Best Practice of ICT in Education with Special Focus on Korean Case

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Dae Joon Hwang, Ph.D.
Prof., Sungkyunkwan University, Korea
djhwang@skku.edu
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V Conclusions
I. Introduction
World-class elementary and secondary school education
• PISA 2006: Reading #1, Mathematics #4, Science #9
• TIMSS 2003: Mathematics #2, Science #3

College enrollment ratio is the highest in the world
• 27.2% (1980) -> 68%(2000) -> 84.1%(2009)

Development in education serves as the driving engine for economic growth and has contributed to the development of democracy

Decrease in the satisfaction level of students in education
• Elementary school (64.4), Junior high school (52.0), High school (47.0) in 2006

Excessive spending on private education
• USD 20 billion in 2007

The Korean industry is riding the Third Wave whereas Korean education has remained on the Second Wave. Thus, revolutionary change is needed
(Industry Innovation Forum, 2005, A. Toffler)
<table>
<thead>
<tr>
<th>Company/Business</th>
<th>100 mph</th>
</tr>
</thead>
<tbody>
<tr>
<td>NGO (non-governmental grassroots organizations)</td>
<td>90 mph</td>
</tr>
<tr>
<td>Family</td>
<td>60 mph</td>
</tr>
<tr>
<td>Labor Unions</td>
<td>30 mph</td>
</tr>
<tr>
<td>Government bureaucracies</td>
<td>25 mph</td>
</tr>
<tr>
<td>School System</td>
<td>10 mph</td>
</tr>
<tr>
<td>Intergovernmental Organizations</td>
<td>5 mph</td>
</tr>
</tbody>
</table>
Backgrounds of Education Innovation

- De-synchronization
- Globalization (Competitiveness)
- Exploiting Technology Innovation
- Challenge to Paradigm Shift in Education

A Catalyst for Education Innovation is Use of ICT in Schools
**Goals of ICT in education**

- Master Plan
- Stable Financing

**Environment settings:** leadership of government, strong cooperation among private, public and parents, legal foundation, implementation system, infrastructure

- HRD: teachers & school CEOs, educational administrators, students, diversify ways of education/learning

- Performance monitoring and evaluation: indicators, assessment

- Dissemination best practices: EDUNET, ICT fair & competition
Goals of ICT in Education in Korea

Education welfare

Quality education

Education competitiveness

Equal opportunities for education
Government Initiatives of ICT Use in Education
## Evolution of ICT Use in Education

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Goal</td>
<td>Establish ICT infrastructure</td>
<td>Promotion of use of ICT in education</td>
<td>Advances in Education and Research Information service</td>
<td>Creative ICT based education/Learning</td>
</tr>
<tr>
<td>ICT Development</td>
<td>1996-2000</td>
<td>2001-2005</td>
<td>2006-2010</td>
<td>2011-</td>
</tr>
<tr>
<td>- Infrastructure building</td>
<td>- Development and distribution of content</td>
<td>- Customized learning</td>
<td>- Create digital ecosystem for learning and research</td>
<td></td>
</tr>
<tr>
<td>- ICT literacy education</td>
<td>- National system for sharing educational contents</td>
<td>- Develop digital textbooks</td>
<td>- Intensify ICT use</td>
<td></td>
</tr>
<tr>
<td>- Internet portal service</td>
<td>- Digital Library System</td>
<td>- U-Learning pilot projects</td>
<td>- Focused on side effects of ICT</td>
<td></td>
</tr>
<tr>
<td>- Opening of EDUNET</td>
<td>- Improving teaching methods</td>
<td>- National Teacher Training Information Service</td>
<td>- Data and evidence based on policy making</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- EDUNET Teaching/Learning center</td>
<td>- Restructuring EDUNET based on Web 2.0</td>
<td>- Encourage stakeholder’s participation and communication</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Cyber Home Learning System</td>
<td>- Develop Edu-fine</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Education Cyber Security Center</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Global consulting on e-Learning</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Penetrate into foreign Knowledge business market</td>
<td></td>
</tr>
</tbody>
</table>

### Training Policies
- **ICT training for over 25% of all teachers annually**
- **ICT training for over 33% of all teachers annually**
- Teacher training for use of ICT in education: 30 hrs (15 hrs, optional) for every 3 years

### Training Direction
- Focus on ICT literacy
- Creative HRD using ICT

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*Image: IITE_TeacherTraining_15Nov2010_DJHwang*
### Stable Financing

