#4), developing modules or a chapter is a good realistic strategy if the output becomes part of formal curriculum of primary or secondary schools.

Easy and smart approach is organizing an event to involve many students in a contest (#5) or a mixture of contest plus lectures (#2). In short term, the education on demand service (#1) seems to be a creative niche approach for not only primary/secondary education but also other types of education.

Some photos are enclosed in <Figure 9> from the primary/secondary education practices.

<Integrating Standardization into Livings> TISI, Thailand

<Standardization and Quality – Textbooks> TSE, Turkey

< Standards Olympiad> KSA, Korea

<Figure 9> Selected images from Primary/Secondary Education Cases

4.3. Higher Education

As the children grow up, many of them choose to be students in university. Totally 27 practices were identified, excluding courses related to specific sector standards like IT-related standards, and 17 out of 27 practices have enough information to be analyzed as listed in <Table 4>. Unlike the education programs in primary/secondary education all operated by government or standards institutions such as METI or TISI, the operators of higher education practices are mixed including government, standards related institutions, consulting company and universities.

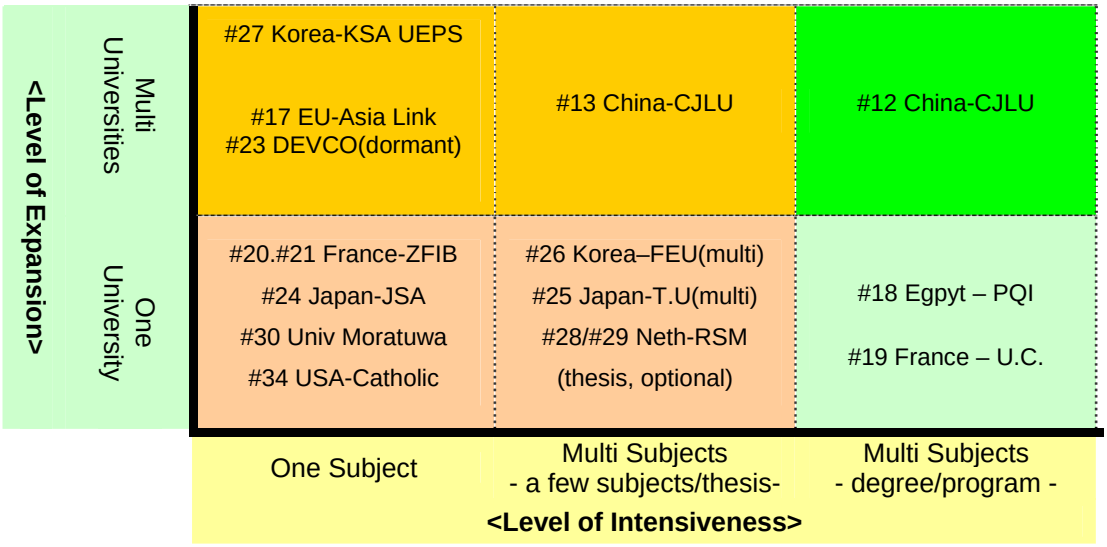
< Table 4 > Selected Seventeen Cases in/for Higher Education

# No	Target	Economy Org.	Operator	Title	Method F.Sheet
12	F3)	China	CJLU	CJLU-SQM program for bachelor's degree	Research AnnexD10
13	F4)	China	CJLU	CJLU MEE and TTMM course for Master's degree	Research AnnexD11
17	F4)	EC(EU)	Helmut Schmidt-Univ, et al	EU-Asia Link -Standardization in companies and markets	Research AnnexD12
18	F4)	Egypt	PQI	PQI's programmes for post graduate degrees (PQI's programme)	Research AnnexD13
19	F4)	France	Univ of Techn of Compiegne	Master's degree in quality management (MQ) Master's Programme NQCE(Normalization, qualite, certification et essays)	Research AnnexD14
20	F4)	France	ZFIB	Standardization as a tool for Competitive Intelligence	Survey AnnexD15
21	F4)	France	ZFIB	Standardization as a tool for Openness	Survey AnnexD16
22	F3)	Indonesia	BSN	Development of curriculum for education on standardization	Survey
23	F3) F4)	ISO	ISO DEVCO	Development Manual 4 - Teaching of standardization on institutions of higher learning	Research AnnexD17
24	F4)	Japan	JSA	Standardization for business solution	Survey AnnexD18
25	F4)	Japan	Tokyo Univ	Graduate school of Technology Management (MOT)	Research AnnexD19
26	F3)	Korea	KSA	KSA-Far East University Standardization Program "Global Standards Strategy" (for Computer Engineering Students)	Survey AnnexD20
27	F3)	Korea	KSA	University Education Program on Standardization(UEPS)	Survey AnnexD21
28	F3)	Netherlands	RSM Erasmus U	Business Administration - Standardization Strategy	Survey AnnexD22
29	F4)	Netherlands	RSM Erasmus U	Standardization Management, et al	Survey AnnexD23
30	F4)	Sri Lanka	Univ of Moratuwa	MBA in Management of Technology / Quality Management & Standardization	Survey AnnexD24
34	F4)	USA	Catholic University	School of Engineering - Engineering Management Program	S+Research AnnexD26

