The Initiatives on ICT in Education in Korea: Cyber Learning System, National Education Information System

9 November 2016

Prof. Dae Joon Hwang, Ph.D.
Sungkyunkwan University, Seoul, Korea
djwang@skku.edu

Technology Transformation in Education

"Technology infuses classrooms with digital learning tools…expands course offerings, experiences, and learning materials; supports learning 24 hours a day, 7 days a week; builds 21st century skills; increases student engagement and motivation; and accelerates learning".
(United States Department of Education, 2013).

Agenda

Background

- Technology transformation in education
- Goals of ICT in Education
- Progress of ICT in education

Cyber Learning System

- Goals
- Services of Cyber Learning system
- Operation strategy
- Outcome analysis

National Education Information System (NEIS)

- Goals
- Services of NEIS: Administration, finance, e-Approval, national service
- Decentralized operation
- Outcome analysis

Conclusion

- Holistic approach
- Government leadership and initiatives
- Teacher training
- Performance evaluation
- P-P-P collaboration

Goals of ICT in Education

Reduce divides in education, economy, and technologies

Global competitiveness

Education Innovation for Global Competitive ness

Reducing big burden of Parent's related private tutoring expenses

Catalyst for education innovation

ICT, a Catalyst for Education Innovation

Issues of ICT in Education

Summary of Use of ICT in Education

Audio-visual Education	Building ICT Infrastructure	Invigorating ICT Utilization	Advancement	Becoming a people powered nation	Creative & competence based education
1970	1996	2001	2006	2010	2014
Introduction of Computer Education (1987)	Master Plan I (1996) ICT in Education	Master Plan Ⅱ (2001) ICT in Education	Master Plan Ⅲ (2006) ICT in Education	Master Plan IV (2010) SMART education	Master Plan Ⅴ (2014) Student-centered learning
▪ Plan for computer education(1970) ▪ 1st educational computer in high school(1971) ▪ Computer education curriculum(1974) ▪ Plan for Reinforcing Computer Education (1987) - ICT use in Education	▪ Completion of educational ICT infrastructure ▪ EDUNET (1996) ▪ RISS (1998) ▪ KERIS established ▪ Guidelines for ICT in Education in primary & secondary schools (2000)	▪ Educational content sharing system(2002) ▪ Improving teacher training program(33% of teachers per year) ▪ NEIS(2003) ▪ Cyber Home Learning System (2004) ▪ e-Learning Global Cooperation Center (2006)	▪ Digital Textbook Development Plan (2007) ▪ U-classroom opened (2007) ▪ Operation of Digital Textbook Model Schools (2008) ▪ Opening of Education Cyber Security Center(2008) ▪ KOCW (2010)	▪ SMART Education Strategy (2011) ▪ Next Generation NEIS (2011) ▪ e - Textbook (2012) ▪ Launch of EduData System - EDS(2012) ▪ Operation of Smart Model Schools (2012)	• Customized learning for primary and secondary education • Higher education enhancement for creative HR • Enhancement of lifelong & TVET for an ability-oriented society • Stabilizing educational welfare for equity

Major Initiatives of ICT in Education

Focus of Policies of ICT in Education

Built ICT Infrastructure

Facilitated ICT use in Education

Mobile Education Services

Just-in-Time & Person Education Services

1970
Audio-Video Education

1996
Education of Computer and Internet
Teacher training based on CBT

2000
Internet connection for all schools
Cyber Universities established

2004
Cyber Home Learning System
e-Learning Regional Support Center established
National Education Information System (NEIS)

2007
Digital Textbooks
KOCW and mobile campus established
Edufine

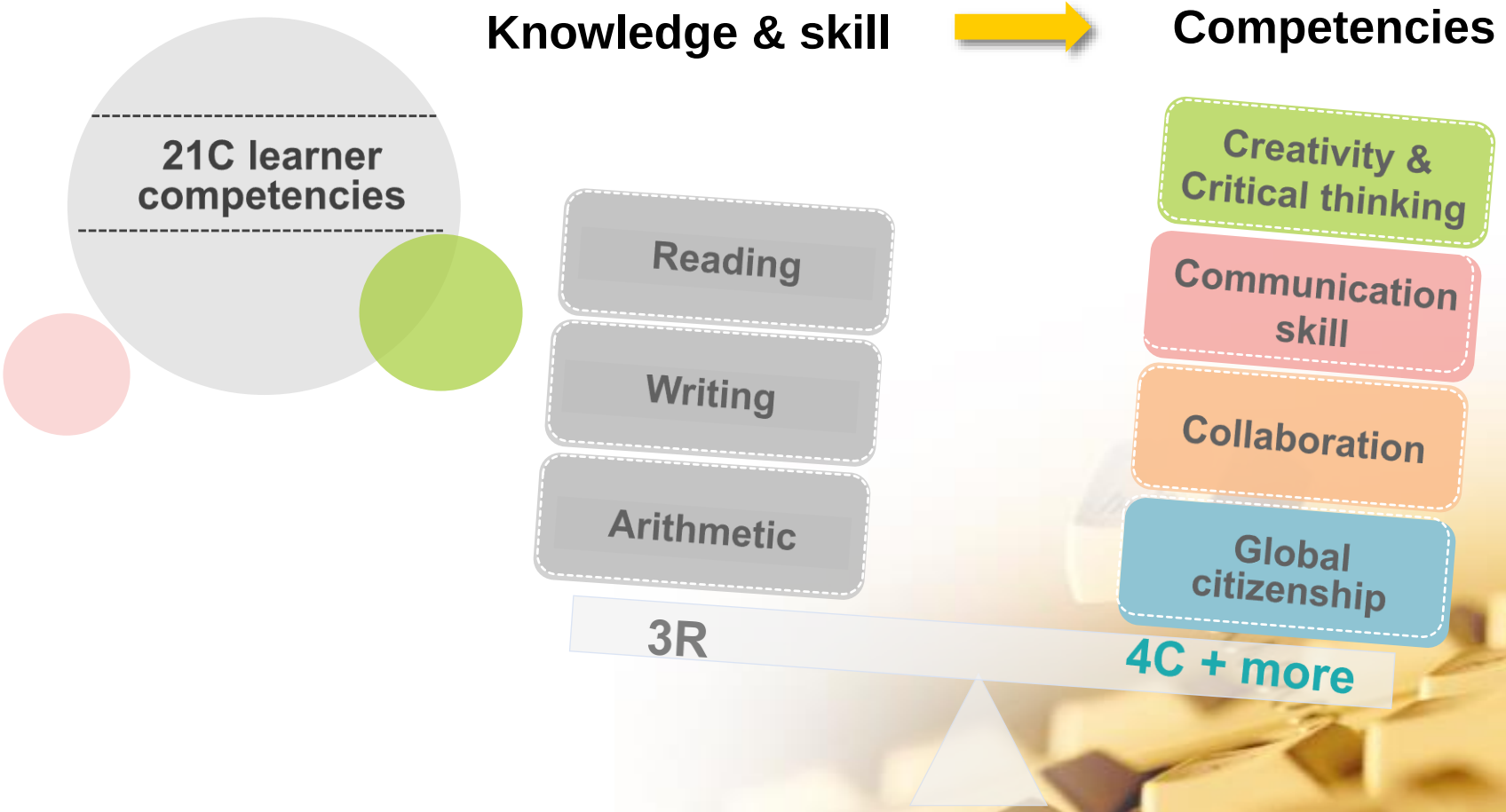
2011
Smart Schools
Promote Smart Education
e-Approval

2015
Free Semester System
K-MOOC began
Cloud campus
Education 3.0

Creation of 21st Century Learning

"To create effective 21st century learning… **students** need to be allowed to do new things, in new ways, and get a different, and better, education because of the technology".
However, the teaching model in higher education is inconsistent with the technological needs of these millennial learners.
(Prensky)

Changing Education to be Competencies-based



Source: Yoon Kyung Jung, Korea's Strengthening Teacher's ICT Competency, Central Asia Symposium on ICT in Education 2014, reformulated by Dae Joon Hwang, Aug. 2016.

Moving to DeSeCo from PISA Assessment

- PISA assessments
  - ✓ Began with comparing students' **knowledge and skills** in the areas of reading, mathematics, science and problem solving.
  - ✓ The assessment of student performance in selected school subjects took place with the understanding, though, that **students' success** in life depends on a much wider range of competencies
- Definition and Selection of Competencies (DeSeCo) Project
  - ✓ In late 1997, the OECD initiated the DeSeCo Project with the aim of providing a sound conceptual framework to inform the identification of **key competencies**
  - ✓ Provides a framework that can guide the longer-term extension of assessments into new competency domains
  - ✓ Key competence must
    - Contribute to **valued outcomes** for societies and individuals;
    - Help individuals meet important **demands** in a wide variety of contexts
    - Be important not just for specialists but for **all individuals.**

Source: Executive Summary of The Definition And Selection of Key Competencies, pp5, www.oecd.org/edu/statistics/deseco
www.deseco.admin.ch

Categories of Competencies of DeSeCo: OECD

- **Competency Category 1: Using Tools Interactively**
  - ✓Use language, symbols and texts interactively
  - ✓Use knowledge and information interactively
  - ✓Use technology interactively
- **Competency Category 2: Interacting in Heterogeneous Groups**
  - ✓Relate well to others
  - ✓Co-operate, work in teams
  - ✓Manage and resolve conflicts
- **Competency Category 3: Acting Autonomously**
  - ✓Act within the big picture
  - ✓Form and conduct life plans and personal projects
  - ✓Defend and assert rights, interests, limits and needs

What SMART Education is About

Not simply technolorizing education environment, but harnessing benefits from technologies, pedagogies, contents, open paradigms, and education research to change education creative, collaborative, personalized to challenge new changes what 21st century education should be

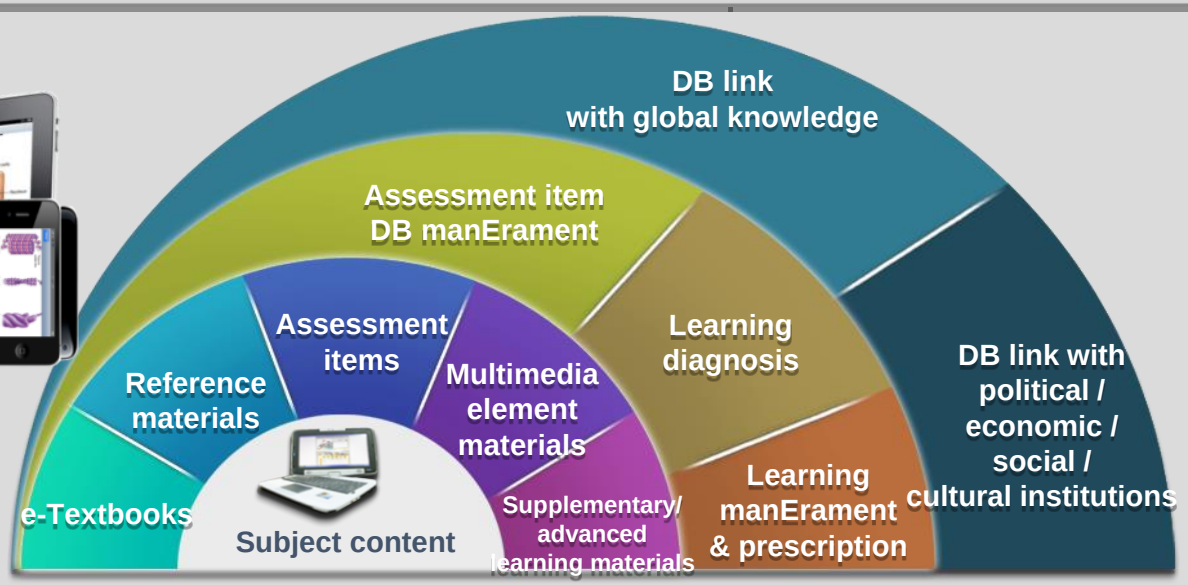
Self-directed	Self-directed manner
Motivated	With fun
Adaptive	Suited for student's levels and aptitude
Resource-enriched	Rich materials
Technology-embedded	Learning by harnessing digital development

Source: Yoon Kyung Jung, Korea's Strengthening Teacher's ICT Competency, Central Asia Symposium on ICT in Education 2014

What Digital Textbook Aims for

What is the Digital Textbook?

Digital textbook refers to teaching-learning material which contains various types of latest information, provides support tools for learners' expressive activities and learning assessment materials, and enables learning diagnosis and prescription.



Paper textbooks

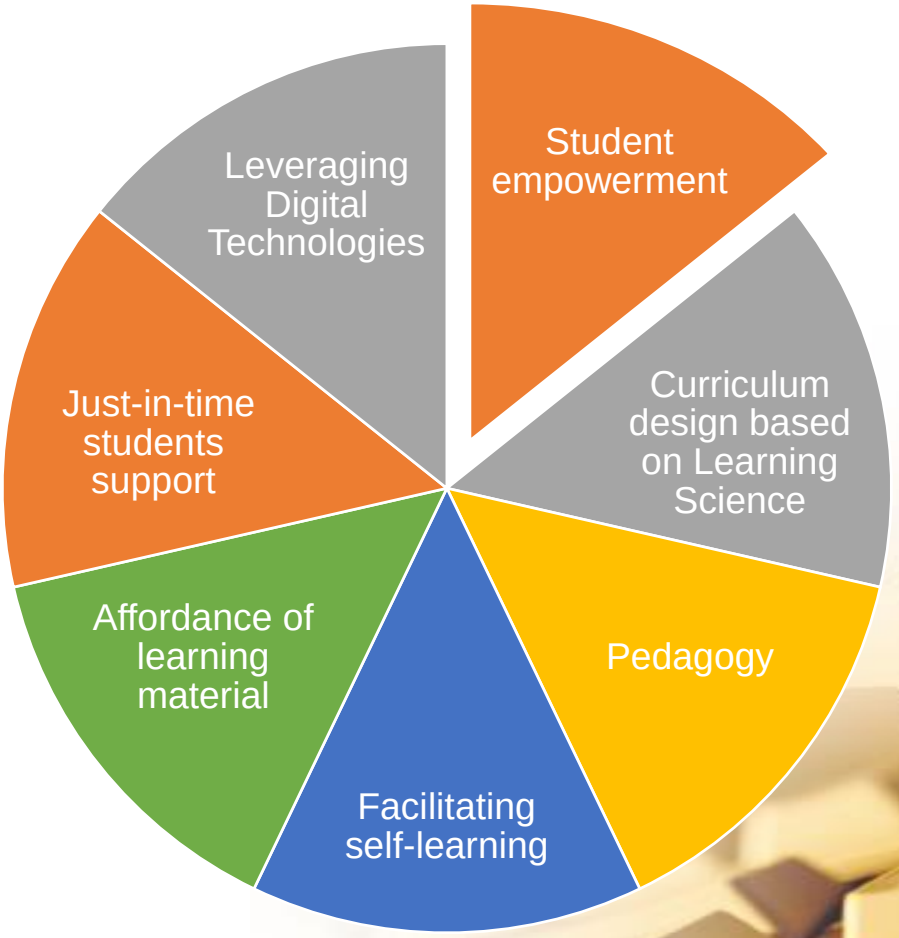
- Limited content
- Hard to reflect latest info
- Limited learning activity

Rich learning materials | **Customized diagnosis-prescription** | **Learning expansion**

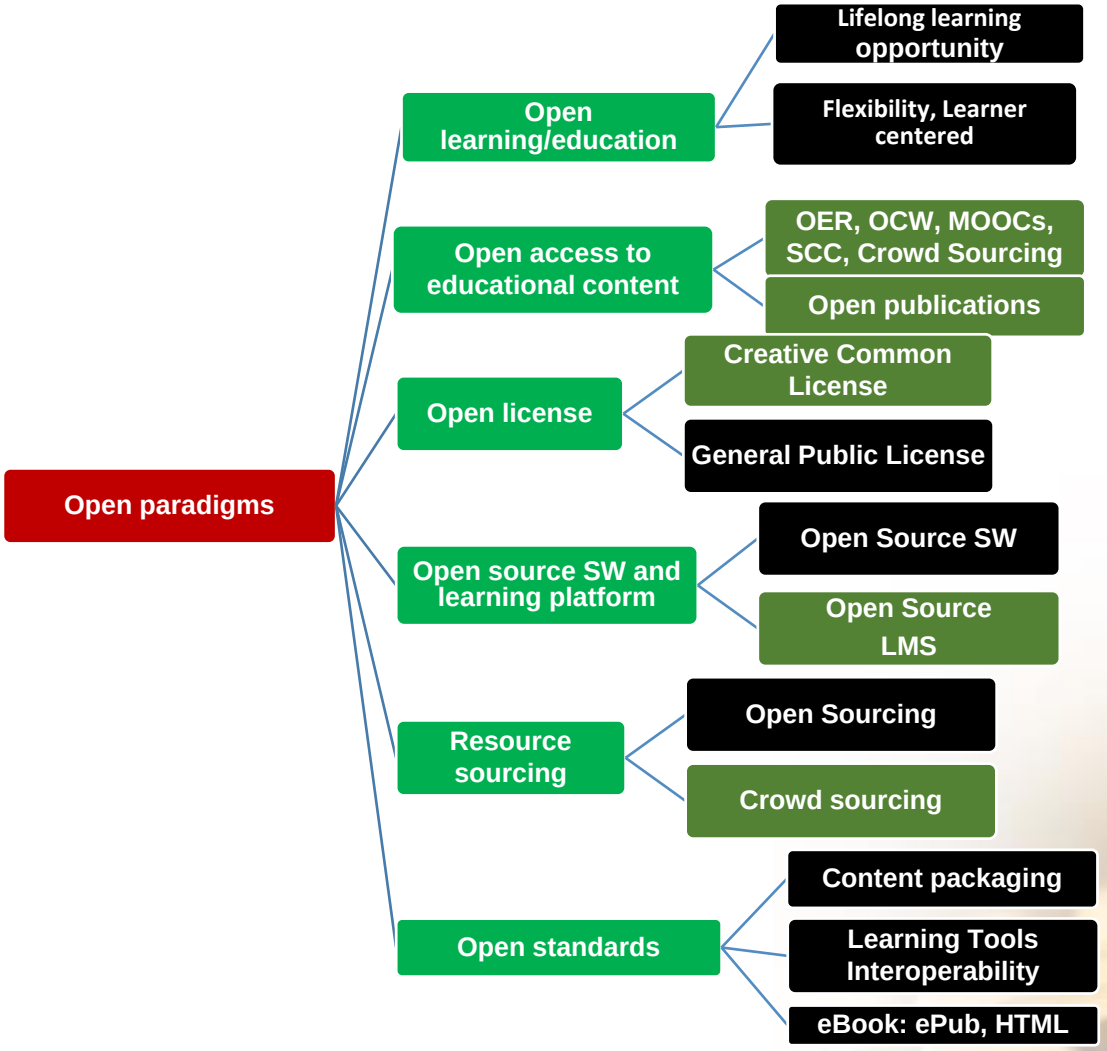
To changes not only contents of textbook but the context of education; pedagogy, students, teachers, classroom setting, and education system and environments

Source: KERIS, Master plan of Smart School Project revised in 2011, Seoul, Korea

Essential Elements of Student-Centered Learning

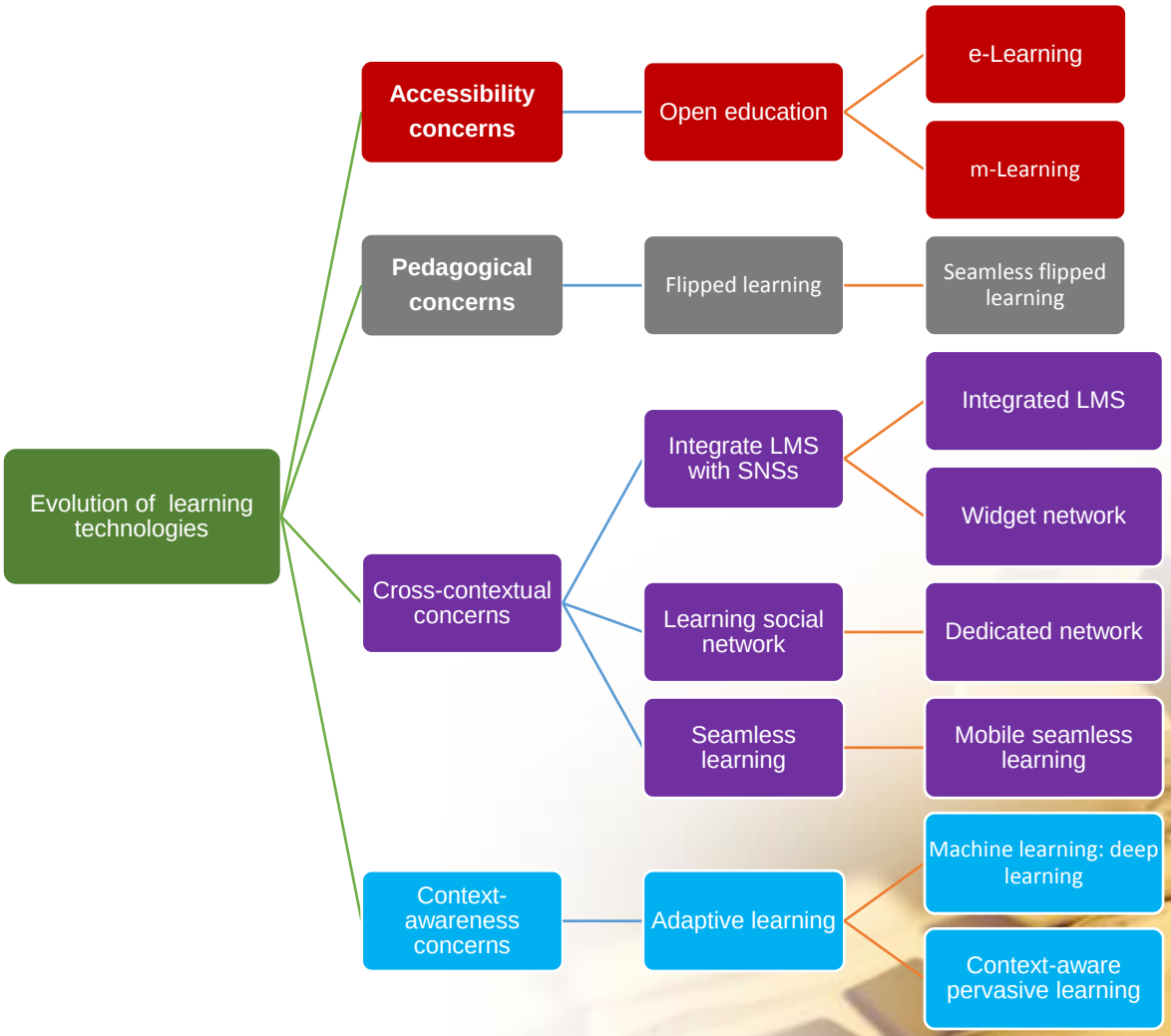


Application Domains of Open Paradigms



- **Diversification of resource securing strategies:** In /out sourcing -> open sourcing, smart sourcing -> crowd sourcing
- **How to challenge emerging issues**
  - ✓ Open access to educationl resources: OER, OCW, MOOCs, SCC (Student Created Content)
  - ✓ Open education/learning environment
  - ✓ Open license: Creative Common License
  - ✓ Open publishing: digital content delivery
- **Achieve cost-benefits**
  - ✓ Risks management recommended to be started as early as possible
  - ✓ Easy to find optimal solution and practices through collective approaches
- **Creation of positive culture for sustainable growth**

A Summary of Learning Technologies



Implications of Success to ICT in Education

Use of ICT in Education

Korean's high drive for education	Government leadership	Coordination of issues among private, pubic, and schools
Curriculum redesign & Perform management	Foundations: Laws, Acts, Presidential decrees	Well established ICT Infrastructure
Teacher capacity building	Role play among MEST, KERIS, and MPOEs	Standards : KEM, SCORM, Education Information Sharing Environment

Cyber Learning System

Overview of Cyber Learning System

CLS

What is it?	▪ The Cyber Learning System is a free Internet-based e-Learning service that enables students to supplement school classes. The system was developed by the Ministry of Education, Science and Technology under the support of KERIS, and currently t he 16 municipal and provincial offices of education operate their own cyber home learning systems.
What does it aims for?	▪ The Cyber Learning System has been devised to reduce out-of-school education expenses and to narrow the education gap b etween regions. The System allows students to supplement school classes, and offers equal quality education to students of all income classes and regions.
How is it developed?	▪ The Cyber Learning System was developed through the following process after the government announced policies to reduce out-of-school education expenses in 2004.
How to provide educati onal content?	▪ The Cyber Learning System provides educational content for each student level by using customized content, a student level diagnosis system, and a learning management system.
How do teachers suppo rt students?	▪ Also, cyber-teachers comprised of teachers in the field support learning in a systematic manner.
LMS supports internet-based learning	▪ LMS is an internet-based learning service that helps students supplement school classes through menus such as learning sup port, teaching management, education affairs management support, and system management.
Types of services	▪ Various customized services are provided by 17 municipal and provincial offices of education.
Number of learners	▪ The Cyber Learning System currently has around 2,152,265 subscribers in 2015, and an average of 69,786 students use the service on a daily basis as of July 2015. According to a survey on the effectiveness of Cyber Learning System, 81.2% of the r espondents replied that the service had a positive effect on learning, indicating that Cyber Learning System is helpful in suppl ementing school classes.

