Education Ecosystem to Challenge Higher Education Issues in Korea

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Voices from the Stakeholders with Different Background

Higher Education In Korea

- National growth and economy development
- Competitive skill level
- Job opportunities
- Quality of education
- Secure job opportunities
- Rationalize education investment
- Quality of education
- Equity of education

Government

Parents

Industry

Students
I. Background

II. Ecosystem of Education 3.0

III. Content Development

IV. Conclusion
Overview of ICT in Education: Korea

**Focus of Policies of ICT in Education**

1970  Education of Computer and Internet
      Teacher training based on CBT

Audio-Video Education

1996  Built ICT Infrastructure

2000  Facilitated ICT use in Education

2004  KOCW and mobile campus established

2007  Digital Textbooks for primary and secondary schools

2011  Build Smart schools
      Promote Smart Education

2015  Just-in-Time & Person Education Services
      Practicing new pedagogies
      K-MOOC began
      Cloud campus
      Education 3.0
Catalyst for education innovation: average adoption rate (86.2%) in 2013

HEIs (79%): 4-Year Univ., (82.1%)
  ✓ Cyber Universities (22, 100%)
  ✓ Junior College (71.9%)
  ✓ School education: Primary (92.7%), Secondary (83.1%), High school (79.6/60.8%), Cyber Home Learning System (nation-wide e-Learning system)
  ✓ e-Teacher training at MOE Training Institute: 70% in 2013
  ✓ Global competence: levels of person (teacher, professor), institution, and state

ICT became a platform for achieving social inclusion and educational welfare: decrease divides of education due to region, economy, and culture

e-Learning Regional Centers (10) established during 2002-2004 contributed to promote cooperation among member universities through learning

KOCW project initiated in 2007 for encouraging sharing contents among HEIs

K-MOOC initiated Mar 2015 for providing open education
Well established ICT infrastructure support societal changes: IDI, e-Government readiness ← mobile users (35 millions)

- e-Learning has been evolving to a major knowledge business with higher growth potential: USD 2.947 Billion for the supplier market in 2013
- A holistic approach taken to promote e-Learning using world class ICT infrastructure
- e-Learning as a major tool for national HRD
  - Government official training: 670,000/517,000, 72 courses
  - Company employee training (25.4%, USD 1 billion): 63.0%, 37/247 (25.4% the company with less than 300 employees, 23.5% the company with more than 300 employees), 2.05 million in 2011 (vs. 20,000 in 1999)
- ICT became a platform for achieving lifelong learning society to challenge quality of life and ever-changing demands on education
- Positive impacts recognized in every sector of society: productivity, education opportunity, cost saving, capacity building, and social safety network.
<table>
<thead>
<tr>
<th>Year</th>
<th>Less than 24 age</th>
<th>25~30 age</th>
<th>30~40 age</th>
<th>40~50 age</th>
<th>Over 50 age</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>5,161 (10.6%)</td>
<td>13,490 (27.8%)</td>
<td>16,915 (34.8%)</td>
<td>9,418 (19.4%)</td>
<td>3,589 (7.4%)</td>
<td>48,604 (100.0%)</td>
</tr>
<tr>
<td>2012</td>
<td>6,262 (10.9%)</td>
<td>12,359 (21.6%)</td>
<td>21,854 (38.2%)</td>
<td>12,314 (21.5%)</td>
<td>4,472 (7.8%)</td>
<td>57,261 (100.0%)</td>
</tr>
<tr>
<td>2013</td>
<td>7,481 (11.5%)</td>
<td>12,187 (18.7%)</td>
<td>24,453 (37.4%)</td>
<td>15,903 (24.3%)</td>
<td>5,316 (8.1%)</td>
<td>65,340 (100.0%)</td>
</tr>
</tbody>
</table>