<Comparison Analysis of Higher Education Practices>

In order to identify implications and find good practices, we have attempted to categorize the seventeen cases by the following two viewpoints as displayed in <Figure 10>.

- Level of intensiveness: How intensive? Does it provide single subject or three different subjects related to standardization?
- Level of expansion: How many universities are using same textbook, modules or curriculum? Is it transferable to other institutions?



<Figure 10> Analysis of Selected Seventeen Cases in/for Higher Education

First, let us look at the three most concentrated programs which are operating single degree or program for standardization; these are located in the most right column in <Figure 10>.

Most intensive and impressive case is CJLU (China Jiliang University, #12). Its undergraduate course SQM (Standardization and Quality Management) providing seven different courses and two additional special courses. The SQM course is for bachelor degree and requires four years to graduate. In total, 592 students graduated in 2003-2006 and surprisingly more than 90% of them are working in the field of standardization; it is probably possible because China is huge economy whose local authorities need a lot of employees comparing to other normal economies. It is reported that some universities in China are using publications and modules developed by CJLU.

Other two intensive courses are PQI's program for post graduate degrees in Egypt (#18), and University of Technology Compiegne's courses in France (#19). The two courses are covering variety of standardization, quality management, certification and metrology.

Secondly, let's move to the cases providing students with two or more subjects related to standardization; these are located in the center column of <Figure 11>.

The graduate courses of CJLU, MEE (Mechanical and Electronic Engineering disciplines) and TTMM (Testing Technology and Measuring Meters disciplines), which are relatively less intensive than its undergraduate course SQM, provides three subjects; the MEE and TTMM requires 2.5 years to graduate and the number of students from MEE and TTMM are about thirty every year.

Stimulating cases are MOT (Management of Technology) and MBA (Management of Business Administration) for graduate students. These interesting cases are MOT in Tokyo University (#25) and MOT/MBA in RSM Erasmus University (#30). Tokyo University provides a MOT program, '*strategic management of industrial standardization and intellectual property*' at Professional Graduate School of Technology; the MOT program provides multiple subjects from standardization policy and strategy to specific technology standards or case study as described. RSM Erasmus University has '*Standardization Management*' course in Department of Management of Technology and Innovation; the Erasmus course encourages students to write their master thesis to standardization and the thesis list is found in Annex D23.

Thirdly, let's jump down to the cases providing students with single subject - usually two or three credits for one semester. These are located in the left column of <Figure 11>.

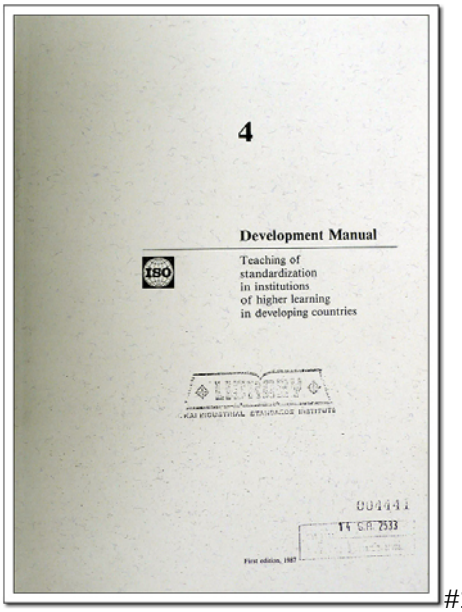
A smashing success is Korea's UEPS (University Education Promotion on Standardization, #27) in standpoint of its semi-nationwide outreach. The UEPS is characterized by common textbook, team-teaching arrangement, database and wide participation from various types of students. The program operator KSA provides a common textbook '*Future Society and Standards*' to all the students of partner universities for free. Also, KSA assists universities to prepare syllabus and to arrange external speakers; most classes are lectured by the outside invited speakers from businesses, standards organizations or research institutions. Each semester, KSA circulates to both teachers and students to collect feedback about the program. There were 6,681 students in 46 universities participated in the program in 2006. The spectrum of students are broad; freshman to senior; engineering to management major, choosing as elective to as required for specific major.