<table>
<thead>
<tr>
<th>Period</th>
<th>Budget</th>
<th>Implementation Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>’87～’95</td>
<td></td>
<td>- <strong>Small change</strong> from national public telephone company (KT): total 64 Mil. USD</td>
</tr>
<tr>
<td>(Beginning Stage)</td>
<td></td>
<td>- Collaboration with national agency to reduce supply cost: Public Procurement Service</td>
</tr>
<tr>
<td>’96～’00</td>
<td>1,406 M USD</td>
<td>- <strong>Edu-Rate:</strong> Reduce Internet communication expense through collaboration with KT</td>
</tr>
<tr>
<td>Master Plan I</td>
<td></td>
<td>- Tax benefit for private sector</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Collaboration with private IT training center to provide PC labs and instructors for public schools</td>
</tr>
<tr>
<td>’01～’05</td>
<td>1.596 M USD</td>
<td>- Establish <strong>National IT Fund</strong></td>
</tr>
<tr>
<td>Master Plan II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>’06～Present</td>
<td>269 M USD in</td>
<td>- <strong>Autonomy</strong> to 16 MPOEs, regional governments</td>
</tr>
<tr>
<td>Master Plan III</td>
<td>2006</td>
<td>- Intergovernmental collaboration</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Public-private partnership</td>
</tr>
</tbody>
</table>
Initiatives of ICT Use in Education

Initiate

Master Plan III

Master Plan II

Master Plan I

1996 2001 2006

EDUNET: National Teaching-learning center
NEIS: National Education Information System
CHLS: Cyber Home Learning System
KMEC: Korea Multimedia Education Center
KERIS: Korea Education & Research Information Service

- Computer education in schools
- Teacher training
- Computer subject
- CAI content
- School network
- Regional bureau
- KMEC & KERIS
- National Bureau
- PCs, H/W.
- Education resources sharing system
- Innovative teacher
- ICT model school
- Multimedia
- Expand content
- Infra. completed
- Regional center for ICT in education
- U-Learning school
- EDUNET
- Teacher training
- CAI content
- School network
- KMEC & KERIS
- National Bureau
- PCs, H/W.
- Digital Textbook
- Self-directed learning content
- U-Learning infra
- CHLS
- Enhanced teacher training
- Teaching-learning model
- Metadata standard
- e-Learning infra
- Education Cyber security center
- Enhanced teacher training
- Capacity building for teacher
- ICT in education standardization & Educational content
- Infrastructure
- ICT in education policy

EDUNET: National Teaching-learning center
NEIS: National Education Information System
CHLS: Cyber Home Learning System
KMEC: Korea Multimedia Education Center
KERIS: Korea Education & Research Information Service

KoreanExp_16Nov10DJHwang
**Legal Foundation of Use of ICT in Education**

1. **Computer Education Reinforcement Plan (1987)**
2. **Education Reform Plan (1995)**
3. **ICT in Education Master Plan I (1996)**
5. **ICT in Education Master Plan II (2001)**
6. **ICT Adapted Education Promotion Plan (2001)**
7. **National HRD Master Plan through e-Learning (2004)**
8. **Monitoring & Evaluation for ICT in Education**
Goals
- Increase computer education opportunities
- Strengthen computer education in public schools

Major Initiatives
- Computer literacy training
- Computerization for school administration
- 8 bit and 16 bit computers
- EDPS training program for teachers
- Adopted CAI (Computer Assisted Instruction) in teaching-learning
- Computer training center
Goals
- Education reform by adopting ICT in education
- Conversion “computer education” → “ICT in education”

Major Initiatives
- Multimedia content
- CAI (Computer Assisted Instruction) & database
- Korean Multimedia Education Center
- Distance learning for teacher training
Firm support and involvement of top educational administrators

- Capability of organizations
- Implement top-down pilot projects / promote grassroots approach
- Monitoring & evaluation system
- Collaboration between government bodies
- Appropriate and sustained budget allocation

Overarching National Policy for ICT in Education

Responsible for promotion of ICT in Education

Enacting Education Policy

MEST

KERIS

MPOEs
Education Information Service Platform

EDUNET
Teacher, Student, Parent
(web 2.0-based, individualized, user homepage)

Integrated certification system/copyright management system

NEIS
Center for Teaching & Learning
Cyber Home Learning
Digital Library
Digital Textbook

User Layer

Service Layer

Nationwide center for integrated educational information service

Resource Layer

Educational information data (applied KEM/DRM), various unit service modules (assessment tools, online discussion tools, etc)
※ Ensure interoperability through compliance with the W3C web standard and adoption of IMS Common Cartridge

(ERSS, national educational information sharing system)
Facilitate information sharing of all stakeholders

- Number of registered users: 6.14 million (100% of school teachers registered)
- Number of daily users: 390,000
- Number of education information and content: 1.06 million
- Number of Question and Tests Items: 193,600
National Education Information System

**General Affairs** (Payroll, Audit, Budget, Accounting, HR Mgmt. of staff, etc.)

**School Affairs** (Processing students grades, recording student activities and their performance), school accounting, etc.