## Statistics of Cyber Universities

<table>
<thead>
<tr>
<th>Category</th>
<th>Total</th>
<th>Freshman</th>
<th>Students transferred</th>
<th>Undergraduates registered</th>
<th>Graduates in 2013</th>
<th>To be graduated in 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>271,893</td>
<td>12,665</td>
<td>13,030</td>
<td>245,996</td>
<td>49,174</td>
<td>48,895</td>
</tr>
<tr>
<td>Humanities (93.3%)</td>
<td>143,978</td>
<td>4,949</td>
<td>4,484</td>
<td>134,546</td>
<td>26,592</td>
<td>26,635</td>
</tr>
<tr>
<td>Social Sciences (73.3%)</td>
<td>62,650</td>
<td>4,800</td>
<td>4,223</td>
<td>53,627</td>
<td>10,742</td>
<td>9,472</td>
</tr>
<tr>
<td>Engineering (40.0%)</td>
<td>5,108</td>
<td>527</td>
<td>337</td>
<td>4,245</td>
<td>1,476</td>
<td>1,666</td>
</tr>
<tr>
<td>Natural Science (20.0%)</td>
<td>48,638</td>
<td>1,421</td>
<td>2,377</td>
<td>42,885</td>
<td>8,700</td>
<td>7,723</td>
</tr>
<tr>
<td>Special majors (6.7%)</td>
<td>117</td>
<td>59</td>
<td>-</td>
<td>59</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Others (33.0%)</td>
<td>35,232</td>
<td>909</td>
<td>1,609</td>
<td>10,657</td>
<td>1,662</td>
<td>1,399</td>
</tr>
</tbody>
</table>

*Now there are 22 Cyber Universities running HE programs since initiation in 2000
*Distribution of students by age: 20s (28.1%), 30s (31.1%), 40s (28.3%), over 50s (12.5%)

Source: Survey of e-Learning Industry in Korea, NIPA, Dec 2014
I. Background

II. Ecosystem of Education 3.0

III. Content Development

IV. Conclusion
Shortage of Students for Higher Education


Number of Student

18-year-olds

Year 2004

’04 (644,962)

’04 (642,188)

’08 (582,436)

Freshman Enrollment Quota

Year 2018

Changes of students demographics and behaviors: shortage of traditional students, adult learners, lifelong learners

Challenge shortage of financial resources

Establish education ecosystem: scalability wall, knowledge transformation wall, desynchronization wall: gap between education skill level
  ✓ Leveraging potential of technology in establishing new education environment: cloud campus, mobile campus
  ✓ Sourcing content: Crowd-sourcing, in-sourcing, out-sourcing
    • Open access to KOCW (OCW and OER): scale contents
    • K-MOOC: scale lecturers
    • Student as contributor to content creation (SCC)
  ✓ Pedagogy-centric approach: flipped learning, blended, action learning
  ✓ Promote partnerships
    ✓ University-industry cooperation: research, contract departments such as semiconductor, automobile parts, smart phone)
    ✓ University-university cooperation: dual degree program, franchise campus, oversea campus

Data-driven planning and decision making: Learning Analytics, Academic Analytics, Predictive Analytics, Institutional Research (IR)

Pay more attention to assessment and culture of stakeholders of HE
- Personalized learning and student’s satisfaction first in mind
- From “What-centric education” to “How-, and Why-centric” learning

- **Students**
  - Explicit Knowledge: crowd-sourced contents
  - Implicit Knowledge: experience, skill

- **Faculty**

- **Pedagogies**

- **Quality Higher Education**
  - Engagement
  - Participating
  - Motivation
  - Satisfaction
The e-Education Project of UNIST (Ulsan National Institute of Technology)

- **Goal:** Enhance the quality of HE through promoting e-Education
  - Students: provide high quality of education
  - Professors: Innovate teaching and learning skill for efficiency and competitiveness
  - University authority: reduce education cost

- **Strategy**
  - Adopt IT-enabled Active Learning based on Flipped Learning infrastructure
  - Redesign of curriculum of disciplines of each specific track