Evolution of Cyber Learning System

CLS

2004

Announced measures to reduce private education expenses by reinforcing public education

Conducted a test operation of the Cyber (Home) Learning support system : Daegu, Gwangju, Gyeongsangbuk-do

2005 ~2006

Provided Cyber (Home) Learning System nationwide (2005)
- For first- to third-year students of middle school contents on five major subjects

Expanded the Cyber (Home) Learning System for fourth to six graders of elementary school and first graders of high school (2006)

2007 ~2008

Developed and began a test-run customized learning management system and a video consultation system (2007)

Developed and applied supplementary and in-depth learning contents for elementary, middle, and high school students (2008)

Developed next-generation LMS(Learning Management System) /LCMS(Learning Contents Management System) (2008)

2009 ~2012

Developed and applied level-based contents (basics, understanding, and in-depth) in which 2007 revised curriculums were reflected (2009-2013)

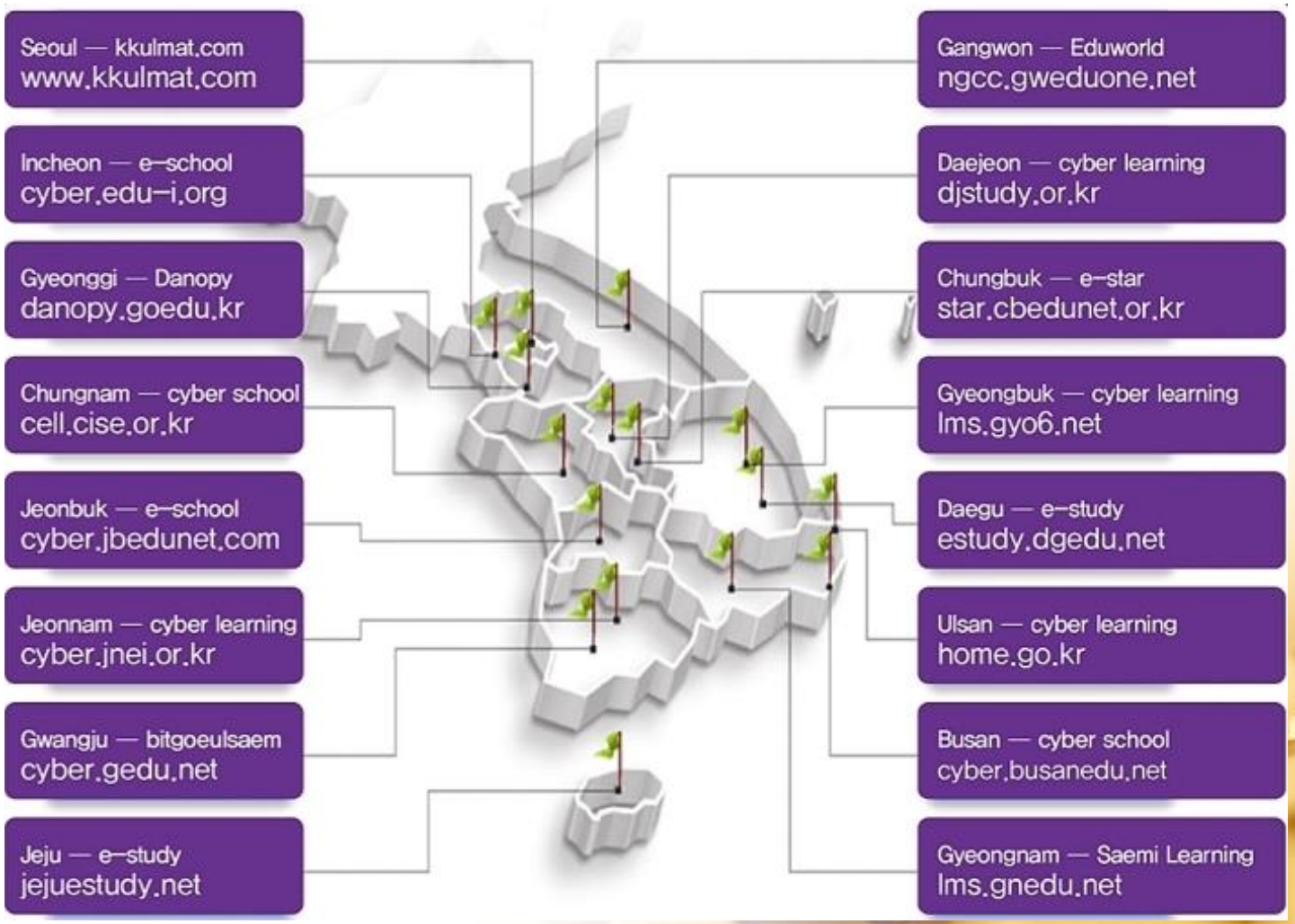
Built networks of next-generation LMS/LCMS in 16 cities and provinces and operated the service (2010)

Changed the title from "Cyber Home Learning System" to "Cyber Learn System" (2013)

Developed and applied contents in which 2009 revised curriculums were reflected (2013-present)

Running of Cyber Learning System: 17 MPOEs

CLS



Cyber Learning System: Seoul Metropolitan Office of Education

CLS

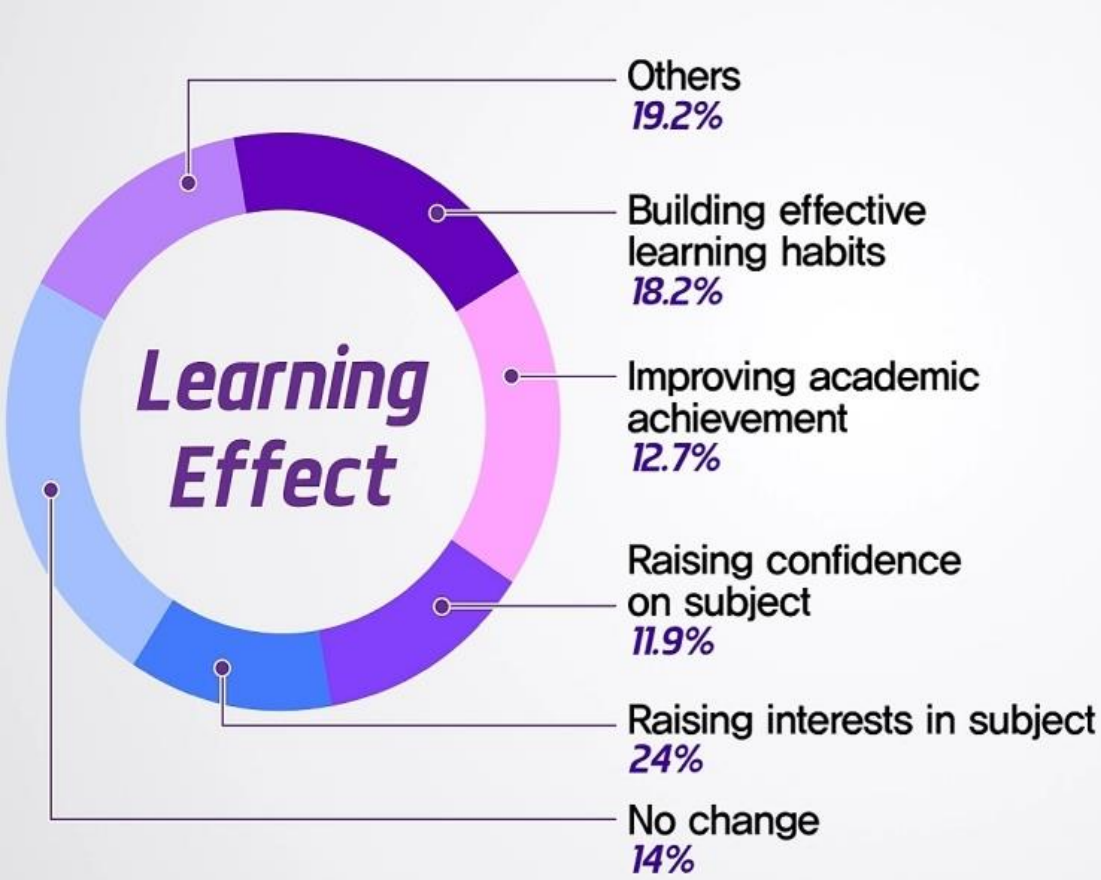
Source: www.kkulmat.com

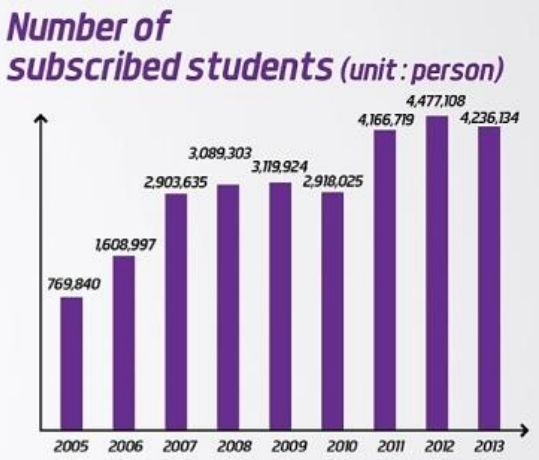
CLS

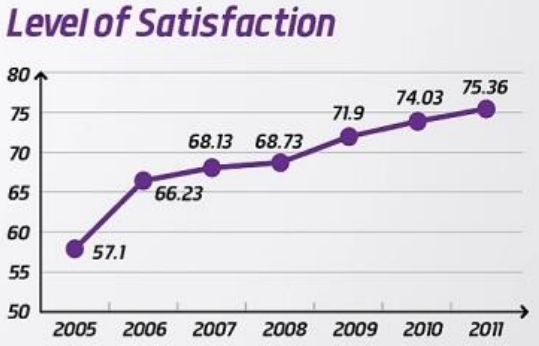
LMS of Cyber Learning System

Outcome Evaluation of Cyber Learning System

CLS







Decreasing Use of Cyber Learning System

CLS

- Erase students record with no records of logins in recent 2 years
- Delay of providing content of new curriculum
- Reduce high school students service
- Difference in the statistics of CLS among 17MPOEs

Year	Number of students	Classroom allocation type		Self-Directed Type: number of students	Average number of daily Login (times)
		No. of classes	No. of students		
2012.8	4,477,108	48,108	696,934	281,832	135,346
2013.7	4,236,134	48,346	635,724	183,365	104,929
2014.7	2,633,078	36,161	470,183	133,690	73,836
2015.7	2,152,265	28,985	231,208	231,208	69,786

What Cyber Learning System is about

CLS

- e-Learning system providing students with supplementary services for students after school: Internet based, student-centered, interlinked with homes, based on national curriculum

5 core subjects

- Korean, Social Studies, Science, Mathematics, English

3 levels of learning

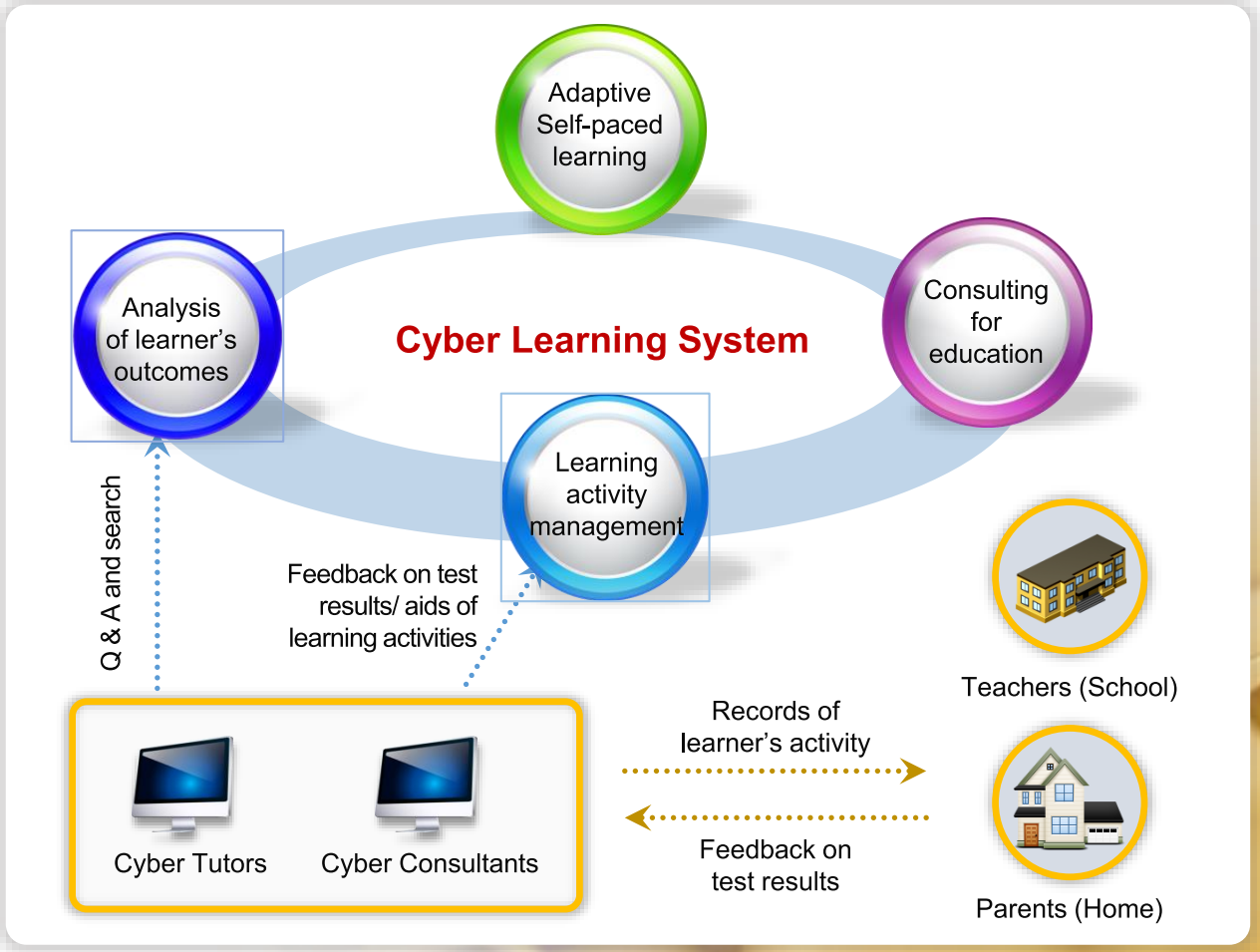
- Basic, Supplementary, Advanced

2 types of learning modes

- Class Allocation Type
- Self-Study Type

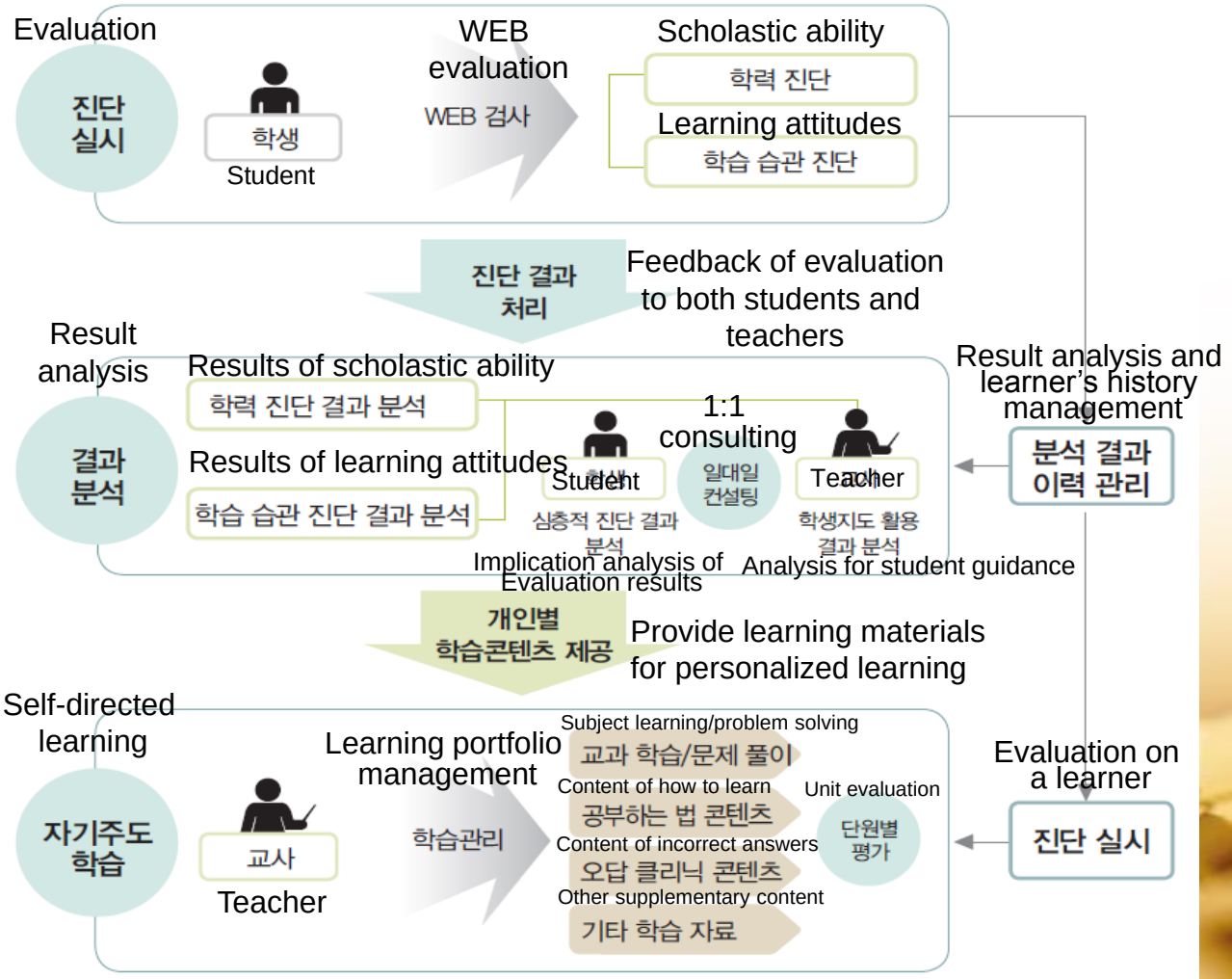
Major services

- Learning Management System (LMS)
- Cyber teacher/tutors
- Learning analysis & learning guidance system
- Provide video lectures
- Consulting system