**Civil Service** (Online service for certificate issuance)

**Staff** (Offices of Education)

**Teachers/ Non-teaching staffs** (School)

**Parents/ Citizens**

16 Metropolitan and Provincial Offices of Education

Statistics/Code

MEST

Code, Index

Statistics
“Digital Textbook” Project

- Handbook / Exercise book
- Dictionary
- Multimedia
- Hyperlink
- Data Searching
- Connection to national knowledge DB
- Connection of contents owned by political / economical / social / cultural institutions
- Learning Management System
- Authoring Tool
- Evaluation Tool
## Index for assessing the utilization of ICT in education

<table>
<thead>
<tr>
<th>Index</th>
<th>Main contents</th>
<th>Target</th>
</tr>
</thead>
</table>
| **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, 5-6 grade), 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 |
e-Learning in Korea
Overview of e-Learning in Korea

- e-Learning in schools: 76.8%
  - Primary (83.5%), Secondary (76.6%), High (67.8%), Junior High (45.1%)
  - HE: Junior college (57.6%), 4Yr University (77.5%)
- Strategy of HRD
  - Gov. official training: 517,700 ('08)
  - Job training: 1.55M ('08) <- 20,000 (1999)
  - Teacher training: 130,000/year
- Legal foundations: Primary and Secondary Education law, HE law, LLL law, Presidential decrees, IPR protection law, Privacy protection law, e-Learning industry promotion law, e-Training in Labor Education Law
- e-Learning quality management:
  - Establishment guidelines: Cyber university, e-Learning institutes
  - QA guidelines: CHLS, Regional e-Learning e-Teacher training, Cyber university, e-Learning institutes
  - Certification guidelines: content and SW for education and training
Structure of Legal Foundations of e-Learning

- Protection Law of Intellectual Property Right
- Life Long Education Law
- Promotion Law of Primary and Secondary Education Law
- Establishment guidelines
- Act of Promotion of Job Training
- QA guidelines
- Higher Education Law
- Presidential Decree No. 20942
- Act of promotion of Government officials training

eLearning Industry Promotion Law
### Analysis of Individual e-Learners

<table>
<thead>
<tr>
<th>Category</th>
<th>2007(%)</th>
<th>2008(%)</th>
<th>2009(%)</th>
<th>Growth Ratio(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>39.4</td>
<td>45.0</td>
<td>48.3</td>
<td>3.3</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>45.8</td>
<td>47.6</td>
<td>50.4</td>
<td>2.8</td>
</tr>
<tr>
<td>Female</td>
<td>31.5</td>
<td>41.9</td>
<td>46.1</td>
<td>4.2</td>
</tr>
<tr>
<td><strong>Age Group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6- 19</td>
<td>67.0</td>
<td>70.9</td>
<td>72.0</td>
<td>1.1</td>
</tr>
<tr>
<td>20-29</td>
<td>50.7</td>
<td>61.3</td>
<td>62.6</td>
<td>1.3</td>
</tr>
<tr>
<td>30-39</td>
<td>27.2</td>
<td>30.5</td>
<td>40.8</td>
<td>10.3</td>
</tr>
<tr>
<td>40-49</td>
<td>23.4</td>
<td>29.6</td>
<td>31.7</td>
<td>2.1</td>
</tr>
<tr>
<td>More than 50</td>
<td>11.2</td>
<td>13.5</td>
<td>18.4</td>
<td>4.9</td>
</tr>
<tr>
<td><strong>Educational Background</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre/Primary school</td>
<td>61.3</td>
<td>70.3</td>
<td>62.7</td>
<td>-7.6</td>
</tr>
<tr>
<td>Middle school</td>
<td>65.6</td>
<td>64.5</td>
<td>84.2</td>
<td>19.7</td>
</tr>
<tr>
<td>High schools</td>
<td>77.4</td>
<td>81.2</td>
<td>90.5</td>
<td>9.3</td>
</tr>
<tr>
<td>University/Graduate School</td>
<td>69.5</td>
<td>69.3</td>
<td>70.2</td>
<td>0.9</td>
</tr>
<tr>
<td><strong>Vocational Background</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student</td>
<td>66.8</td>
<td>70.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional Clerical</td>
<td>43.5</td>
<td>48.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service/Production</td>
<td>16.1</td>
<td>22.4</td>
<td></td>
<td>NA</td>
</tr>
<tr>
<td>Housewife</td>
<td>10.0</td>
<td>10.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jobless</td>
<td>21.1</td>
<td>26.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Source: Survey of the eLearning Industry in Korea, NIPA, 2010, [http://www.nipa.or.kr](http://www.nipa.or.kr)
**e-Learning Supply Market**