- **Plan for redesign of curriculum**

<table>
<thead>
<tr>
<th>Classify</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basics</td>
<td>18</td>
<td>20</td>
<td>24</td>
<td>25</td>
</tr>
<tr>
<td>Disciplines</td>
<td>14</td>
<td>40</td>
<td>54</td>
<td>73</td>
</tr>
<tr>
<td>Total</td>
<td>32 (9%)</td>
<td>60 (18%)</td>
<td>78 (23%)</td>
<td>98 (30%)</td>
</tr>
</tbody>
</table>
Responses from Students and Professors for Flipped Learning

- **Personalized learning environment** - learn at your own pace
  - Students: 40%
  - Professors: 25%

- **More classroom collaboration**
  - Students: 30%
  - Professors: 15%

- **More classroom engagement**
  - Students: 35%
  - Professors: 30%

- **Better performance/grades**
  - Students: 20%
  - Professors: 15%

(학습의 개별화) (협동 학습 증가) (학습 참여 증가) (학습성과 및 성적 향상)
## Composition of Learning Materials

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture note (prepared by yourself, from publishers, from open source)</td>
<td>13</td>
</tr>
<tr>
<td>Reading materials (prepared by yourself, from open source, from publishers)</td>
<td>11</td>
</tr>
<tr>
<td>Videos from open source</td>
<td>11</td>
</tr>
<tr>
<td>Web-based course package by publishers</td>
<td>3</td>
</tr>
<tr>
<td>Videos prepared by publisher</td>
<td>2</td>
</tr>
<tr>
<td>Videos recorded by yourself</td>
<td>2</td>
</tr>
<tr>
<td>etc. (online quiz, students' reading, discussion, and writing activities)</td>
<td>2</td>
</tr>
</tbody>
</table>
Considerations in Flipped Learning in Classroom

<table>
<thead>
<tr>
<th>Consideration</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Getting students to do pre-class activities before class</td>
<td>11</td>
</tr>
<tr>
<td>Shifting from a teacher-centric to a student-centric approach</td>
<td>9</td>
</tr>
<tr>
<td>Amount of time to create/format course content</td>
<td>4</td>
</tr>
<tr>
<td>Professional development to support the model</td>
<td>3</td>
</tr>
</tbody>
</table>
Course Organization of Differential and Integral Calculus

Pre-class Activities
- Key-Term Assignment
- Mymathlab.com HW
- Linked Video Lecture

In-Class Activities
- Lecture (3 Professors)
- Discussion (3 AI + 25 TA)

After-(In)Class Activities
- Recitation (3 AI)
- Quiz
Collaborate

Global Collaborative e-Learning

Open

Transform

Education 3.0 Interactive Classes

Global MOOC

KOOC (KAIST MOOC)

Source: Education 3.0, KAIST, 2014
Education 3.0: “Flipped Learning”

Interactive Class

No Lecturing

Problem-Based, Collaborative, Active

Interaction in Class

Q&A Discussion Team Learning/Task Interactive Exercise Evaluation Presentation Labs

Team Learning + TA Support

Online Self-Learning

Lecture Video

Lecture Slides

Textbook

Quiz & HW

Virtual Lab

Q&A, Information Sharing, Social Network Services

Online Interaction

Query Search Interactive Watching Q&A Inform. Sharing Discussion Authentication Evaluation

MOOC or e-Learning

Source: Education 3.0, KAIST, 2014
A MOOC Ecosystem: KAIST

- **Industry**
  - Train employees
  - Jobs

- **Campus Students**
  - Quality Teaching
  - Quality Lectures

- **MOOC Platforms**
  - Fame/Reputation, Revenue Sharing?
  - Quality Lectures

- **Professors**
  - Fame/Reputation
  - Recognition/Incentives/Motivation

- **Universities**
  - Opportunities
  - Feedback/Acknowledgment

- **“Social” Students**
  - Opportunities
  - Feedback/Acknowledgment

Source: Education 3.0, KAIST, 2014
Changes in education: student’s behavior and demography, technology, role of professors, diversify contents, Big Data -> provide students with personal learning space.