CLS

Major Service of CLS: Consulting



Major Services of CLS: Course Offerings

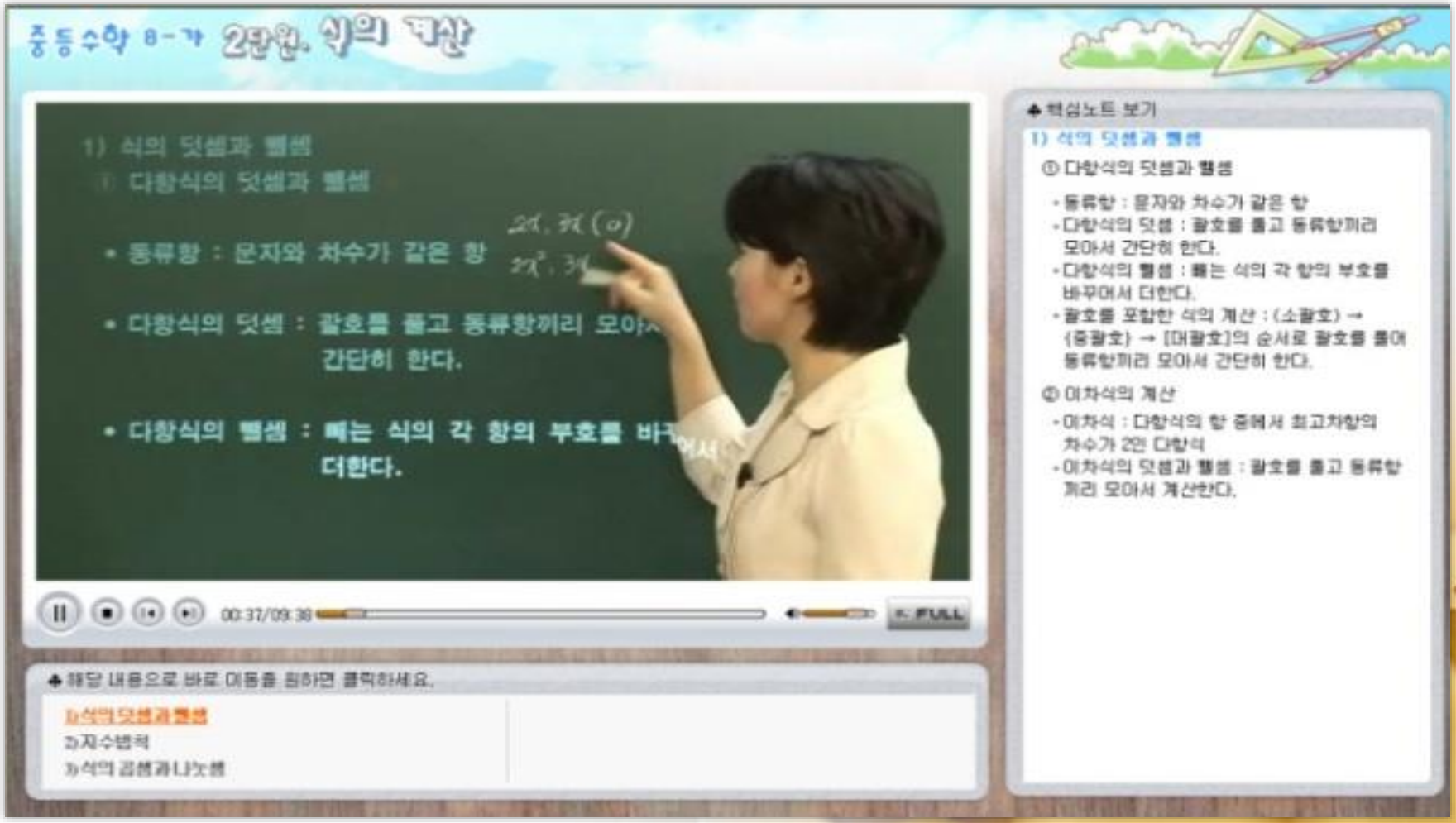
CLS

3 Types of Course Offerings Based on Academic Ability

Major Services of CLS: Video Lecturing

CLS

Video Lecturing



Major Services of CLS: Self Evaluation

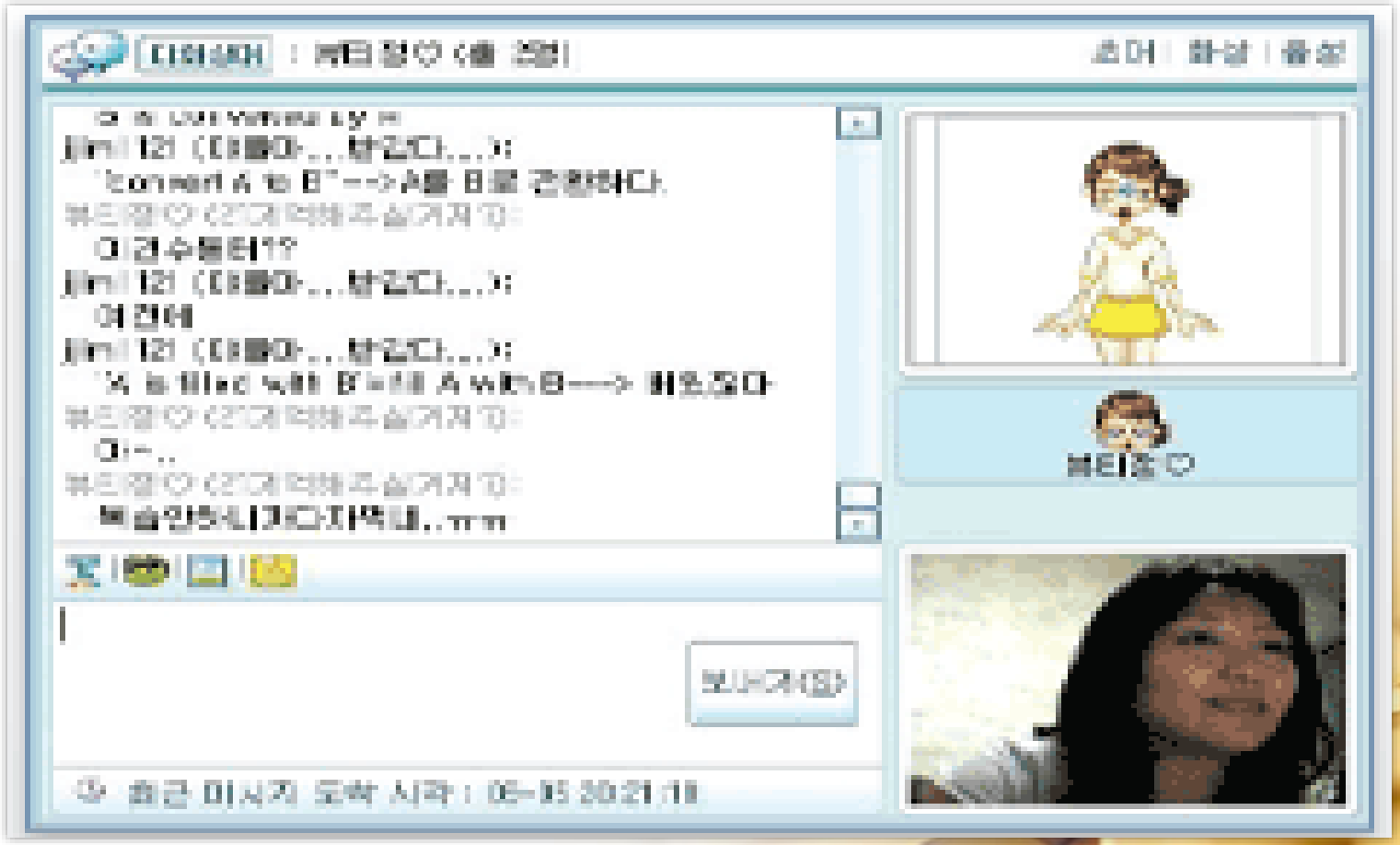
CLS

Self Evaluation

Major Services of CLS: Online Chatting

CLS

Online Chatting with Cyber Teacher



Major Services of CLS: Online Consulting

CLS

Online Consulting in Video

Connect Global, Create Future KERIS

National Education Information System (NEIS)

Background of NEIS

NEIS

- Comprehensive education information service framework integrating administration (NEIS), finance (Edufine), works management (e-Approval), educational information service of education (NS): 11,700 schools, 176 offices of education supports, 17 MPOEs and Ministry of Education

Goals of National Education Information System

NEIS

National competitiveness for the 21 century and promoting the national benefits

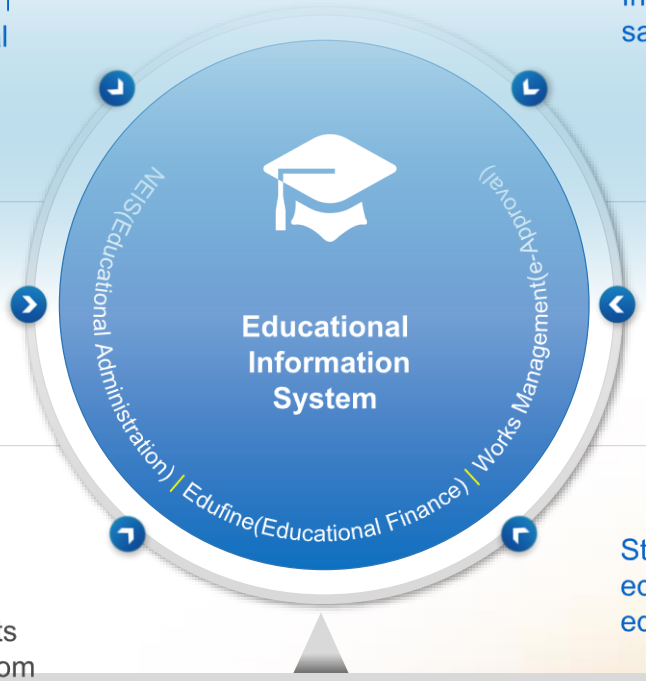
- Realizing e-government

Digital administration to promote transparency and efficiency

- High-speed Internet and information communication technology

Challenge security issues facing schools

- About 70% of all security accidents occurred in public institutions is from school (as of 2001).



Innovate work processing systems to save operating costs

- Preventing the overlapped development of program in each Office of Education (City/Province), Improving the integrations between the systems

Allow teachers to focus on class and ensure the time for research

- Reducing the actual school works, including reducing hand-written documents, integration of various statistics, and improvement of work procedures, etc.

Strengthen the communication with education party for substantial school education

- Providing school educational activities and school activities information for children

Article 23 of Framework Act on Education

Article 30 (4) of ELEMENTARY AND SECONDARY EDUCATION ACT, etc.

Regulation on Early Childhood Education Information system and Operation of Education Information System (Ministry of Education)

NEIS

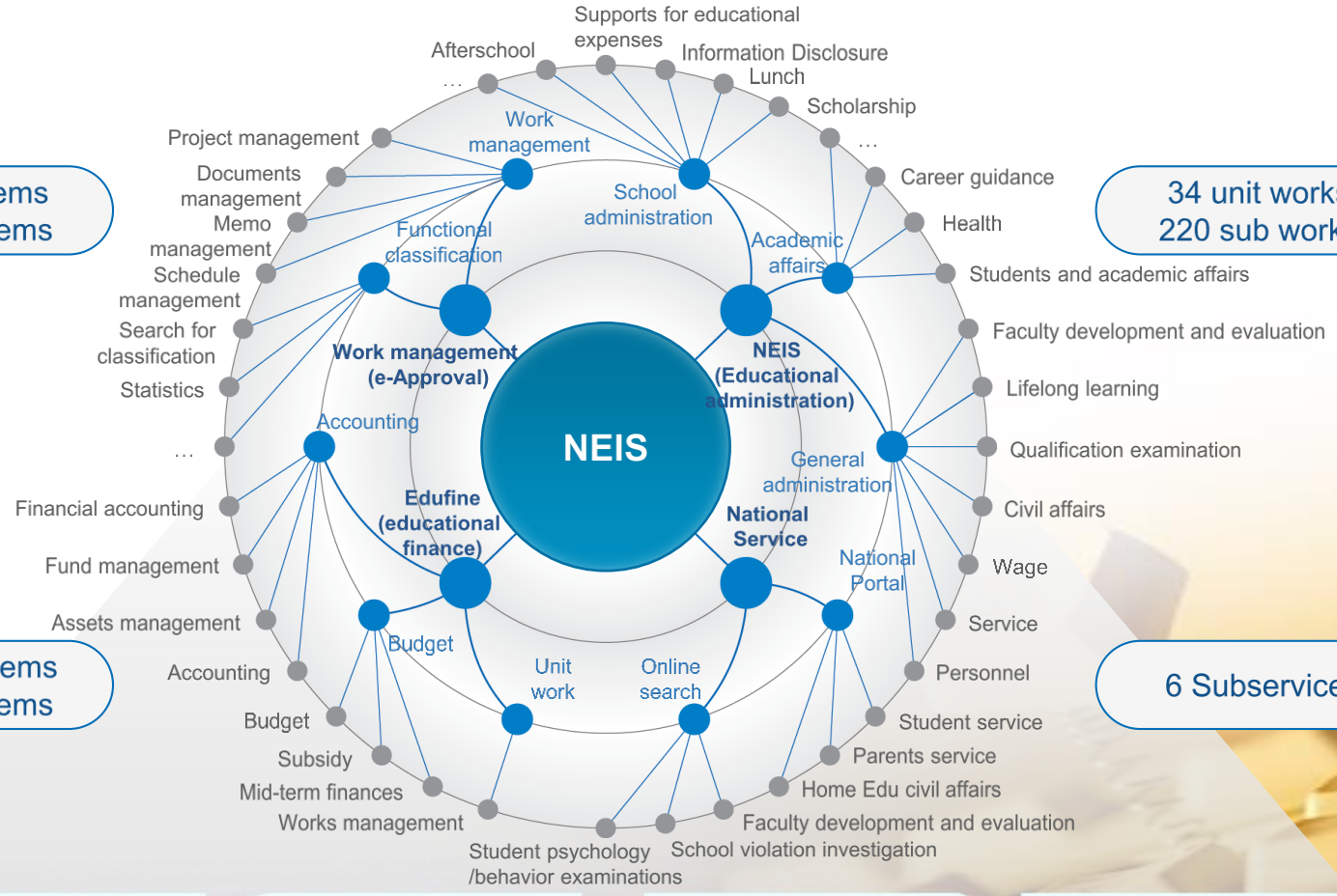
Service Architecture of NEIS

3 unit systems
19 subsystems

17 unit systems
61 subsystems

34 unit works
220 sub works

6 Subservices



Information Security (Main infrastructures for information communication)	Infrastructure Maintenance	Application S/W Maintenance	User PC security

NEIS

The Progress of NEIS

1997 ~ 2000

1997
- Development and dissemination of School Information Management System (SIMS)

2000
- Completion of IT infrastructure building in all Elementary/Middle Schools at nationwide

2001 ~ 2003

2001
- NEIS building ISP

2002
- Beginning of educational administrative service (22 areas of general administration)

2003
- Expansion of educational administrative service (5 areas of school affairs)

2004 ~ 2006

2004
- Beginning of online admission screening service

2005
- Beginning of educational civil service (Cyber Home Learning System

2006
- Beginning of national parents service

2007 ~ 2010

2007
- Test operation of Edufine (educational finance)

2008
- Edufine (educational finance)
- Beginning of service

2009
- Work management service ISP:e-Approval

2010
- Reformation of the next-generation NEIS program and infra rebuilding

2011 ~ Present

2011
- Opening of next – generation NEIS and beginning of woks management service

2012
- Beginning of the national mobile app service and students service

2013
- Beginning of overseas Korean school

2014
- Reformation of national service

NEIS

Operation of NEIS

MINISTRY OF EDUCATION
REPUBLIC OF KOREA

17 education offices of city/province

176 offices education support

11,700 schools

KERIS
KOREA EDUCATION AND RESEARCH INFORMATION SERVICE

Working Groups and Advisory Groups

Vendors

- Application Program Maintenance
- H/W Infra Maintenance Management
- 0079 Edu Call Center

Related Institutes/Service

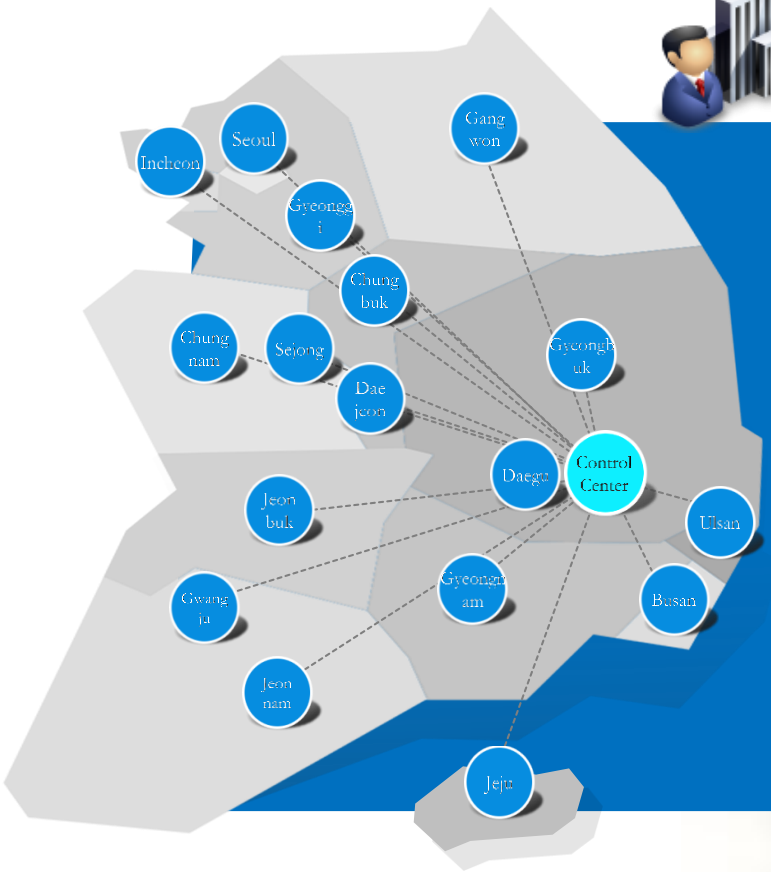
Ministry of Strategy and Finance	Local governments
Ministry of Government Administration and Home Affairs	National Institute for Lifelong Education
Ministry of Health & Welfare	Private School Teachers Pension
Military Manpower Administration	Government Employees Pension Service
National Procurement Service	Korea Agro-Fisheries Trade Corporation
Fire Services	Korea Asset Management Corporation
National Tax Service	Card company
National Archives of Korea	E-documents distribution center
Central Educational Research Center	Public Information Sharing Center
Korea Financial Telecommunications & Clearings Institute	E-documents distribution center
Korea Centers for Disease Control	Digital Budget & Accounting
	The Korean Teachers' Credit Union

Decentralized Operations of NEIS

NEIS

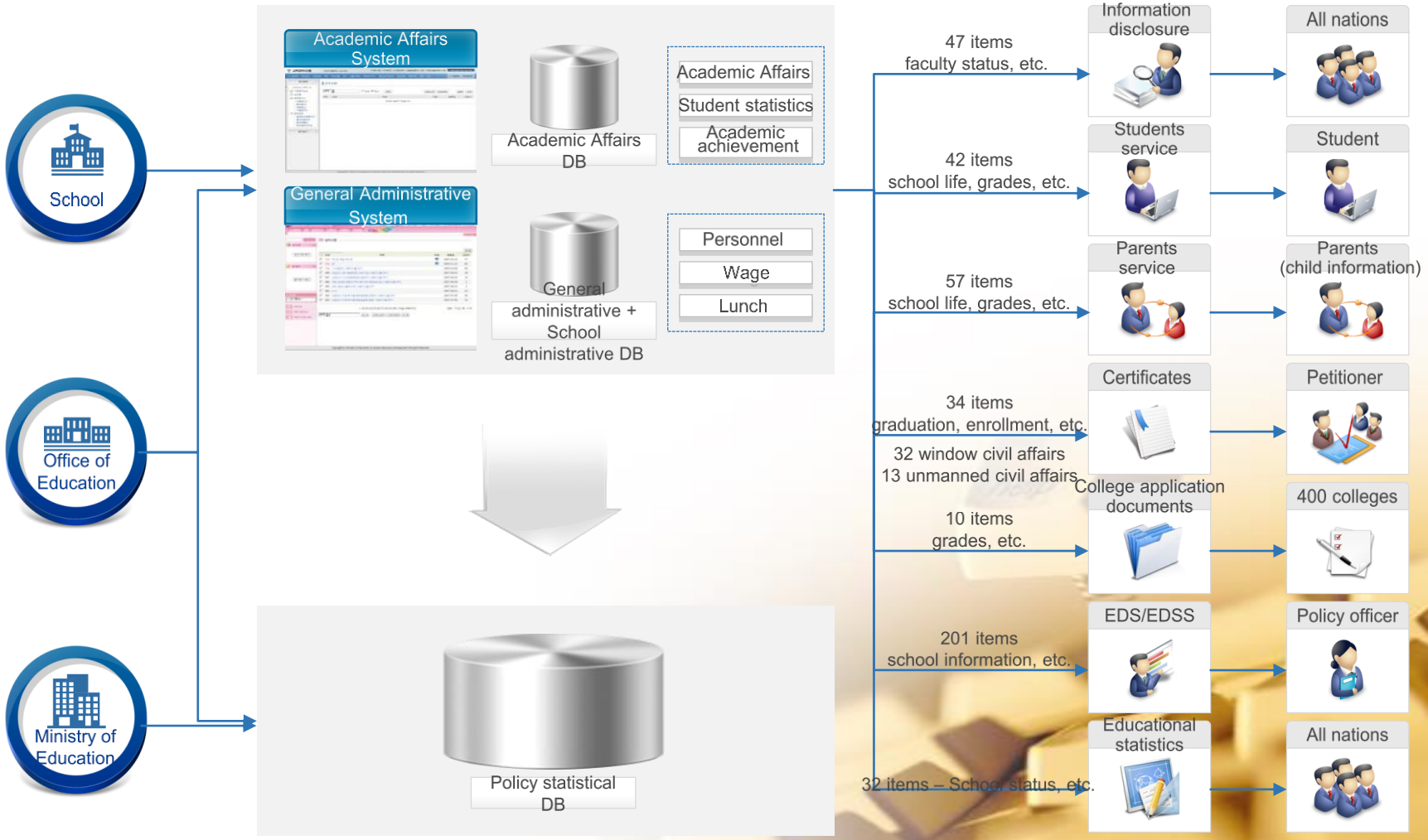
- Decentralized operation among 17 MPOEs in association with 1 Control Center

18 operating centers → 17 Offices of Education(City/Province) + Control Center



- Decentralized operation of 17 MPOEs and 1 Control Center
- Improving a web service based on e-government development standard
- Single sign On to use NEIS, Edufine and Works Management
- Providing the individual service upon the user environment of nation and faculty
- Delivery of information encrypted between the control center and 17 MPOEs

Sharing of Data Bases



Outcomes of NEIS

Economical Effects

- 2011~2020 NEIS benefit costs of KRW 1.4 trillion (from 2011 to 2020: 14 times greater than building cost)
- Annual saving of KRW 208.8 billion

Qualitative Effects

- Establishing e-Government
- Work reformation and improvement
- Improving the quality of school education
- Reducing faculty works
- Improving the work efficiency and transparency