Two different types of cases are EU (#17) and ISO DEVCO (#23) – not programs but project/textbook. The EC funded project '*EU-Asia Link – Standardization and Markets*' is an eye-opener to the people when they first see the 718 pages of hardcover textbook. Dozens of standards originations and universities are involved to develop the textbook, e-learning modules, and pilot education program. The textbook is on sale, but the e-learning site is only open for its partners. The ISO DEVCO's deliverable '*Development Manual 4 - Teaching of standardization on institutions of higher learning*' was published in 1987 mainly for developing economies, but not being widely recognized or used now.

Other four courses in this category are Catholic University (#34), ZFIB course (#20, #21), JSA's MBA program (#24), and University of Moratuwa (#29). Catholic University provides a subject '*Strategic Standardization*' for graduate students in engineering; Catholic course requires student to prepare a research paper related to standardization which consists 90% of students' course achievement. ZFIB provides operate two types of courses – '*Standardization: a tool for Competitive Intelligence' and 'Standardization: a tool for Openness*' also for graduate students in engineering; assumably the firm ZFIB provides the course on demand by university. JSA's offers '*Standardization for business solution*' course for MBA student; JSA provides 18 hour short course with team-teaching method. Moratuwa offers '*Quality Management & Standardization*' in MBA in Management of Technology Program; the professor from Moratuwa suggests the course is suitable for Management of Technology and Information Technology.

Noteworthy enough is that six graduate courses (F4) - the cases of Tokyo Univ, RSM Erasmus, Catholic, ZFIB, JSA and Moratuwa – are targeting for similar spectrum of students in engineering, MOT or MBA, and the contents of those are more focusing on how standards function as strategic management tool. In principal, standardization is interrelated with technology, management, administration and its education is better accepted when to be discussed with academic theory and business practices together. With the interdisciplinary characteristics, at graduate level, standards education seems to be fitting well as part of MOT or MBA curriculum.

Some textbook images are enclosed in <Figure 11> from the higher education practices.



#1

#2

<Photos: from above, clockwise>

#1. ISO DEVCO (Annex C#23, D17)
#2. Korea – KSA UEPS (Annex. C#27, D21)
#3. China-CJLU (Annex C#12/13, D10/D11)
#4. Netherlands–RSM (Annex C#28/29, D22/23)
$5. EU-Asia Link (Annex C#17, D12)


#3

$5

#4

<Figure 11> Textbook Images from Higher Education Cases

4.4. Professional Education

Different from formal education, there have been various professional education programs by many national standards and conformance related institutions for decades to meet for the demand of society. That is basically why this guideline is primarily dealing with formal education which is at its beginning stage. However, we make an effort to analyze typical professional education practices as it is constructive to clarify what is common or different between formal and professional education.

After having reviewed various practices, we recognize that majority of the professional education programs are designed to build particular capacity or skills. The editor intentionally collected all the courses operated by ANSI, BSI and KSA to examine various range of skill-up programs at a glimpse. Based on the 65 practices in #38 to #102 of Annex C, we attempted to classify the activities or skills in professional education as follows in <Table 5>. You might note the fact that the topics of No.8 to 14 are general and could be the contents for any target groups while No.1 to No.7 are dealing with skills for the profession in special positions or tasks.

< Table 5 > Classification of Skills in Professional Education

No	Topics or Skills	Main Target Groups	Relevant practices
1	Conformance Skills – test, assessment, and documentation	NMI, laboratories Biz experts	#81
2	Administration of standardization activities	NSB, NMI, SDOs Committee chair/sec	#48, #49, #82, #85
3	Standards for technical regulations or legislation	Government officials NSB, NMI, SDOs	#38, #53, #67, #89, #100
4	Communication skills – chairing/moderating a meeting	Committee chair/secretariat	#78, #86, #99
5	Working across cultures – cultural differences	Committee chair, secretariat, members	#52, #76
6	Developing/Drafting standards – template	Committee members Biz experts	#45, #49, #53, #70, #79
7	Specific industry/technology standards or their aspects	Specific Industry experts	#54, #59, #77, #93, #97
8	Communication skills – language (English)	All Committee members	#52
9	Communication skills – consensus, negotiation, discussion	All Committee members	#52, #72
10	Standards Development Procedures	Committee members Biz experts	#39, #45, #74, #75, #79
11	Standardization Process, Practices in general	All Committee members	many including #40, #60, #101, #102
12	Structure of national standardization system	All Committee members	#41, #42, #65, #83, #88, #89, #91, #95
13	Structure of international standardization system	All Committee members	#42, #51, #80, #87
14	Basics, Fundamentals about standardization	All	(many including #39,#84, #90, #92, #94)