- Average annual growth ratio (in revenue): 5.4% during 2005 - 2009
  - $1.47B (‘05), 1.62B (‘06), 1.73B (‘07), $1.87B (‘08), $2.09B (‘09)
- Business category of eLearning: service, content, and solution
- Market volume in revenue: $2.09B, 11.8% increase in 2009
  - Service business leads the supply market: $1.39B
  - Company average: $1.53M

<table>
<thead>
<tr>
<th>Business Category</th>
<th>2008</th>
<th>Ratio (%)</th>
<th>2009</th>
<th>Ratio (%)</th>
<th>YoY(%)</th>
<th>Average Revenue/Company</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Revenue (Unit: $1M)</td>
<td></td>
<td>Revenue (Unit: $1M)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service</td>
<td>1,216</td>
<td>65.0</td>
<td>1,389</td>
<td>66.4</td>
<td>14.2</td>
<td>1.54</td>
</tr>
<tr>
<td>Content</td>
<td>433</td>
<td>23.1</td>
<td>491</td>
<td>23.5</td>
<td>13.4</td>
<td>1.57</td>
</tr>
<tr>
<td>Solution</td>
<td>221</td>
<td>11.9</td>
<td>211</td>
<td>10.1</td>
<td>-4.5</td>
<td>1.39</td>
</tr>
<tr>
<td>Total</td>
<td>1,870</td>
<td>100.0</td>
<td>2,091</td>
<td>100.0</td>
<td>11.8</td>
<td>1.53</td>
</tr>
</tbody>
</table>

* Source: Survey of the eLearning Industry in Korea, NIPA, 2009, [http://www.nipa.or.kr](http://www.nipa.or.kr)
- Total revenue in 2009: $2.07B
- Average annual growth ratio in revenue: 11%
  - $1.7B ('07) expanded to $2.07B ('09)
- Individual leads the e-Learning demand market since 2008

### e-Learning Demand Market

<table>
<thead>
<tr>
<th>Groups of Category</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>Avg. Growth Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Revenue (Unit: $1 M)</td>
<td>Ratio (%)</td>
<td>Revenue (Unit: $1 M)</td>
<td>Ratio (%)</td>
</tr>
<tr>
<td>Individual</td>
<td>735</td>
<td>42.6%</td>
<td>816</td>
<td>43.7%</td>
</tr>
<tr>
<td>Corporation</td>
<td>760</td>
<td>44.0%</td>
<td>812</td>
<td>43.5%</td>
</tr>
<tr>
<td>Regular Education Institutions</td>
<td>70</td>
<td>4.0%</td>
<td>71</td>
<td>3.8%</td>
</tr>
<tr>
<td>Public Institutions</td>
<td>163</td>
<td>9.4%</td>
<td>167</td>
<td>9.0%</td>
</tr>
<tr>
<td>Total</td>
<td>1,728</td>
<td>100.0%</td>
<td>1,866</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

* Source: Survey of the eLearning Industry in Korea, NIPA, 2010, [http://www.nipa.or.kr](http://www.nipa.or.kr)
Cyber Home Learning System: Goals

- Allow students to have equal opportunity for learning
- Provide students with seamless learning environment
- Reduce private tutoring expenses
- Enhance quality of public education

Major Services

- Customized Learning
- Q&A
- Level Assessment
- Career Counseling

LMS / LCMS (SCORM 2004)