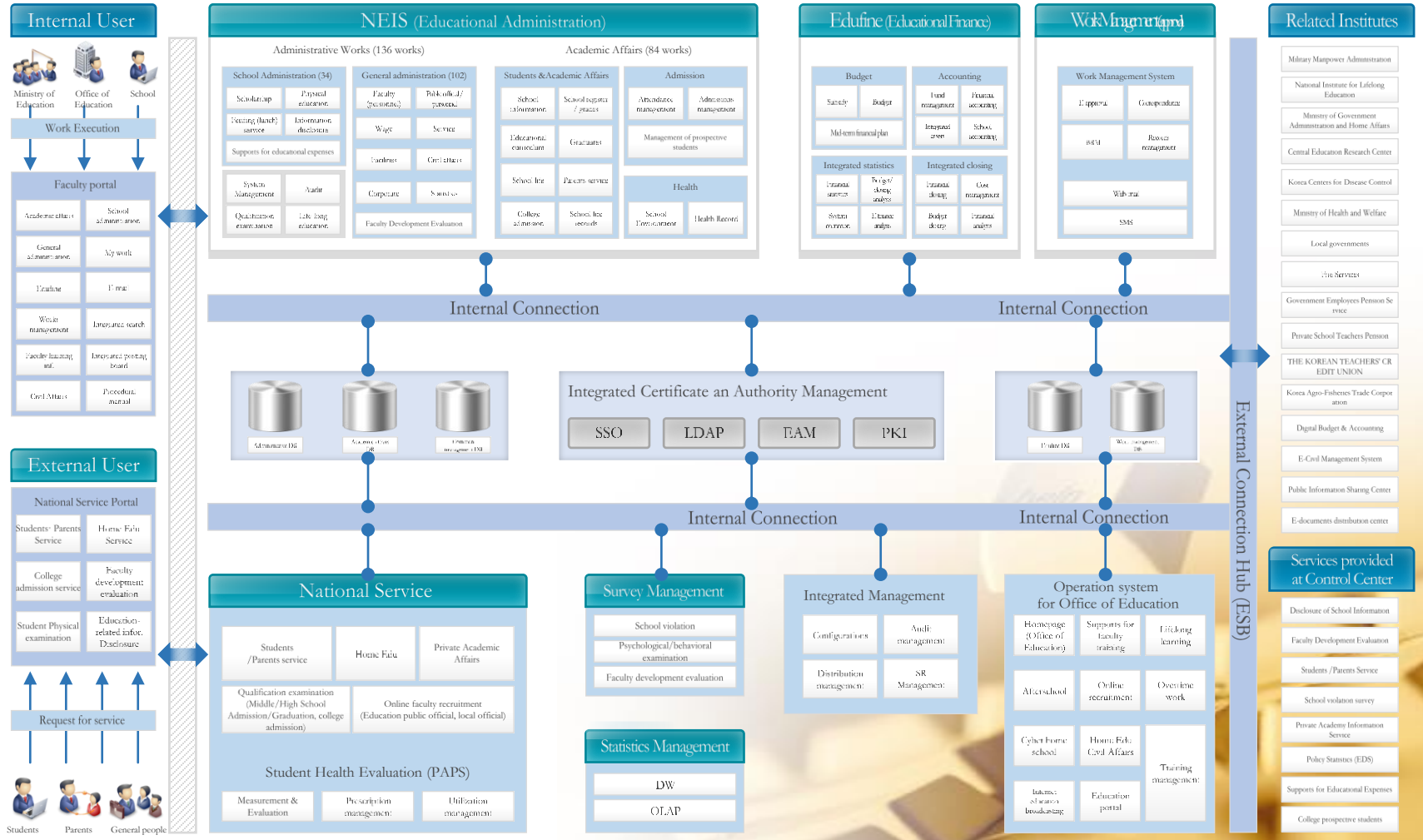
Source: Youngsik Jeong, A Study on the Effects of NEIS System on Educational Administration, 2013

More on Outcomes of NEIS

Area	Category	Before	After
Academic Affairs	School register	Student biographical information to be reentered when entering upper level school	Enter information one time when entering elementary school
	Evaluation	Processing and managing the grades by each faculty	Process and manage the grades by each subject teacher
	Curriculum	Lecture hours and classes manually managed	Automated teaching hours and class formulation
	Documents submission	Parents should submit the documents for transfer or admission	Data integration via a system
	Transfer	Postal delivery required for student documents	Online sending of student information
General Administration	Work processing	Manually written document	System-based work processing
	Information sharing	Offline transmission of information	Information sharing by integration
	Civil affairs – issuing certificates	Visit or postal	Online request for certificate issuance
Online College Application	Service user	Current students	Current students and graduates
	Production Form	CD	Provide online (encrypted)
	Student information	Provide college with student information in a CD form	Provide information to college that the student applies for.
Use of service	External connection	1,930,000 (2011)	1,1950,000 (2014): 600% increased for 10 years
	Online college application	1,420,000 (2005)	4,830,000 (2014): 300% increased for 10 years

The System Organization of NEIS

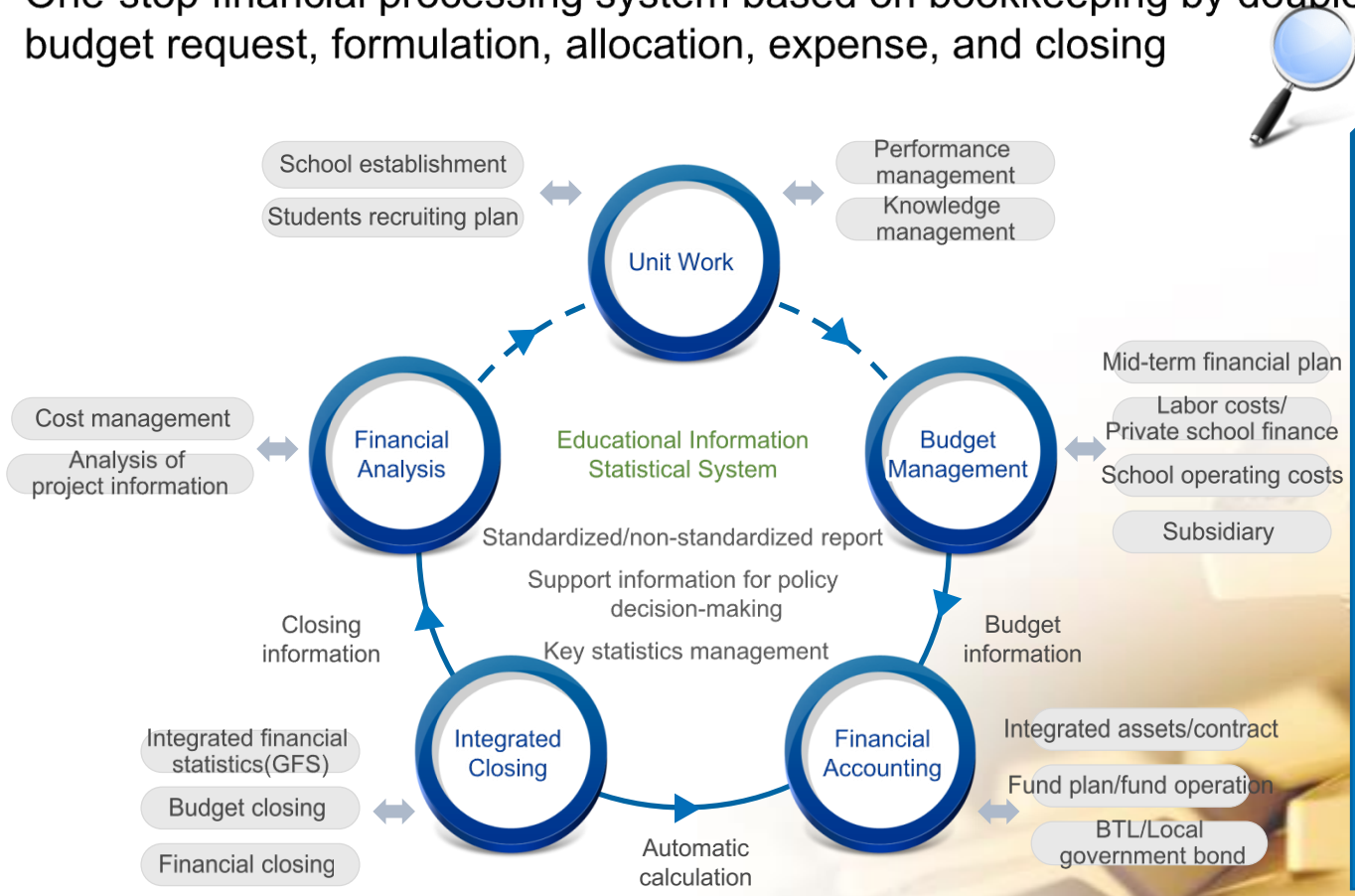
NEIS

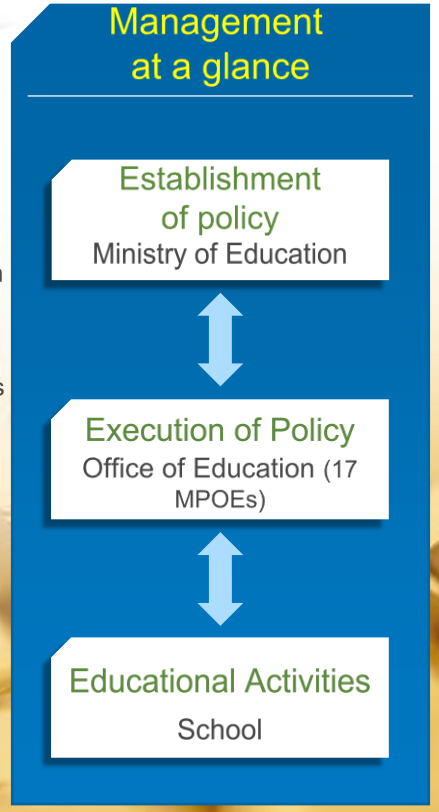


Background of Edufine

Edufine

- A Decentralized, responsibility and performance-oriented advanced educational finance
- Improving the transparency, efficiency and soundness of regional educational finance
- One-stop financial processing system based on bookkeeping by double entry encompassing budget request, formulation, allocation, expense, and closing

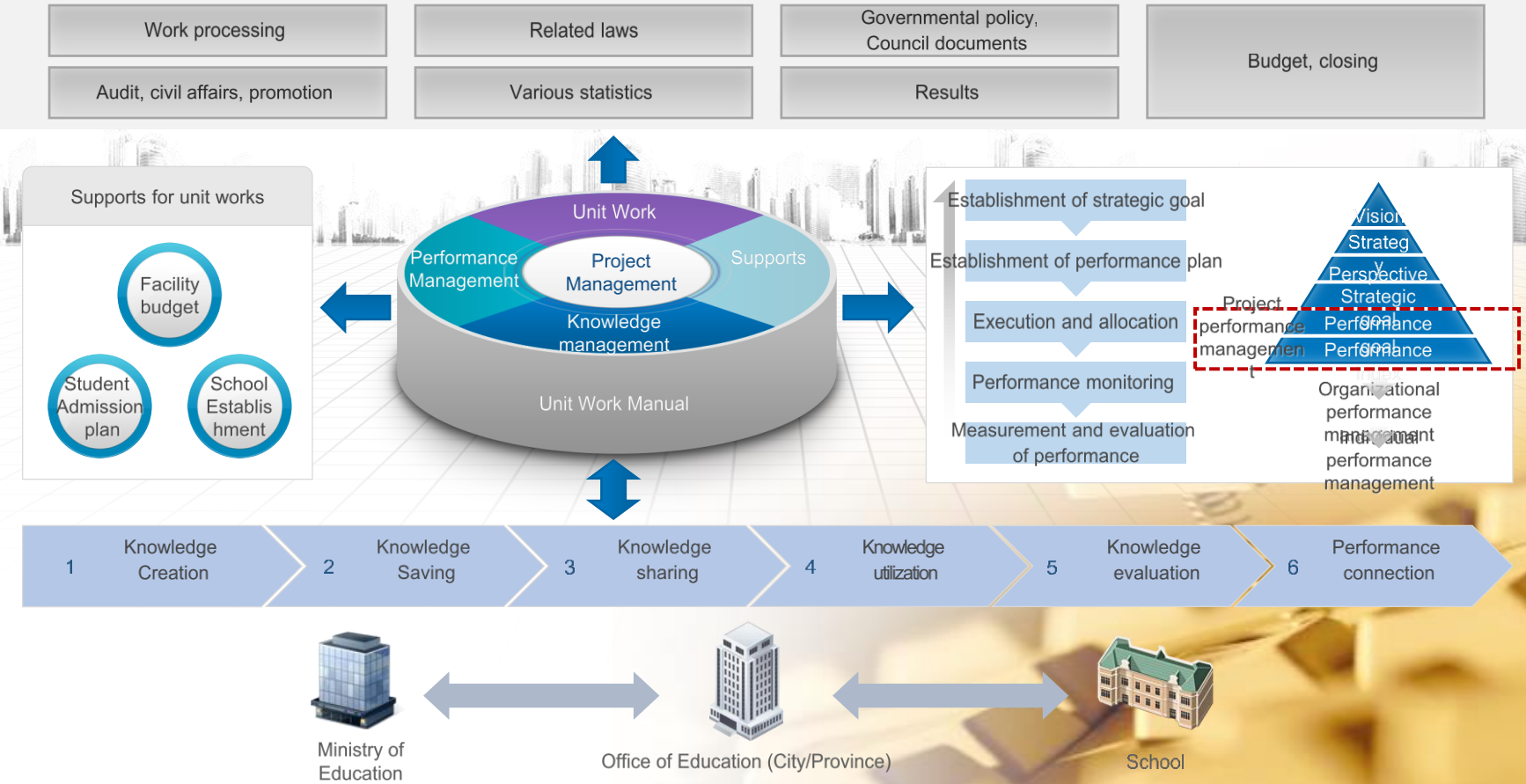




Systematic Project Management of Edufine

Edufine

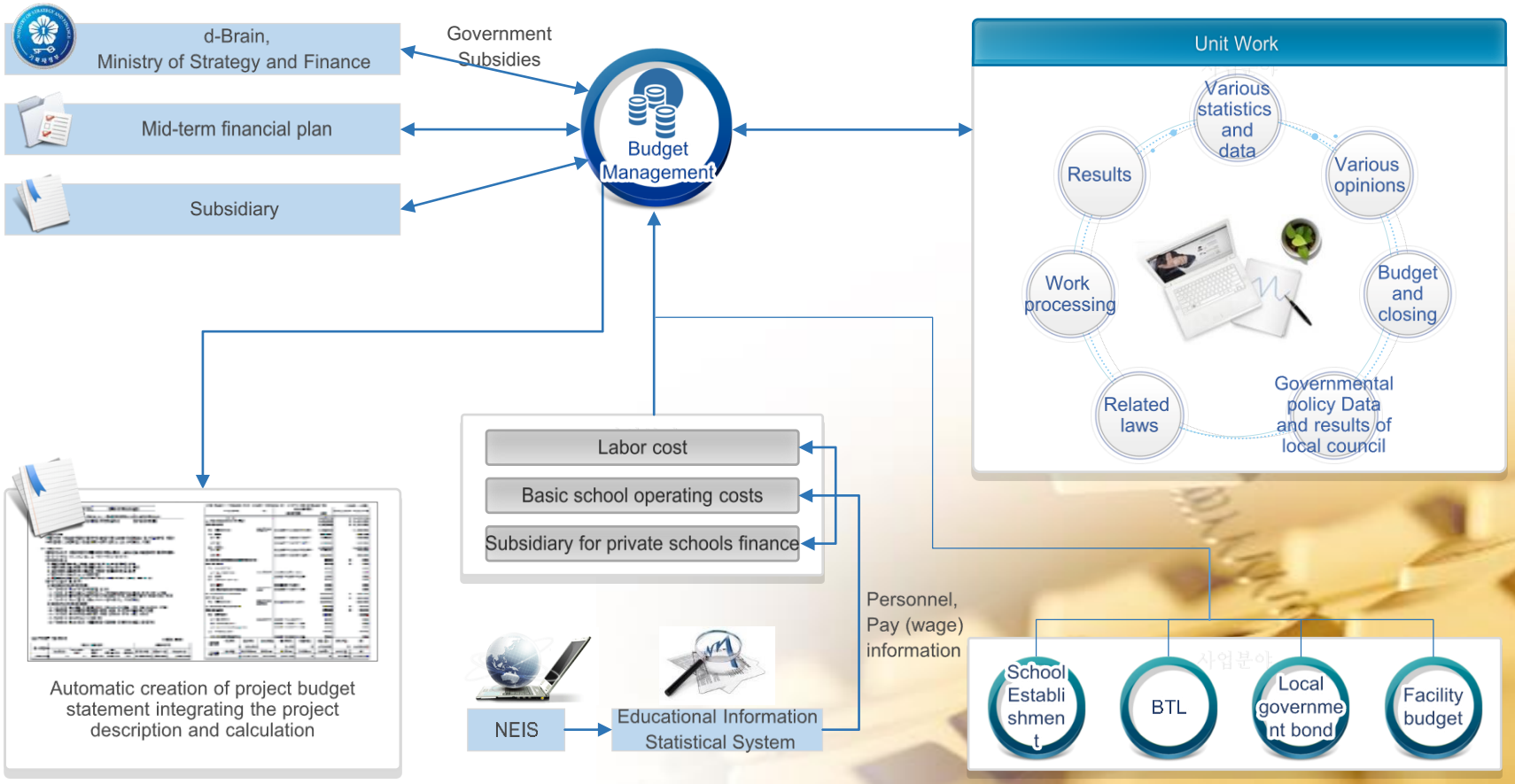
Integrating work and system together, Records management from work processing to results



Edufine

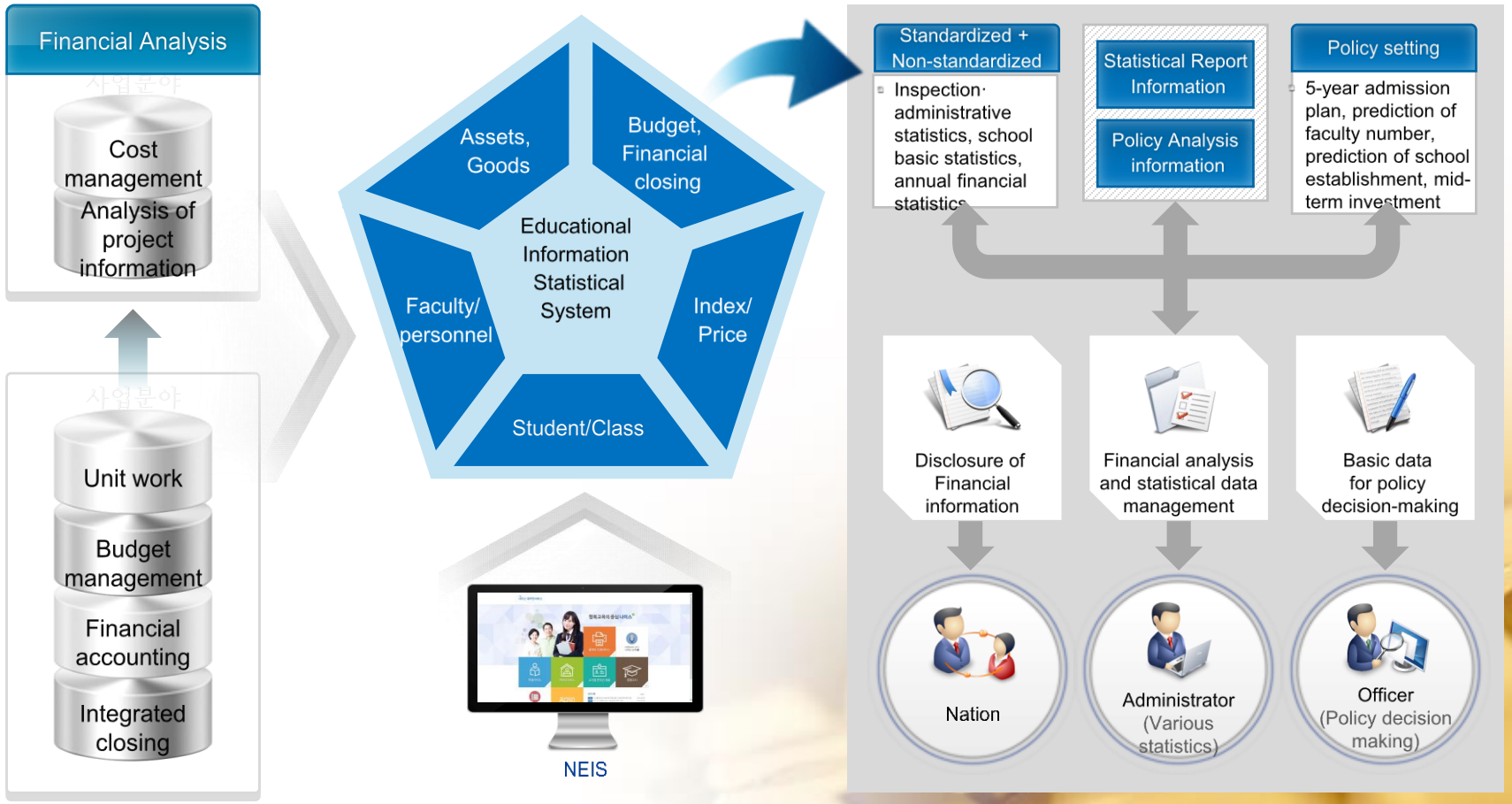
Budget Management of Edufine

- Applied the budget structure for each project
- Improving the efficiency of analyzing the project details and performance



Linkage of Educational Information

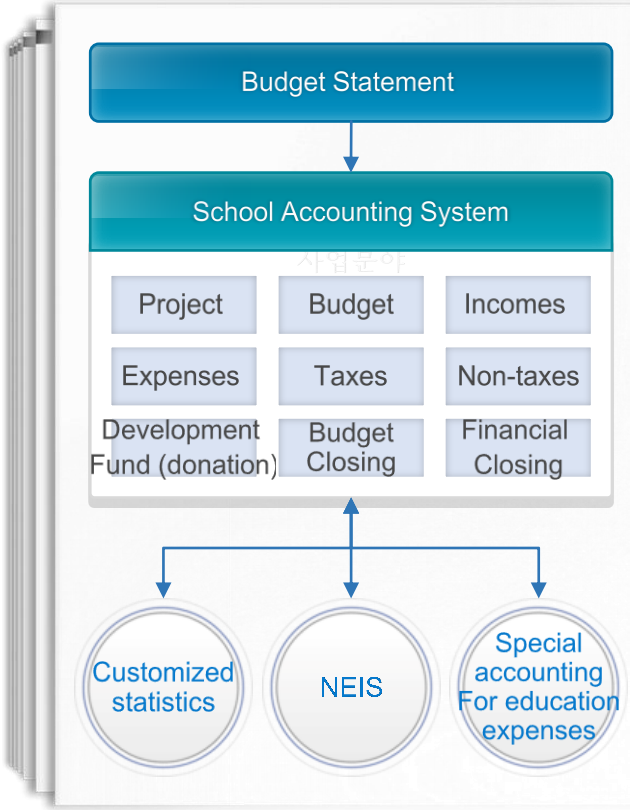
- Providing a systemic financial analysis and monitoring information for each project in association with NEIS



School Accounting

One-Stop processing

covering school budget formulation, request, expenditure, closing, etc.



Minimizing the manual work

Improving the understanding of school accounting operation

Outcomes of Edufine

General Nation

- Improving the understanding of educational financial information
- Expanding the participations of education demands

Edufine Service

Office of Education/Schools

- Convenient budget operation
- Improving the efficiency of analyzing the performance of policy activities

Local Council

- Improving the efficiency of budget screening and audit
- Predicting financial risks in advance

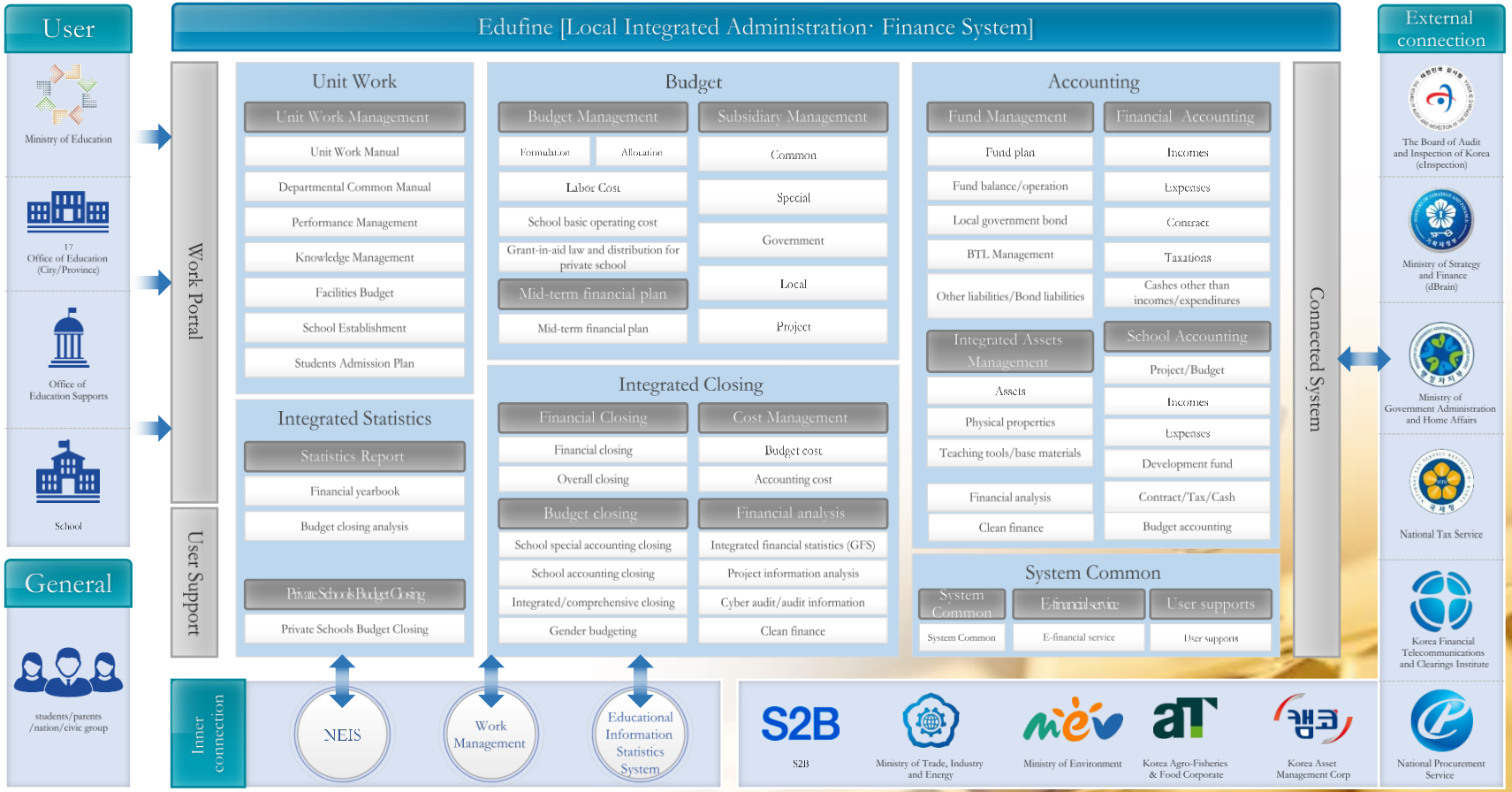
Ministry of Education

- Improving the efficiency of project analysis
- Supports for establishing analysis-based policy

The System Organization of Edufine

Edufine

- Composed of 6 areas, 17 unit systems and 61 subsystems



e-Approval

What e-Approval Aims For

Strengthening the competitiveness in educational administration

- Standardization of educational administration to improve the quality of educational site
- A systematic management of work processing and decision-making process
- Strengthening the transparency and responsibility of educational policy

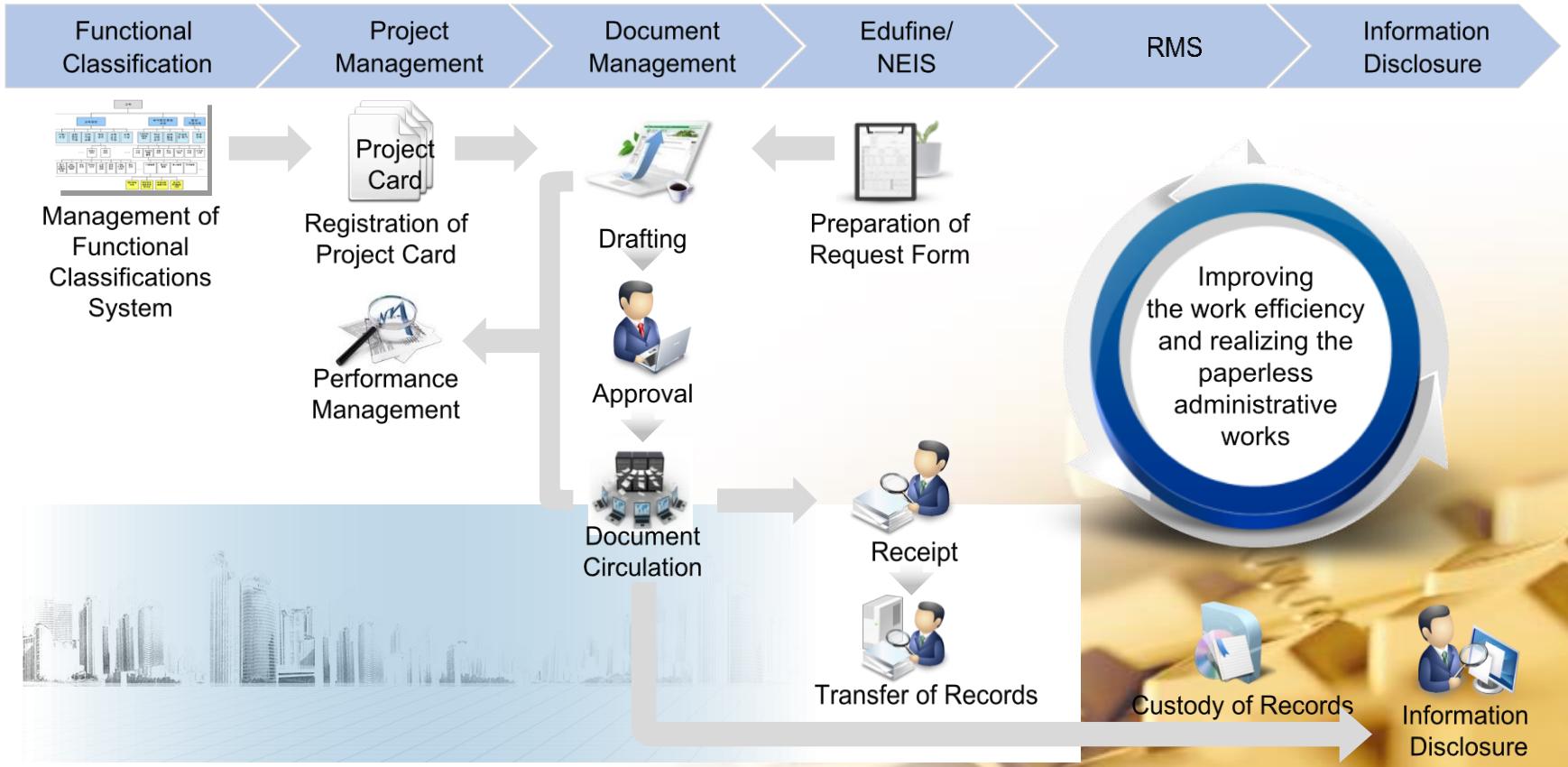
Relieving faculty workloads

- e-Approval system to simplify the approval procedure
- Memo report to report and share the works conveniently
- Activate the document post to reduce the circulations of official documents
- Administrative information system (Edufine, NEIS, etc.) and one-stop approval service to simplify the faculty workloads

e-Approval

Overview of e-Approval

- e-System maximizing the efficiency, responsibility and transparency of works in schools and educational institutes by improving working methods and relieving faculty workloads



e-Approval

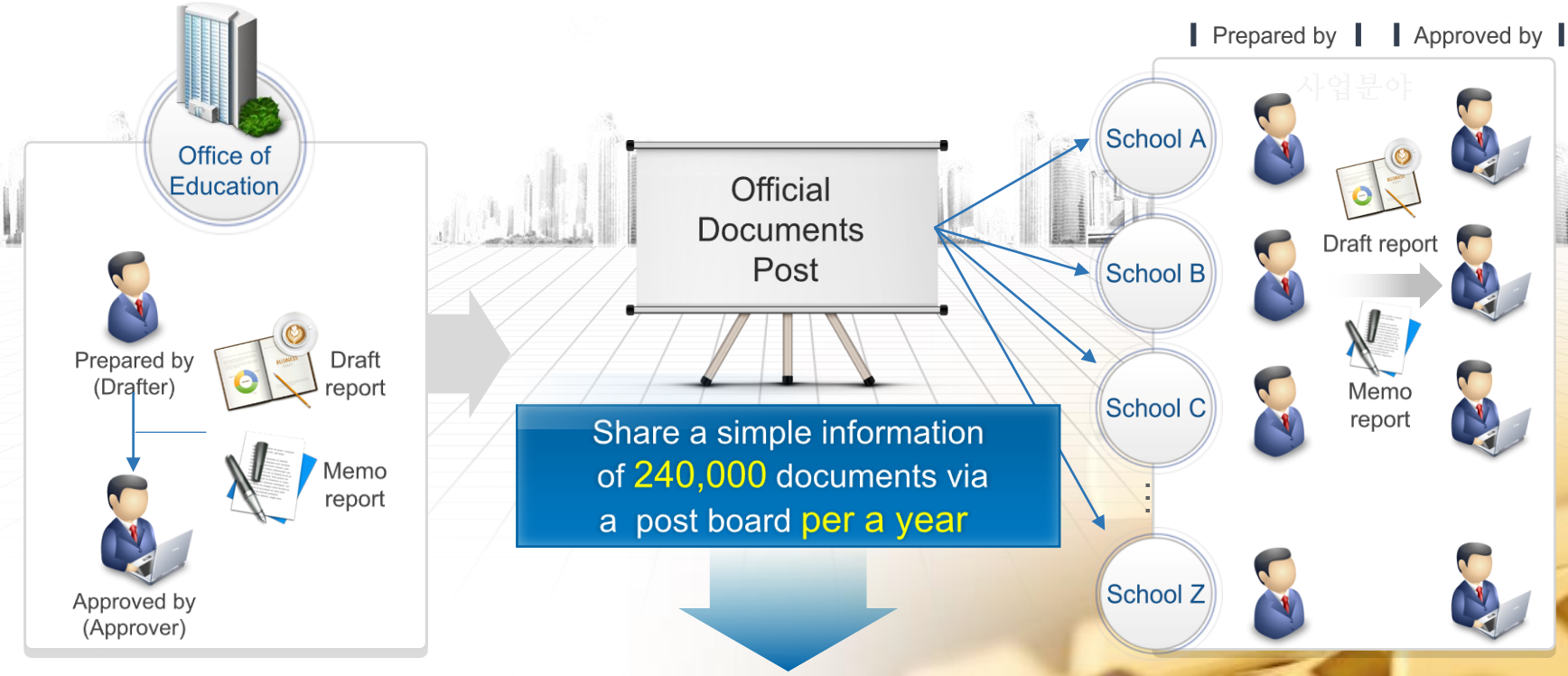
How e-Approval Works

- Electrical processing for 14.5 million administrative works in a year, transmitting official documents in a real time manner with around 12,000 institutions and institutes

e-Approval

Outcomes of e-Approval

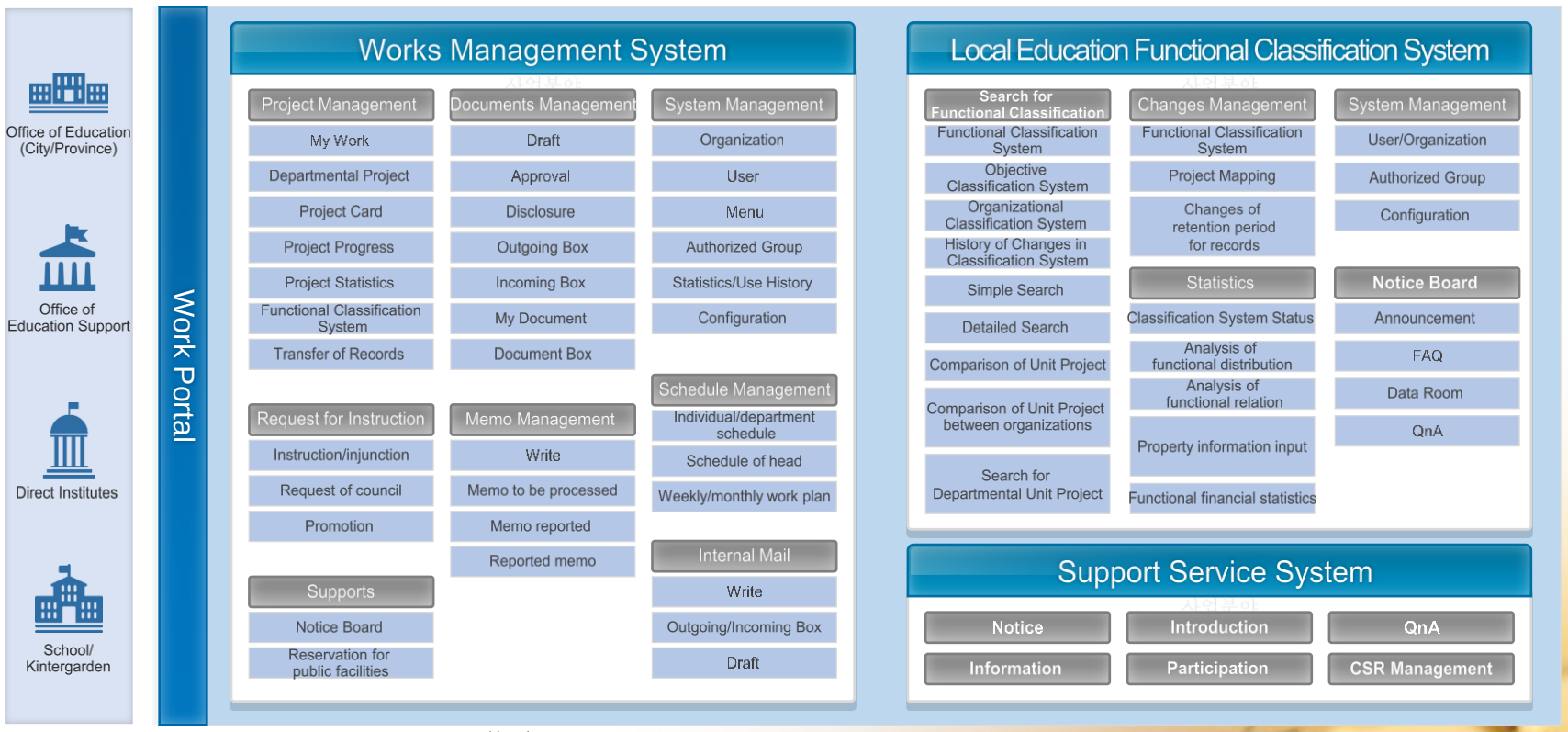
- 32% of official documents from the Office of Education to School (760,000) are processed via document disclosure, 240,000 via a memo reporting (or post board)



32% cut-off of official documents by information sharing between faculties, a prompt decision-making

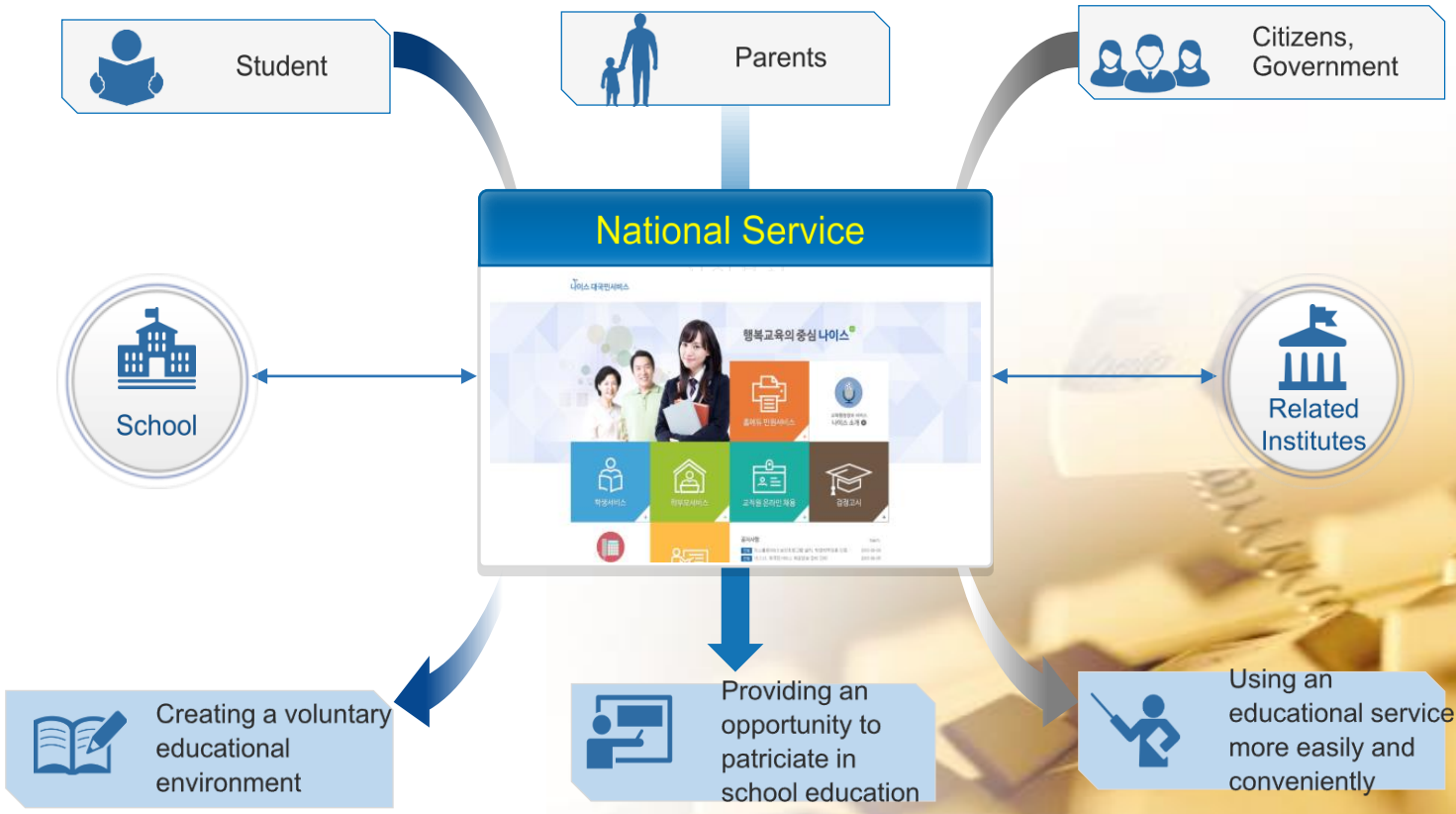
The System Organization of e-Approval

e-Approval



Background of National Service

- Provides an accurate and quick education information to students, parents, citizens, and government, as well as providing them an opportunity to patriciate in education: Students/Parents Service, Home Edu Service, Educational Supports Service, Private Academic Service, Online Application, and Survey Service



Progress of National Service

2006
- Beginning of Home Edu Service
- Beginning of parents service

2011
- Faculty development and evaluation service
- Supports for student educational costs

2012
- Beginning of student service
- Issuing certificates for students/parents
- Online survey for school violation

2013
- Online examination of student psychological/behavioral examination
- App service –disclosure of private academy information

2014
- Reformation of national service
- NEIS OpenAPI implementation
- Test operation of mobile service

Student-Parents Service

Student

Online/Mobile

Free certificate issuance

Parents

Providing customized information

My own opened pathway, Student Service

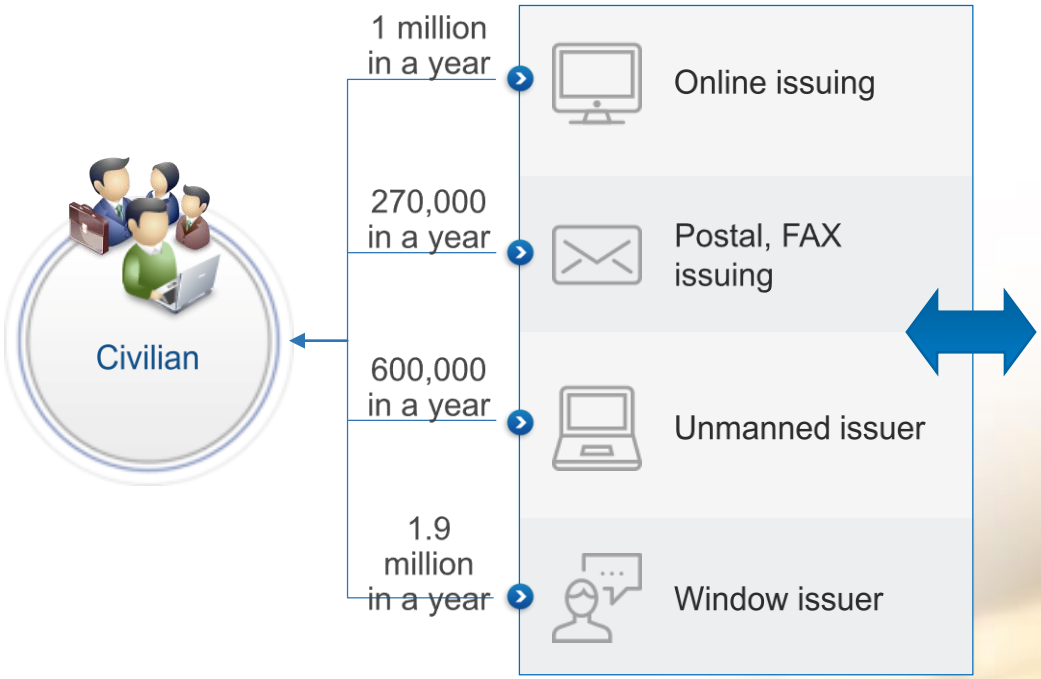
- Certificates: 42 kinds
  (Grade report, school report, health report, afterschool, etc.)
- Annual inquires – 100 million

Getting about children, Parents Service

- Information: 57 kinds
  (School report to parents, teacher consulting, school report, etc. dietary menu, school life, etc.)
- Annual inquires – 2.3 million

Home Edu.Private Academy

This service supports anyone to access the online search, issuance and postal request of certificates at their home anytime.



NEIS

Support for Educational Expenses

- A service supporting the educational expenses for student is to protect applicant student from the social stigma effect and investigate the incomes and properties of applicant household, thereby, Supporting students from underprivileged family first and fairly.

Parents

1.2 million applicants a year

Supports for Educational Expenses

NEIS ⇄ Happy e-eum?