Content Repository

Knowledge DB

KoreanExp_16Nov10DJHwang
Cyber University in Korea

- Types of operations: Cyber Universities and LLE Institutions
- Course available: Social science (72.7%), Humanities and Engineering (63.6%), Education (45.5%), Arts (36.4%)
- Students registered in 2009: 95,640
- Cyber Universities: 12 (67%): $250M
  - Established by School Foundations
  - Enrollment capacity in 2009: 20,260
  - Offer BA programs
- Life Long Education Institutions: 6 (33%), 7,700, $350M
  - Type A: 4 (22%)
    - Established by non-profit organizations
    - Enrollment capacity in 2009: 5,600
    - Offer BA programs
  - Type B: 2 (11%)
    - Established by School Foundation
    - Enrollment capacity in 2009: 2,100
    - Offer Diploma programs
IV Outcomes and Implications
Teacher
- Time for securing resources: 70.9 min → 53.4 min (24.7%)
- Utilization of EDUNET: 849M in 2008 → 977M in 2009 (15%)
  - EDUNET: 6.0M registered users, Daily users: 400,000, Daily use of information: 2.3M items

CHLS decreases private tutoring cost
- Number of users: 3.1M, Daily users: 360,313

Digital textbook contributed to establish future learning environment
- Number of pilot schools: 132
- Number of content: 16 (Primary schools), 2 (Secondary school)
Impact of Cyber Home Learning System: Learner achievement

(unit: %, n=54,775)

- More interested in learning: 32.5%
- Enhanced self-motivated studying habits: 25.3%
- Confidence gained in problem solving: 20.7%
- Overall improvement in grades in the subject: 20.1%
Outcomes of NEIS

Reduce Teacher’s workload and simplify duty process
- Electronic account book: 217
- Online University Entrance Information Service: 16 days -> within 1 day, cost saving: USD 130M
- Consolidate educational use through parents service
  ※ Number of parents: 2.37M, Services: 38 (score, roaster, student records, attendance, etc..)
- Provide public information service for schools: 15 regions, 47 sub-regions

Consolidating user service and sharing NEIS information
- Public service: 25, reduction of documents: 29 at ministry level

Global consulting capability for leading ICT in education
- Consulting on ICT in education: Uzbekistan, Colombia etc.
- Educate global consultant on ICT in education: 67
- Educate leading teachers for developing countries: 225 in 2009
- Cooperation with ICT in education for Africa in association with UNESCO
- Training for ICT leadership of developing countries in association with World Bank and UNESCO, and IDB

Research of ICT policies and implementation
- Research reports (10), Issue report (7), and Databook (5)
- Study of IPTV in education and R&D of future education

Lead international standards of ICT in education

<table>
<thead>
<tr>
<th>Category</th>
<th>Korea Standards</th>
<th>ISO</th>
<th>IMS(Group)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completed</td>
<td>9/17 subjects</td>
<td>-</td>
<td>8/27 subjects</td>
</tr>
<tr>
<td>Under developing</td>
<td>1/4 subjects</td>
<td>5/10 subjects</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>10/21 subjects</td>
<td>5/10 subjects</td>
<td>8/27 subjects</td>
</tr>
</tbody>
</table>
Establish Education Cyber Security Center for protection from intrusion and hacking attacks

- Secure information service of MPOE, Schools, HE Institutions: 11,000, 24x365 days
- Run intrusion detection system for early response to hacking attacks

Electronic Signature Center for secure use of information

- MEST administration electronic signature issues and updates: 630,000
- Intensify security and authentication service: utilization ratio 100%

ISO 20000 based System operation and management: intensify stability
Factors of Success in ICT in Education

Global Best Practice of ICT in Education

- Korean’s high drive for education
- Curriculum redesign & Perform management
- Teacher capacity Training
- Government leadership
- Foundations: Laws, Acts, Presidential decrees
- Role play among MEST, KERIS, and MPOE
- Strong cooperation among private, public, and schools
- Well established ICT Infrastructure
- Standards: KEM, SCORM, Education Information Sharing Environment
Policy issues

- Policy planning: data-based -> evidence-based
- Budget allocation: buying & own, utilization rate -> dynamic use and smart sourcing due to cloud and Open Education Resources,
- Secure use of information service and technologies: addiction, clearance of Intellectual Property Right for educational resources
- Digital divides: equal opportunities for education/learning using ICT

Consolidate cooperation for local and global partnership and leadership: among states, ministries, private, and stake holders

- Creativity, critical thinking, and collaboration are key words for future education/learning
- Concern more about in- and non-formal learning to challenge ubiquitous society
- Flexibility in teacher capacity training to challenge new demands from students and society: offline, online, blended, self-directed
- International standards get importance for sharing and interoperability
- Performance management: competence and changes in human factors
Thank you
감사합니다

Dae Joon Hwang, Ph.D.
Professor, Sungkyunkwan University, Korea
djhwang@skku.edu