Supports for school work	Select a candidate for supporting	Income/ properties survey

Student educational expenses	Tuition for high school, lunch, afterschool class, informatization supports	Applied standard for city/province
Educational pay	Entrance fee, class fee, materials/submaterial fees, school supply fees	Common at nationwide (~ 50% for middle income level)

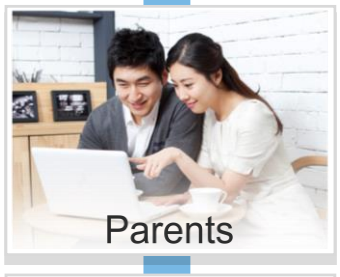
Confidentiality assured

Supports 1 million/year

Annually about KRW 1 trillion

Outcomes of National Service


Students


Parents


General Nation

Systematic supports for educational activities

Educational material (Data) → Information

Checking student's school life and communicating with school

57 service kinds, 3 million members subscribed to parents service

Easy, convenient national service

62 different certificates, about 3.48 million certificates are issued in year

Efficient opinions-gathering

7.6 million pad participated in the survey of the satisfaction with educational activities

Creating happiness Educational Environment


Issues of
Discussions

Issues of Discussions

- Policy issues: Goals, master plan, funding, coordination, legal foundation, curriculum redesign, teacher training, build up infrastructure, service rate, performance evaluation

- Implementation issue: Open Source Learning Platforms, Open Source SW, cloud computing, types of service, international standard, user interface, N-screen system, content securing strategies, copy rights issues

Policy Issues

Issues		Strategies	Remarks
Policy planning and making	Master plan	Terms,, initiatives, action plans	
	Financing	Funding strategies: formulating special funds, Special purpose tax system	Korea: IT promotion fund, education tax
	Legal foundation	Infrastructure, security, Information privacy	
	Coordination function	Coordinator: decision level, working level Coordination among stakeholders: government, teachers, students, parents	MOE: policy planning Government Institute: e.g. KERIS: think tank, implementation
	Curriculum redesign	New curriculum reflected on education reform plans	
	Teacher training	Institutes and schools: Teacher training institutes, KERIS, school	Leading teachers, Training program
		Training program: principals, Faculty, subject teachers	Life-span career based training program
	Performance evaluation	Targets: Schools, principals, teachers	
		Rewarding system	
		Development of indicators	
	Consultation by experts	Government committee, Government Institutes, Personal consultant	ICT Committee of MOE, Consultants for Minister of MOE, Foreign experts

Implementation Issues

Issues			Strategies	Remarks
e-Learning system	Learning Management System		Open source learning platform	Moodle, Blackboard, OpenLearn
	Content development	Securing strategy	Self- development, Open-sourcing, Crowd-sourcing	Korea: Distributed and dedicated development by 17 MPOEs and shared
		Management	Content Management System, Metadata descriptions	CMS interconnected with LMS , Metadata: KEM1.0 and 3.0
		Sharing environment	1: n, 1:1	Korea: 1:n (Center-17 MPOEs, MPOE – Schools) distributed development and sharing
	Media type		Multimedia	Text, Audio, Video
	User interface		PC, Personal Digital Mobile Devices	Korea: N-Screen system
	Tutoring service		Cyber teacher, cyber tutors	Korea: Cyber teacher, Parent tutor
	Consulting service		Cyber consultant	Korea: cyber consultant
	Learning science		Big Data analysis	Just-in-time, Just-for-person
	International standards		Metadata: LOM, KEM Content packaging: SCORM, IMS CC	Korea: KEM1.0, KEM 3.0, SCORM and IMS CC
	Copy rights		MOE, School district, school	Korea: MOE

Implementation Issues

Issues		Strategies	Remarks
Education Information System	Infrastructure	Center establishment, Outsourcing: IDC hosting, Cloud computing	Korea: NEIS, coordination model (1 Control Center, 17 MPOEs)
	Category of service	Types of users: MOE, School, teachers, students, parents, citizen	
	User interface	PC, Personal Digital Mobile Devices	Korea: N-Screen system
	Service development	Open source based, proprietary products	Korea: proprietary products
		Development framework, Web	Korea: e-Government Service Development Guideline
	International standards	Interoperability, sustainability	Korea: KEM, SCORM, IMS CC
	Service delivery technology	Internet, mobile	
	Security system	Network: intranet, Internet	
		Security management:	
		Encryption: data, transaction, file, service	
	Performance evaluation	Indicator development Category of evaluation: usability, contentment affordability, effectiveness of learning, learner's satisfaction, efficacy	Guideniles

More Considerations on Education Information System (1)

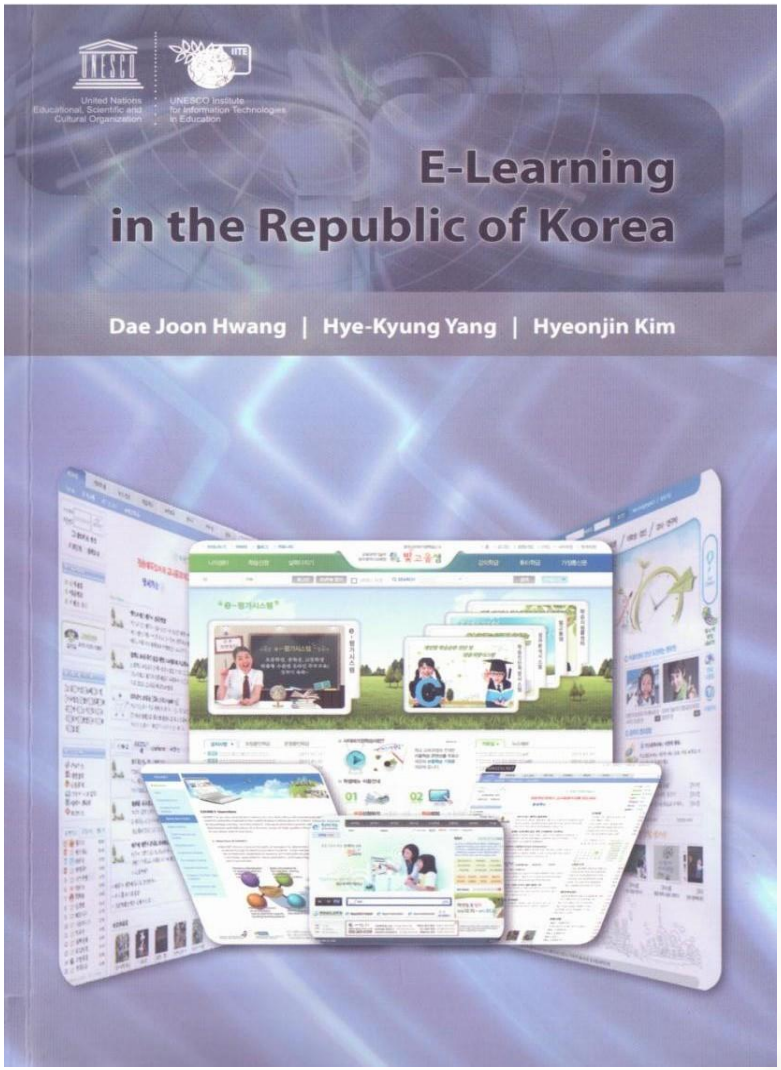
Issues				
Policy	Master plan		Multiple-year based	
	Legal foundation		Information privacy protection, protection of Illegal use of student and school information, procurement	
	Coordination function		Coordination of different issues, demands, and voices among Ministries	Deputy Minister of MOE: policy Deputy Min of ICT NCA: Network Infrastructure, KERIS: implementation
	Use of service		e-Rate: 30% (customer, school), 70% (Telco and Gov)	e-Rate
	Security	National level	School information: academic and health record of students	Data encryption, Education Cyber Security Center
		School level	Protection from illegal use or misuse	
		Personal level	Privacy	
	Open forum for discussions		Directions, privacy, service, quality of service	

More Considerations on Education Information System (2)

Issues				
Service	Development strategy		Framework based	Guidelines of development, use, and maintenance
	Types of services		Administration, National Scholastic Aptitude Test or…	
	Interface design		School, teachers, students, parents, MOE	
	Service delivery technology		Internet, mobile network	
	Legal foundations		Privacy protection, Protection of Illegal use	
	Open forum for stakeholder's participation		Service enhancement, participation, satisfaction	Exhibition, open forum
Performance evaluation system	Process and improvement monitoring	School	Improvement of workflow, reduction of paper workload and document	Mobile office, Web based service
		Teacher	Reduction of administration workload and document, efficiency of administrative job processing	Mobile office, Web based service
		Education district	Monitoring process of improvement	

What to Consult with

A Best Practice of e-Learning: Korea



Source: Dae Joon Hwang, H. Yang and H. Kim, A Best Practice of e-Learning in Korea, UNESCO IITE, Moscow, Russia, Dec 2010

Evolution Paths of e-Government Initiatives

Inception

1978~1996

Foundation

Informatization of core services for citizens(1992~1996)
DB on Basic Administrative Information(1989~1992)

1996~2000

Building Korea Information Infrastructure for high-speed network
Online certificate issuance and transaction
Sharing of government information
Promotion of electronic document and approval

Diffusion

2001~2007

11 initiatives for e-Government,
31 projects for e-Government
Roadmap

Maturity

2008~2012

Expansion of
Integration of e-Government

e-Government 3.0

2013 ~

e-Government 3.0

Source: NIA, e-Government Policy of Korea, October 2015, Seoul, Korea, www.korea.go.kr.

Evolution of e-Government

	Government 1.0	Government 2.0	Government 3.0
	1978-2007	2008-2012	2013-
Operation	Government-oriented	Citizen-oriented	Individual-oriented
Core Value	Efficiency	Democracy	Greater Democracy
Participation	Government initiated	Limited disclosure and participation	Active disclosure, participation
Administrative Service Delivery	One-way	Two-way (Standardized)	Proactive, Customized
Method(Channel)	Personal Visit	Internet, Wireless network	Mobile Internet, Smart phone, Green tech, Big Data, IoT, AI, Open paradigms

Goals of ICT in Education

Reduce divides in education, economy, and technologies

Global competitiveness

Education Innovation for Global Competitive ness

Reducing big burden of Parent's related private tutoring expenses

Catalyst for education innovation

ICT, a Catalyst for Education Innovation

Policies of ICT in Education (1)

	MP 1: ICT literacy	MP 2: Promotion of ICT use in Education: e-Learning	PM 3: Advances ICT use in education: u-Learning	MP 4: Fusion of education and science
National plans				
Goals	Establish ICT infrastructure	Stabilize and diffusion of ICT in education	Provide Web2.0 based service for education and Research Information service	Mobile technology for Smart education/Learning
Government initiatives	**1996-2000** • Establish ICT infrastructure : Internet connection among schools (100%) • ICT literacy education and training: Students, teachers, and parents • Open Internet Education • Portal Service: EDUNET • Feasibility study on establishing high-tech schools through adoption of e-Learning	**2001-2005** • Development and distribution of content • National system for sharing educational contents • Digital Library System • Improving teaching methods • EDUNET Teaching/ Learning center • Cyber Home Learning System • EBS lectures for college academic ability test • Establish Cyber University • Regional e-Learning Support Center	**2006-2010** • Customized learning • Develop digital textbooks • u-Learning pilot projects • National Teacher Training Information Service • Restructuring EDUNET based on Web 2.0 • Develop Edu-fine • Establish KOCW • Education Cyber Security Center for safe use of education information • Global consulting on e-Learning • Promote to create foreign Knowledge business market	**2010-2013** • Outcomes and evidence based policy making • Emphasis on creativity and critical thinking in education • Create digital ecosystem for learning and research • Establish m-Learning Infrastructure • Leverage ICT for education innovation • Pay attentions to side effects of ICT • Nurture competency of teachers • Encourage stake holder's participation and networking
Teacher training	ICT training for over 25% of all teachers annually	ICT training for over 33% of all teachers annually	e-Teacher training for ICT use in education: 30 hrs(15 hrs, optional) for every 3 years	
Focuses on assessment	How to establish ICT infrastructure	How to innovate education system using ICT	How to prepare competences for 21st century education	How to change education to be SMART for creativity, fun, quality, global competence

Policies of ICT in Education (2)

Focus on competencies, Student-centered learning

National plans

MP 5: Creative and competencies based education

Goals

Leveraging digital developments and student-centered and competencies based learning

Government initiatives

2014-2018

- Outcomes and evidence based policy making
- Focus on competencies based education: creativity and critical thinking, communication, collaboration, global citizenship
- Establish digital ecosystem for learning and education
- Establish personalized education environment
- Leverage digital development for education innovation
- Pay attentions to Big Data to support just-in time and just-in-person support
- Nurture teacher's competencies for future education
- Encourage stake holder's participation and networking
- Free semester system in the middle school education since Mar 2016

Teacher's competencies training

e-Teacher training system for ICT use in education: 30 hrs (15 hrs, optional) for every 3 years, SW and smart education training for leading teachers

Focuses of assessment

Course based evaluation, Participation, experience, competencies are focal points of evaluation

What are Changing? (1): Now and Then

What is changing…	Then	Now	Implications on education
Network technology	IoP, Wired Internet	Mobile and wireless, IoT	Exponential growth of data
Device	PCs	Personal Mobile Devices	BYOD
Server	Client-server, IDC hosting	Cloud computing	Economy of scale
Web technology	1.0	2.0, 3.0	Collaboration
SNS	Openness (2nd gen SNS)	Personalized, customized (3rd gen SNS)	Personalization, customization, social works
Education service delivery	teacher/instructor-centered classroom lecture (f2f), e-Learning	m-learning, u-Learning	Open learning (e-, m-, u-Learning), MOOCs
Artificial Intelligence	Rule based reasoning	Machine learning	Intelligent tutoring or consulting

What are Changing? (2): Now and Then

What is changing…		Then	Now	Implications in education
Education system		Education 1.0, 2.0	Education 3.0	Open education, Quality and flexible education
Goals		Literacies: ICT/Media literacy	Student success and competences: e-Skills, cultural literacy	Students empowerment
Classroom setting		Traditional	Smart classroom	Technology embedded and connected classrooms
Forms of education		Formal education	Formal, non-formal, informal education	All forms of education with SNSs
Use of media		Stationary setting: Desk-top PCs, Notebook	BYOD	Personalized platform
Learning science	Curriculum development	National curriculum for teacher-centered education	Curriculum design for student-centered education	Toward student-centered education/learning
	Pedagogy	Teacher-centered education	Student-centered learning	Student-centered learning
	Learning theory	Peer-assisted learning: collaborative, cooperative learning	Action learning, problem based learning	Focused on student empowerment
	Textbook	Paper book	e-Book, Digital textbook	Decreased latency of knowledge upgrading
	Learning design	Semester based polling and inquiry analysis	Learning science, just-in-time analysis, just-for-person analysis	Bid Data analysis: pedagogy, student support, administration improvement
	Scalability of learning	classroom	Inter classroom/institutions, cross boarder classroom/institutions	Cross contextual scalability

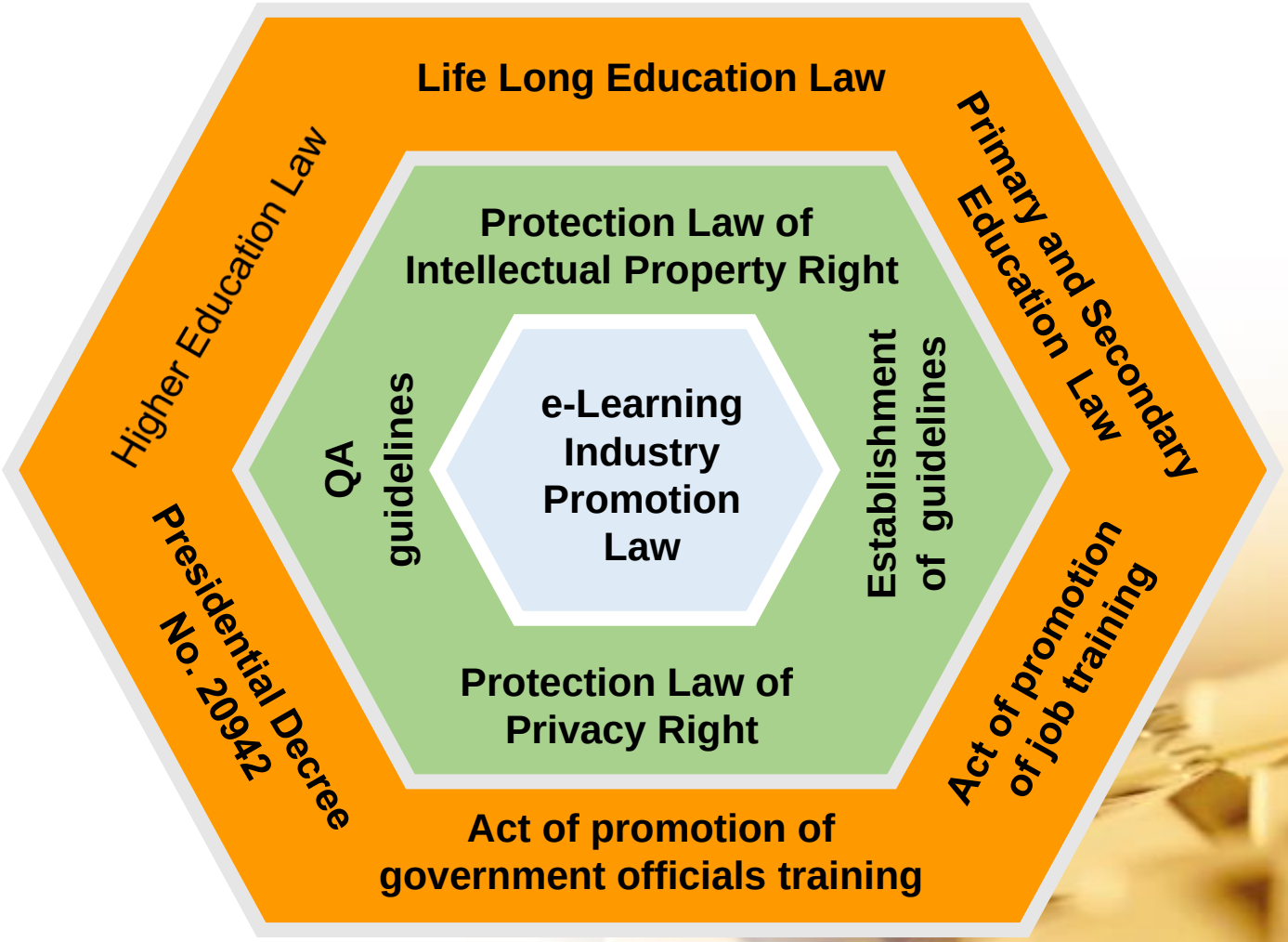
Funding for ICT in Education

Period	Budget	Implementation Strategy
1987~1995 (Beginning Stage)		• Small change from national public telephone company (KT): total 64 mil. USD • Collaboration with national agencies to reduce supply cost: Public Procurement Service
1996~2000 Master Plan I	USD1,406 M., MOE	• Edu-Rate: Reduce Internet communication expense through collaboration with KT • Tax benefit for private sector • Collaboration with private IT training center to provide PC labs and instructors for public schools
2001~2005 Master Plan II	USD1.596 M., MOE	• Establish national IT Fund
2006~2010 Master Plan III	USD 269 M. (2006), MOE	• Autonomy to regional government • Intergovernmental collaboration • Public-private partnership
Master Plan IV	Budgets, 17 MPOEs	• Budget allocation and management are endorsed to 17 MPOE (Metropolitan and Provincial Office of Education)

Policies for Promotion of ICT in Education

- Computer Education Reinforcement Plan (1987)
- 2nd and 5th Education Reform Plans (1995, 1997)
  - → Guidelines for ICT in Education in Primary & Secondary Schools (2000)
- ICT in Education Master Plan (1996)
  - → Monitoring & Evaluation for ICT in Education
- ICT in Education Master Plan II (2001)
  - → ICT Adapted Education Promotion Plan (2001)
- ICT in Education Master Plan III (2006)
  - → National HRD Master Plan through e-Learning (2004)

The Legal Framework of e-Learning: Korea



Cooperation among Ministries

- Approved e-Learning in HE, cyber universities, and Primary and secondary education
- Certify the quality of e-Learning programs
- Develop de facto standards

Ministry of Education, Science & Technology

- Support job training by e-Learning
- Unemployment insurance refunds for e-Training courses

Ministry of Labor

- Promote e-Learning industry
- Developing technology and de jure standards
- Certify the quality of e-Learning product

Ministry of Knowledge Economy

Ministry of Public Administration & Security

- Operation of e-training system for government officials and the public service

MCST
Ministry of Culture, Sports & Tourism

- **Developing e-Learning content for promotion of multiculturalism and home with different culture**

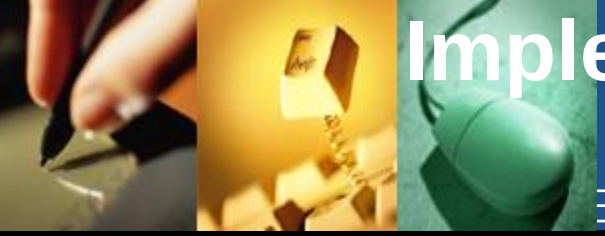
Source: e-Learning Industry, e-Learning Expo 2009, Sept. 3, 2009, Korea, NIPA

Summary of e-Government Initiatives (1)

Category	Inception (1978 -1996)	Foundation (1996 – 2000)
Overview	**Computerization** was promoted as a national strategic project for fostering the information industry in order to prepare for the future information society	With establishment of the first 'Master Plan for Informatization Promotion' in June 1996, **Korea's e-Government development entered the stage of full-scale implementation**
Vision	An information society with the level of advanced countries	A small but efficient government
Goals	• Complete the National Basic Information Network by the mid 1990s • Enhance and maintain national competitiveness with high productivity level	• Process services for citizens through an online single window (G2C) • Facilitate e-commerce between the government and businesses to maximize transparency (G2B) • Maximize productivity and transparency of internal administrative affairs (G2G) • Expand use of e-signature • Establish an integrated computing environment
Legal framework	• Act on Expansion of Computer Networks and Usage Promotion('86) • Legal ground for providing support for the National Basic Information Network project	• Framework Act on Informatization Promotion (1995) • The Act states that the "Government must establish the Master Plan for Informatization Promotion in order to facilitate informatization" (Article 5) • The Master Plan shall include each area of public sector, local environment, industry, and lifestyle

Collaboration among Ministries

Ministry	Major policy	Institute
Ministry of Knowledge Economy (MKE)	• Enact E-Learning industry law in 2004 • Establish “E-Learning Industry Development Plan” in 2011 • Promote e-Learning business	NIPA (National ICT Promotion Agency)
Ministry of Education, Science, and Technology (MEST)	• Approval of authorized “Cyber University” in 2000 • Promote establishing “University e-Learning Support Center” in 2006 • Establish “Cyber Home Learning System” in 2004 • Support university entering programs of EBS • Initiate “Smart Education Project” in 2010	KERIS (Korea Education and Research Information Service)
Ministry of Labor (MOL)	• Provide internet-based training with employment insurance in 2002 • Support association of e-Learning HRD in 1998	ILE (Institute for Labor Education)
Ministry of Culture, Sports, and Tourism (MCST)	• Enact “Online Digital Contents Industry Development” law in 2004 • Lead policies of smart content	KOCA (Korea Cultural content promotion Agency)
Ministry of Public Administration and Security (MOPAS)	• Create the guidelines of “Government Official Cyber Training” in 1999 • Establish “Smart Work Strategies” in 2010	GOCT (Government Official Competency Training Center)



Implementation of Korea Information Infrastructure Project

- Classes of Korea Information Infrastructure (KII)

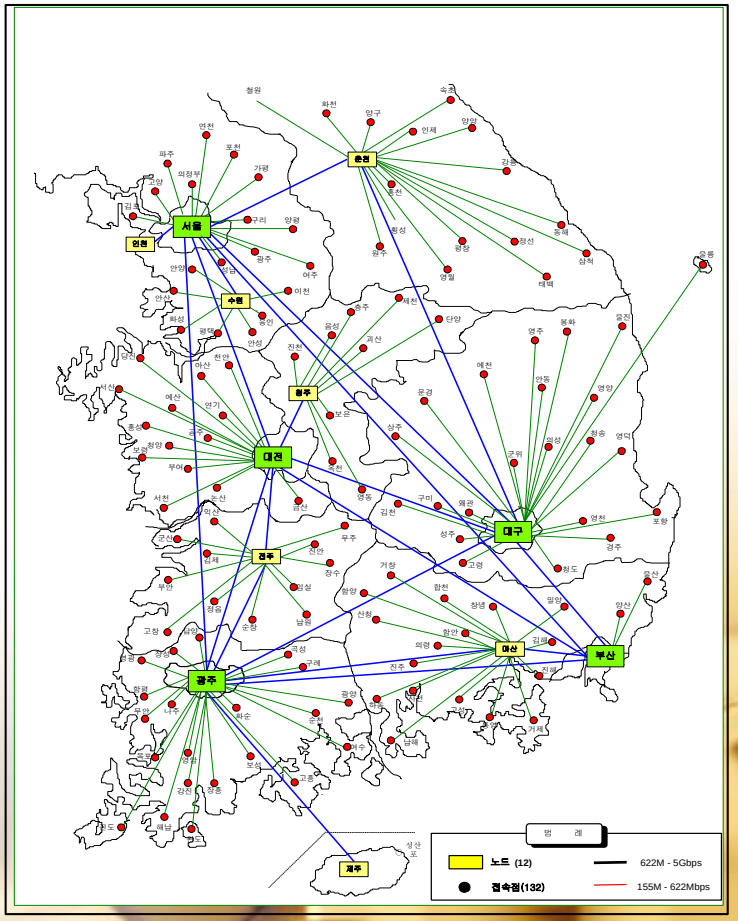
	KII-Test bed	KII-Government	KII-Public
Main User	Research Institute	Government	Home and Business
Investor	Gov. + Private	Government	Private Sector
Main Target	Test bed	Backbone	Access
Phase 1 (1995~1997)	2.5Gbps between Seoul and Daejon	Connect 80 call zones	Fiber to the big buildings
Phase 2 (1998~2000)	Giga PoPs	Connect all 144 zones with ATM switches	30% of total household with ADSL and CATV
Phase 3 (2001~2005)	All Optical Net	Upgrade to Tera bps	Over 200Mbps Service to the Home

- Construction of the broadband convergence network (BcN) (2004~2010)
- Building of the broadcasting communications network (2009~2013)
  - ✓ Built the ultra broadband convergence network (UBcN) to provide the world's top-level services converging broadband and communications

Overview of Korea Information Infrastructure Project

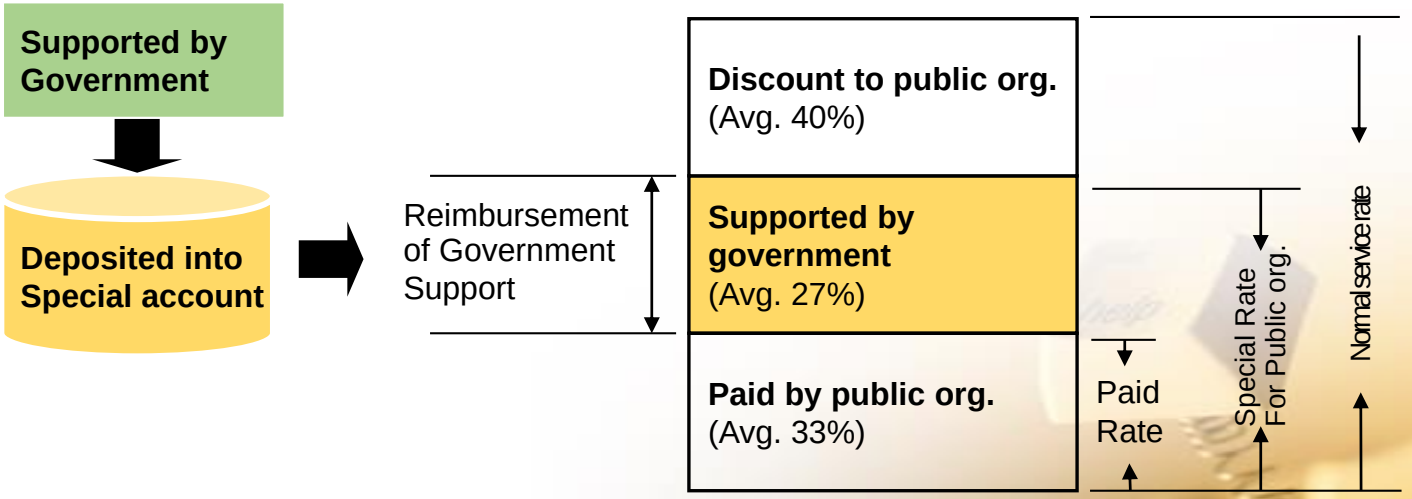
- KII-Backbone : Nationwide Optical
- Backbone Connect all 144 call zones in 2000
  - ✓ Investment : 437 Million USD (1995~2000)
- STM + ATM + Internet
- Provide broadband services to government & public institutions
  - ✓ 37,036 lines to 30,820 institutions (June, 2004)
- **Connected all schools(Dec., 2000)**

※ STM (Synchronous Transfer Mode)
ATM (Asynchronous Transfer Mode)



Funding System for Korea Information Infrastructure Project

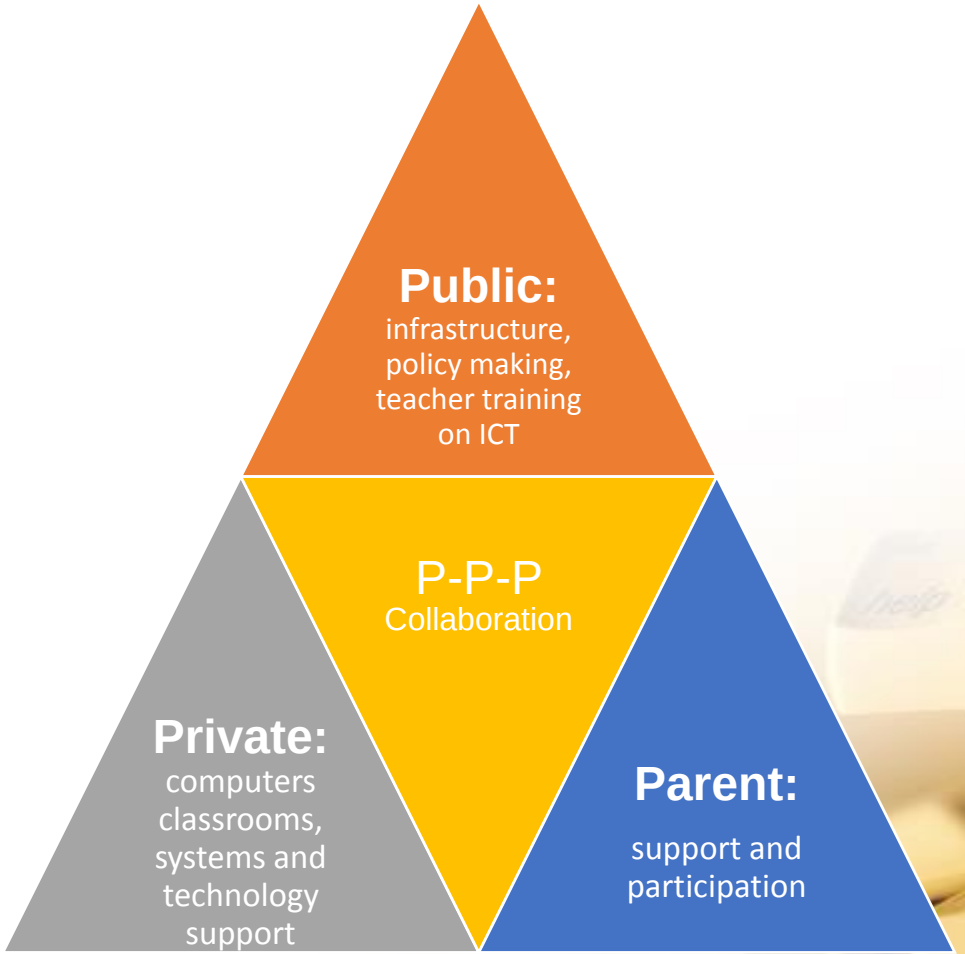
- Some investment cost for infrastructure was supported by the government budget and given to the providers (KT and Dacom).
- The providers repaid it through the discount of telecom service fee to public org. (The facilities left after the service becomes the possession of the provider)



※ Reimbursement System

- ✓ Subscribed Rate (or e-Rate) : The contracted rate between the government and providers. Usually avg. 40% discount for conventional public rate.
- ✓ Paid rate : The actual amount paid for telecom service by public org.
- ✓ Supported by Gov. : The amount supported by the government for each subscriber's telecom service, it is reimbursement for government funding on infrastructure development

P-P-P Collaboration



What KEM looks like

- KEM
  - General
  - Life cycle
  - Meta-metadata
  - Technical
  - Educational
  - Rights
  - Relation
  - Annotation
  - Classification

Table of Contents

- Step 1 : Contents
- Step 2 : Chapter
- Step 3 : Clause
- Step 4 : Item
- Step 5 : Sub-item

Role

- Right holder
- Subject matter expert
- Instructional Designer
- Developer
- Content reviewer
- Service provider
- Institute

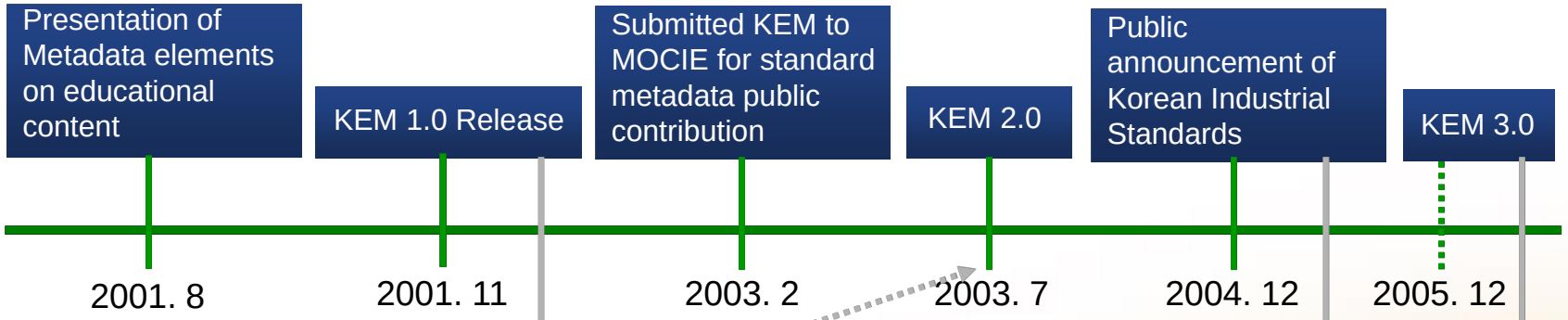
Teaching method

- Information search
- Information analysis
- Information
- Web discussion
- Cooperative research
- Exchange of experts
- Web pen pal
- Creation of web information

Environment

- One PC per class
- One PC per group
- One PC per learner

History of KEM Metadata Standards



- Lack of interoperability with global standard
- Expression in the form of DTD
- Inadequate structure
- Consideration on scalability and accuracy
- Used in EDUNET

Used for content management in Cyber Home Learning System and RISS

- Adding component related to Digital Right Management property
- Applying to Higher Education

KEM 3.0 vs. LOM 1.0

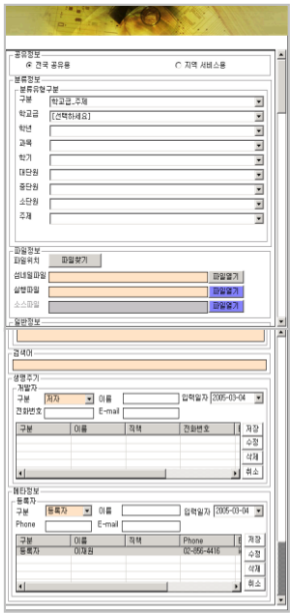
	LOM 1.0			KEM 2.0		
	No	Category	Attribute	No	Category	Attribute
Genaral Element	1	1	General	1	1	General
	5	1.2	Title	5	1.2	Title
				6	1.3	Sub Title
	6	1.3	Language	7	1.4	Language
	7	1.4	Description	8	1.5	Description
				9	1.6	Table of Contents
	8	1.5	Keyword	10	1.7	Keyword
	9	1.6	Coverage	11	1.8	Coverage
	10	1.7	Structure			
	11	1.8	Aggregation Level	12	1.9	Aggregation Level
	40	4.6	Other Platform Requirement			
	41	4.7	Duration			
Educational Element	42	5	Educational	41	5	Educational
	45	5.3	Interactivity Level	44	5.3	Interactivity Level
	46	5.4	Semantic Density			
	47	5.5	Intended End User Role	45	5.4	Intended End User Role
	53	5.11	Language	51	5.10	Language
				52	5.11	Pedagogy
				53	5.11.1	Teaching Method
				54	5.11.2	Environment
				55	5.11.3	Assessment
	54	6	Rights	56	6	Rights
	55	6.1	Cost	57	6.1	Cost
	56	6.2	Copyright And Other Restrictions	58	6.2	Copyright And Other Restrictions
				59	6.3	Expiry Date
	57	6.3	Description	60	6.4	Description

Model of Application to Information Search

Main Attributes
- Category
- File
- General
- Key word
- Life cycle
- Metadata
- Taxon path

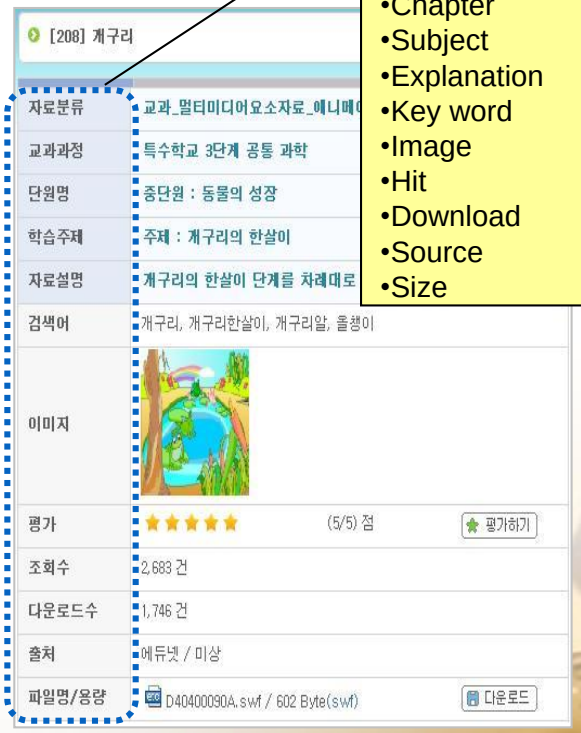
frog.jpg

+



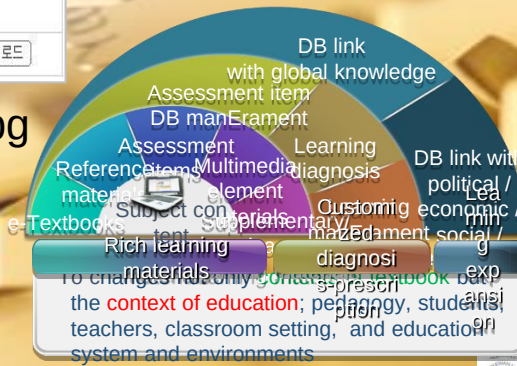
KEM Input Tool

service



- Category
- Course
- Chapter
- Subject
- Explanation
- Key word
- Image
- Hit
- Download
- Source
- Size

Information about frog.jpg



Metadata Collection Map (1)

- Metadata Collection Map in Education Domain

LOM | CanCore | KEM | DC/EdNa | **Meta Collection Map** | Vocabulary Map

NO	ID	Meta Collection Map	DataType	LOM v1.0	CanCore v2.0	KEM v2.0	DC/EdNA
1	1	General	Container	O	O	O	X
2	1.1	Identifier	Container	O	O	O	X
3	1.1.1	Catalog	CharacterString	O	O	O	X
4	1.1.2	Entry	CharacterString	O	O	O	O
5	1.2	Title	LangString	O	O	O	O
6	1.3	Subtitle	LangString	X	X	O	O
7	1.4	Language	CharacterString	O	O	O	O
8	1.5	Description	LangString	O	O	O	O
9	1.6	TableofContents	CharacterString	X	X	O	O
10	1.7	Keyword	LangString	O	O	O	O
11	1.8	Coverage	LangString	O	X	O	O
12	1.9	Structure	Vocabulary	O	X	X	X
13	1.10	AggregationLevel	Vocabulary	O	O	O	X
14	2	Lifecycle	Container	O	O	O	X
15	2.1	Version	LangString	O	O	O	X
16	2.2	Status	Vocabulary	O	X	O	X
17	2.3	Contribute	Container	O	O	O	X
18	2.3.1	Role	Vocabulary	O	O	O	X
19	2.3.2	Entity	CharacterString	O	O	O	O
20	2.3.3	Date	DateTime	O	O	O	O
21	3	MetaMetadata	Container	O	O	O	X
22	3.1	Identifier	Container	O	O	O	X
23	3.1.1	Catalog	CharacterString	O	O	O	X
24	3.1.2	Entry	CharacterString	O	O	O	X
25	3.2	Contribute	Container	O	O	O	X
26	3.2.1	Role	Vocabulary	O	O	O	X
27	3.2.2	Entity	CharacterString	O	O	O	O
28	3.2.3	Date	DateTime	O	O	O	X
29	3.3	MetadataScheme	CharacterString	O	O	O	O
30	3.4	Language	CharacterString	O	O	O	X
31	4	Technical	Container	O	O	O	X
32	4.1	Format	CharacterString	O	O	O	O
33	4.2	Size	CharacterString	O	O	O	O
34	4.3	Location	CharacterString	O	O	O	X
35	4.4	Requirement	Container	O	X	O	X
36	4.4.1	OrComposite	Container	O	X	O	X
37	4.4.1.1	Type	Vocabulary	O	X	O	X
38	4.4.1.2	Name	Vocabulary	O	X	O	X
39	4.4.1.3	MinimumVersion	CharacterString	O	X	O	X
40	4.4.1.4	MaximumVersion	CharacterString	O	X	O	X
41	4.5	InstallationRemarks	LangString	O	X	O	X
42	4.6	OtherPlatformRequirement	LangString	O	O	X	X
43	4.7	Duration	Duration	O	O	X	X
44	5	Educational	Container	O	O	O	X
45	5.1	InteractivityType	Vocabulary	O	X	O	X
46	5.2	LearningResourceType	Vocabulary	O	O	O	O

Metadata Collection Map (2)

- Vocabulary Map for Various Metadata Specification

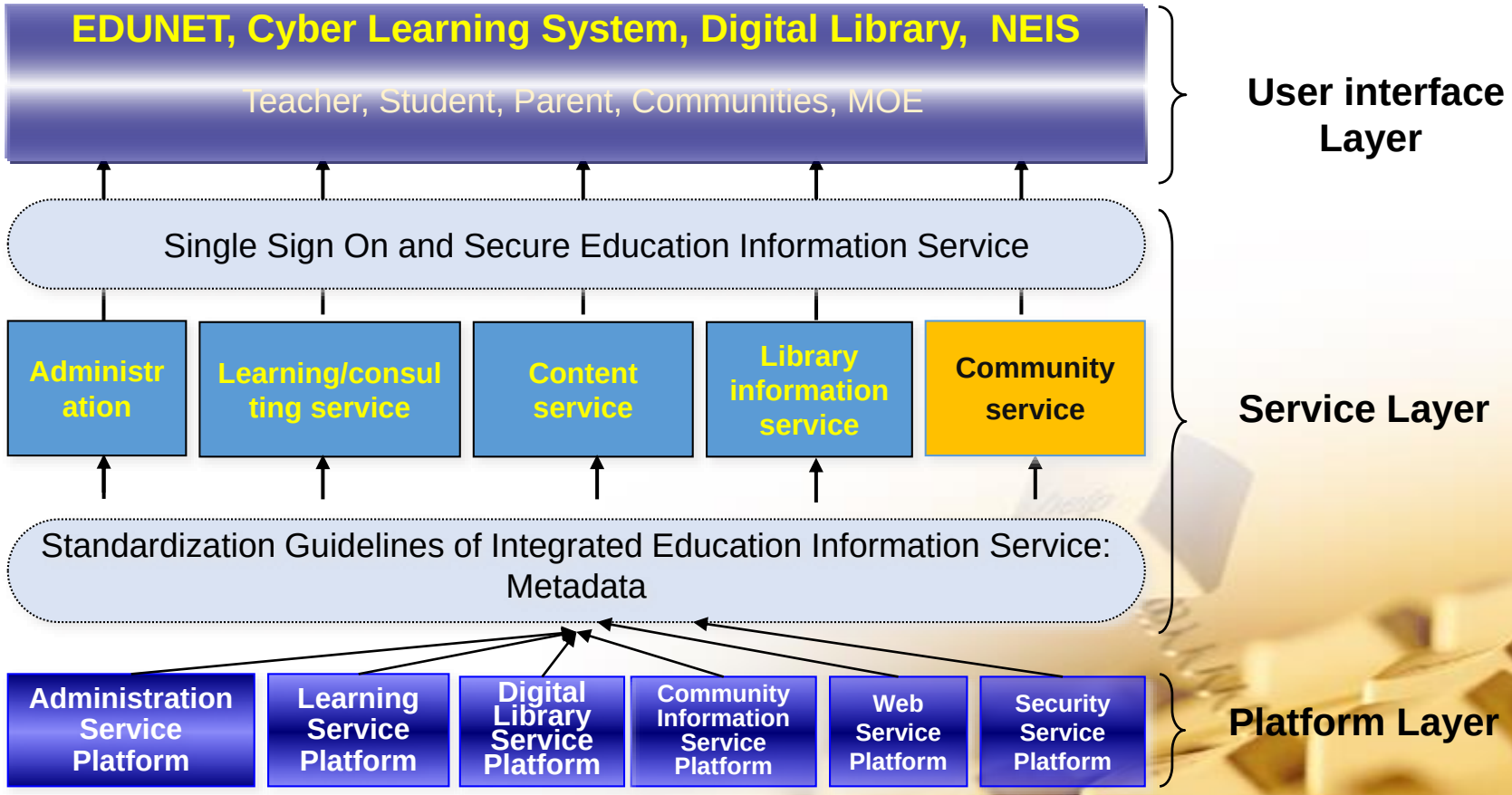
LOM | CanCore | KEM | DC/EdNa | Meta Collection Map | **Vocabulary Map**

NO	LOM/CanCore	KEM v2.0	Note_Lom_KEM	DC/EdNA	Note_Lom_EdNA
3	medium	medium			
4	difficult	difficult			
5	very difficult	very difficult			
5.12.1	<TeachingMethod>				
1		information search			
2		information analysis			
3		information			
4		web discussion			
5		cooperative research			
6		exchange of experts			
7		web pen pal			
8		creation of web information			
5.12.2	<Environment>				
1		one PC per class			
2		one PC per group			
3		one PC per learner			
6.1	<Cost>				
1	yes	yes			
2	no	no			
6.2	<CopyrightAndOtherRestrictions>				
1	yes	yes			
2	no	no			
7.1	<Kind>				
1	ispartof	ispartof		isPartOf	
2	hasversion	hasversion		hasVersion	
3	isrequiredby	isrequiredby		isRequiredBy	
4	requires	requires		requires	
5	ispartof	ispartof		isPartOf	
6	haspart	haspart		hasPart	
7	isreferencedby	isreferencedby		isReferencedBy	
8	references	references		references	
9	isformatof	isformatof		isFormatOf	
10	hasformat	hasformat		hasFormat	
11	isbasedon	isbasedon			isbasedon -> source
12	isbasisfor	isbasisfor			isbasisfor -> n/a
9.1	<Purpose>				
1	discipline	discipline			
2	idea	idea			
3	prerequisite	prerequisite			
4	educational objective	educational objective			
5	accessibility restrictions	accessibility restrictions			
6	educational level	educational level			
7	skill level	skill level			
8	security level	security level			
9	competency	competency			

Strategy for Developing Educational Service

- Integrated framework based approach: National Education Information System
- International standards adopted to develop metadata to create national educational content archive: KSX metadata standards, Edunet
- Establish sharing environment of educational content: Edunet
- Teacher training system: Life-span career development system
- Provide researches and higher education institutions with information about research and technology development: RISS4U
- Diminish digital gabs between haves and have nots

Framework of Education Service Development



Organization of National Teacher Training Information Service (NTTIS): Korea

Training Information

Training offered by
- MPOEs
- Private companies including e-Learning institutes
- Universities

Self-diagnosis and Prescriptions

By position and rank
- Professional competence
- Common competence

Comprehensive Training Information System

- Training Application
- Linked analysis of training info & diagnosis results
- **Taking Training Courses**
  - **Attendance**
  - **Distance**
- **Training Path & Quality Assurance**
  - Individual training path
  - Quality assurance
    - Training course
    - Training institutes
- National Training Statistics Management

Training Outcome Analysis

- Field Test
- Outcome Evaluation
- Course Feedback

Expert Consulting

Consulting on:
- Professional competence
- Common competence
- Class lessons
- Student guidance

National Education Information System (NEIS)

Summary of Monitoring Process of Use of ICT in Education: Korea

Domain	Indicators
Goal	• Develop indicators to evaluate outcomes of ICT in education • Manage evaluation system focused on outcomes and their use • Analysis of annual trends in use of ICT in education in every year
Background	• 2nd ICT in education development plan (2001~2005) : develop indicators of ICT in education and evaluation • 3rd ICT in education development plan (2006~2010): establish outcomes management system of ICT in education project
Indicators developed	• 2001 : Development of Indicator of ICT in education for primary and secondary schools • 2002 : Development of Indicator of ICT in education for high schools • 2003 : Development of Indicator of ICT in education for lifelong education • 2004 : Development of Indicator of ICT in education for special education (use for special schools/special classrooms)
Annual Survey of the status of ICT in education	• 2003 : 2,297 primary and secondary schools (30% of schools) • 2004 : 2,675 primary and secondary schools (32% of schools) • 2005 : 2,259 primary and secondary schools (32% of schools), Special schools (115), Special classes (706) • 2006 : 10,889 primary and secondary schools (100% of schools) • 2007 : Amend indicators and statistics of ICT in education (MOE) • 2008 : Development of statics of ICT in education of NEIS • 2009 : Monitoring ICT in education for 11,026 primary and secondary schools • 2010 : Monitoring ICT in education for 9,027 primary and secondary schools • 2011 : Monitoring ICT in education for 10,622 primary and secondary schools • 2013 : Monitoring ICT in education for 11,307 primary and secondary schools • 2014 : Monitoring ICT in education for 9,840 primary and secondary schools

Development of ICT Indicators in Education

- Indicators developed to assess use of ICT in education in Korea

Index	Main contents	Target
ICT literacy assessment tools for students	Focus : Assessing the ability to resolve the given problematic situation effectively Utilization : Apply to the revision of the information education system Domain : - Content domain: Computers networks and , Expression and logic of Information, Algorism and modeling, Information society and ethics - Ability : define, Access, Evaluate, Create, Manage, Communicate	Primary school students(1-2, 3-4, 5-6grade), Secondary school students (middle school and high school students)
ICT Skill Standard for Teacher (ISST)	Focus : Assessment of ICT skill depend on role of teachers Utilization : Use in the teacher training courses Domain : Information gathering, Information processing, Information exchange, Information ethics	Teachers, Executive teachers, CEOs

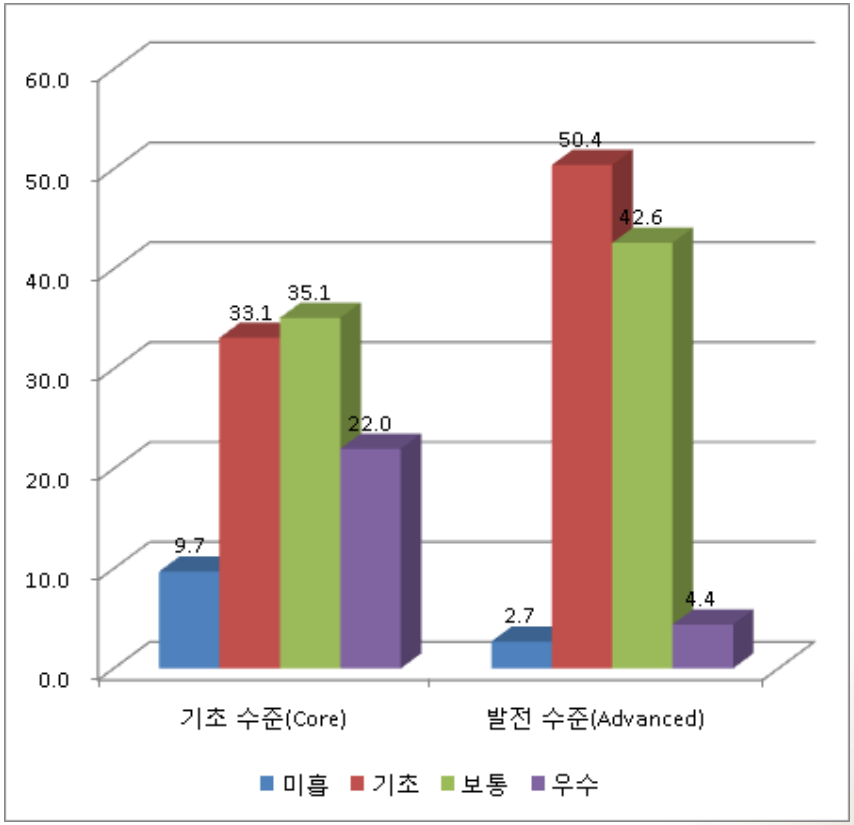
Source: Dae Joon Hwang, How to Prepare Education Innovation in the RB, A Talk at the Session of Expert Group, IT Agency, 16 July 2013, Ufa, Republic of Bashkir Republic.

Analysis Results of National Status Survey of ICT in Education: 2014

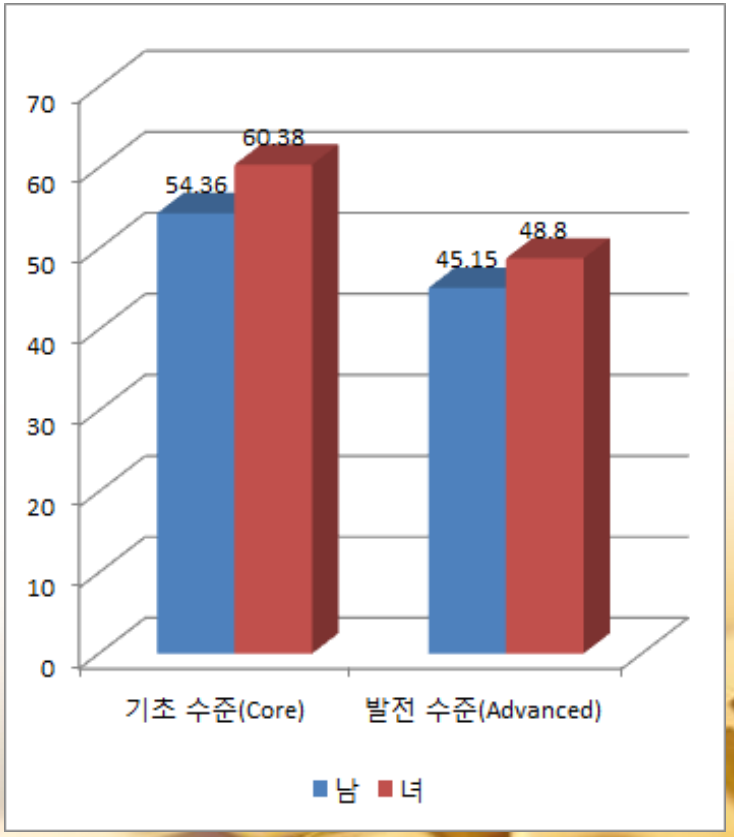
Elements	Regression coefficient (β)
Effort of Principal	0.210
Record of teacher training for ICT	0.200
Number of personnel in charge of ICT in education	0.313
Designation of School CIO	0.155
Number of teachers teaching ICT subject	0.302
Budget for ICT in education	0.118
Number of PCs	0.044
Number of Video and display equipment	0.078
Availability of mobile devices	0.069
Bandwidth of Internet	0.089
Web accessibility of students with disabilities	0.034
Availability if computer labs	0.112
Use of computer labs	0.200
Availability of Education on ICT	0.175
Student's participation to ICT community and events	0.111
Teacher's participation to ICT community	0.094
Teacher's efforts for ICT in education	0.488

Teacher's efforts for ICT in education came to be known as the factor with the most significant impacts (0.488)

Analysis of ICT Literacy of Students (1)

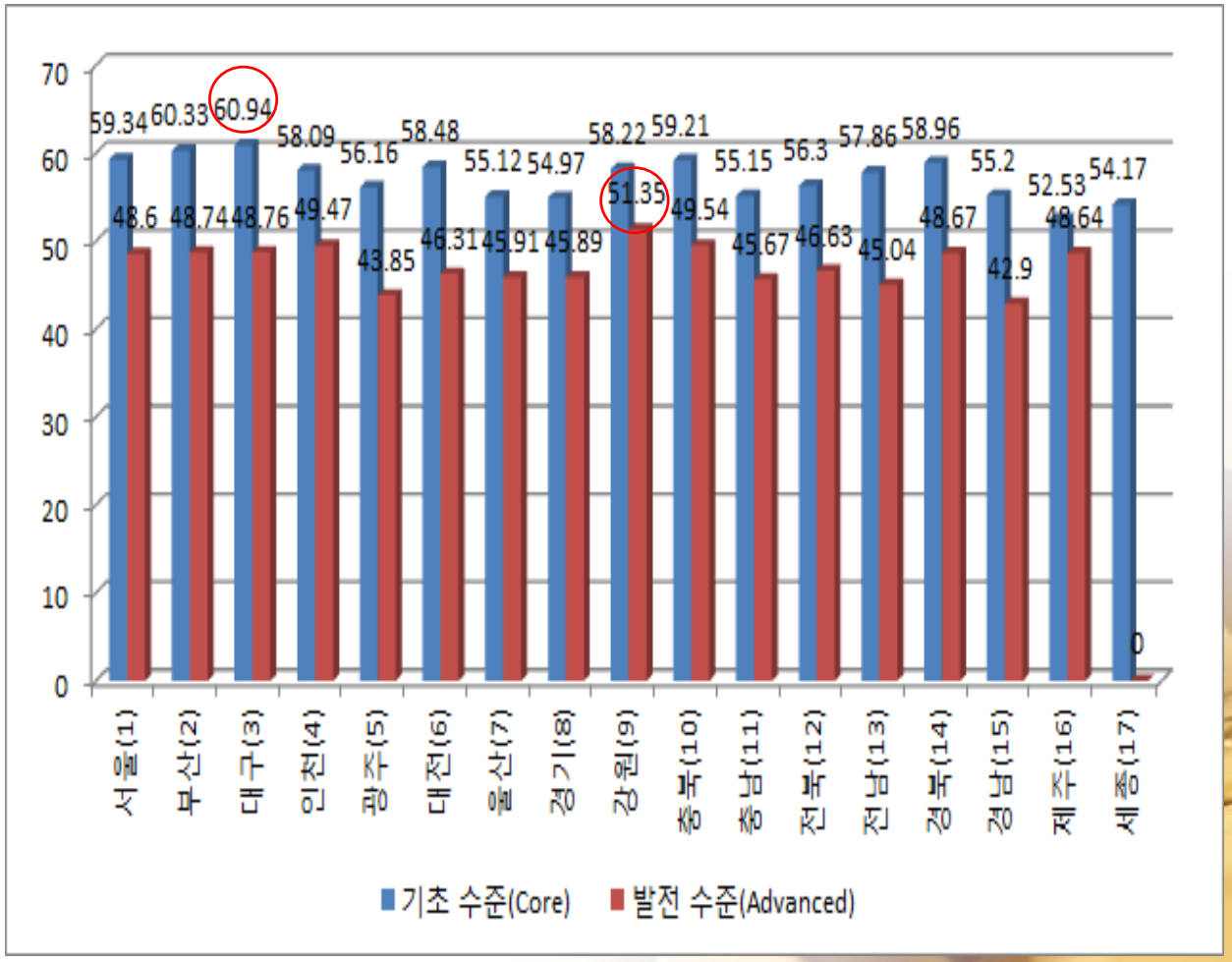


Core vs. Advanced level

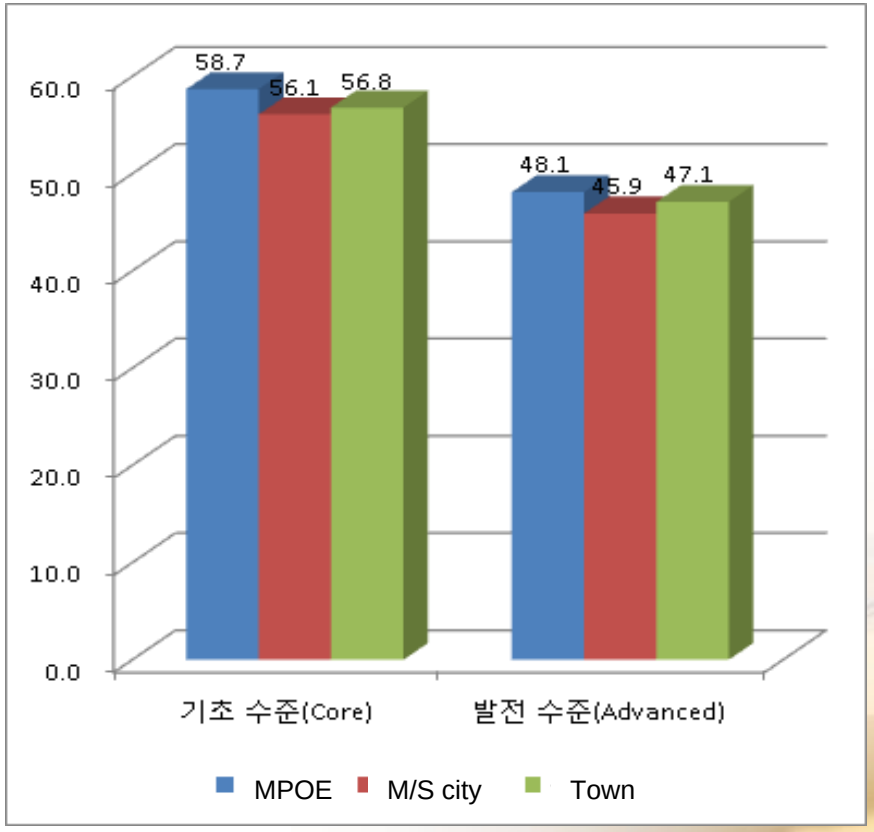


Gender

Analysis of ICT Literacy of Students: MPOEs(2)

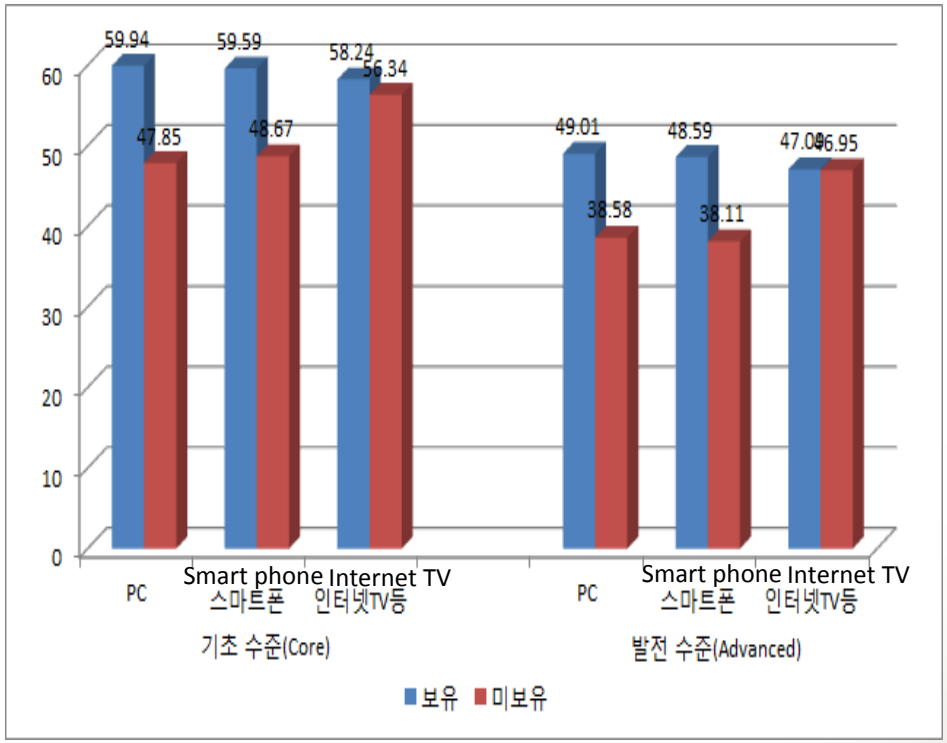


Analysis of ICT Literacy of Students (3)

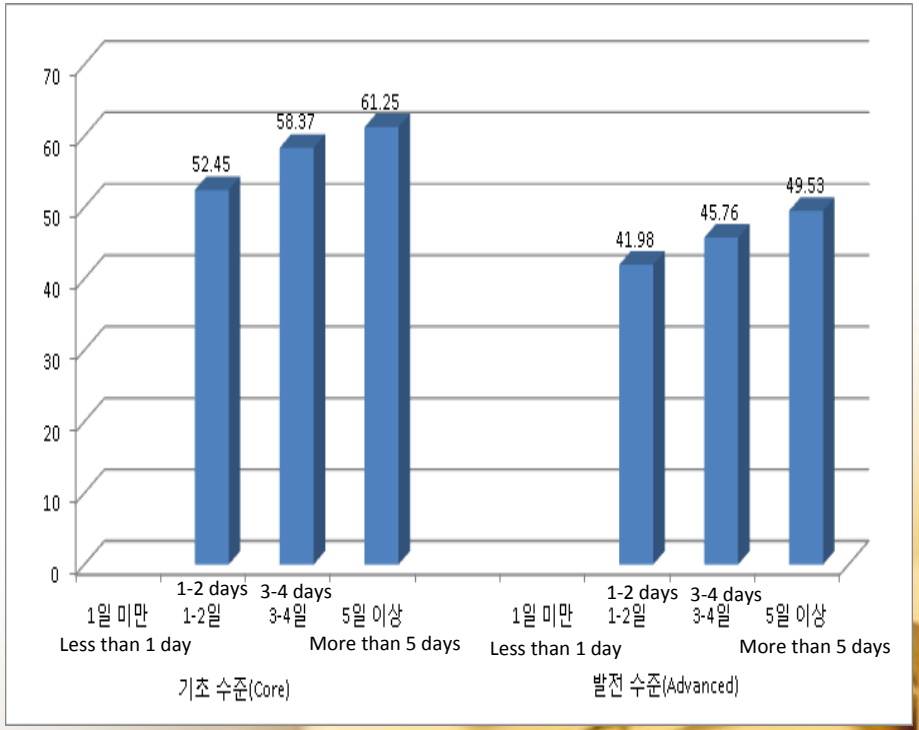


Geographical Location

Analysis of ICT Literacy of Students (4)



Availability of PCs, Smart phones, and Internet TV at Home



Use of Internet per Week


Concluding
Remarks

Conclusion

- Taking holistic approaches to ICT in education is important to its success
- Public-Private-Parent collaboration is essential to sustainability of education innovation
- Government leadership and initiatives are essential to build up environment and practices of ICT in education
- Framework based approach to service development relieves redundancy and enhance consistency and efficiency in developing services
- Nurturing teachers (and principals) on ICT literacy and rewarding their participation are essential to promote use of ICT in classrooms
- ICT is an important tool for accessibility, affordability, equity, welfare, and education innovation
- Parents tutoring is quite successful to encouraging students to be engaged in learning process
- Performance monitoring system and feedback must be prepared to keep tracking of changes in progress and outcomes of ICT in education
- Creating culture of innovation is important for substantial growth of education

감사합니다
Thank You

Prof. Dae Joon Hwang, Ph.D.
Sungkyunkwan University, Seoul, Korea
djwang@skku.edu