Polarization of Smart Phones
35 Million Users in Korea

The Era of Sharing
Web 3.0

Data Economy
Big Data, Social Data, Cyber Money
Open Education Platform

Cloud Carrier

Cloud Provider

Cloud Auditor

Security Audit

Privacy Impact Audit

Performance Audit

Cloud Consumer

Cloud Auditing

Cloud Management

Cloud Consumer

Content Management System

OER, OCW

MOOC

University-Developed Content

Student-Created Content

Content from Publishers

Education Service Configurator

Education Delivery Aggregator

Web-Based Learning

MOOC Platforms

LMS-Based Learning

Flipped Learning

Action Learning

Classroom-Based Learning

Learning Measurement System

Academic Knowledge Management System

Source: Dae Joon Hwang, Ecological Infrastructure for Open Education, ICDE Conference 2014, 25-26 Sept 2014, MESI, Moscow, Russia
Management of Lectures and Student Service

- Plugins and Widgets Library
- Web Services
- Streaming
- Server
- Opencast Matterhorn
- VoV Cataloging And Access Hydra Head
- Front End
- Back End
- Tomcat
- Media Database / CDN
- User Management
- Content Management
- Management Console (registration, authentication)
- Statistics and Reports
- Source Control
- Billing
- Bug reporting
- SNS Searching and messaging
- Support Center
Key considerations

- Be able to encompass both conceptual and practical perspectives
- Instrumentation is based on contextual and structural ambidextrous approaches
- Innovation should be adaptable to individual HEI based on real issues and problems facing
- Harness available resources: technologies, open paradigms (contents sourcing)
Implementation of Strategic Innovation: SKKU

- Student satisfaction, community service, and in R & D competences
  - Create culture for collaboration and innovation
- Tangible outcomes: budget saving ($2.85 million/year), administration process improvement (111%)
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K-MOOC Initiative

- **Vision:** Higher education innovation through open education environment
- **Goals**
  - Innovation university class through openness of premium lectures
  - Equity of HE
  - Establish infrastructure for lifelong HE
- **Strategies**
  - Establish high brand of lectures and scale them
  - Manage K-MOOC based on university autonomy and diversity
  - Establish nation-wide infrastructure and develop value-added services
  - Globalization after stabilization of home service
- **Projects started in Mar 2015**
  - Content development: 20 (‘15), 100 (‘16), 200 (‘17), 500 (‘18)
  - Common platform establishment and management
  - Quality management of content and service
  - Establish Ecosystem of K-MOOC
  - Collective approach: MOE, Institutes, EBS, Universities, KCUE

Source: MOE, Basic plan for building K-MOOC infrastructure and management, MOE, Feb 2015, Republic of Korea
### Statistics of KOCW

- Initiated in July 2007 and running by KERIS
- Category of contents (7): Social Sci. and Humanities, Natural Sci. Engineering, Medical and Pharmaceutical Sci., and Arts and Sports
- Provide curation service for each theme according to user group with diverse interest
- Types of KOCW: university developed, video-tapped lectures by broadcasting station and institutes, distinguished scholar, linkage with oversea content

<table>
<thead>
<tr>
<th>Category</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of Organizations</td>
<td>No. of Lectures</td>
<td>No. of Contents</td>
</tr>
<tr>
<td><strong>Korea</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>University</td>
<td>137</td>
<td>4,103</td>
<td>62,005</td>
</tr>
<tr>
<td>Institutes</td>
<td>15</td>
<td>535</td>
<td>1,390</td>
</tr>
<tr>
<td><strong>Oversea</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>University and Institutes</td>
<td>12</td>
<td>354</td>
<td>122,158</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>164</td>
<td>4,992</td>
<td>185,553</td>
</tr>
</tbody>
</table>

ICTinHE_25Mar2015_DJHwang
<table>
<thead>
<tr>
<th>No.</th>
<th>Course Title</th>
<th>Institution</th>
<th>Department</th>
<th>Offered in</th>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Understanding of psychology</td>
<td>HKU</td>
<td>Psychology</td>
<td>2011/2012</td>
<td>Psychoanalytic principles, cognitive psychology, social psychology</td>
</tr>
<tr>
<td>2</td>
<td>Linear algebra and statistics</td>
<td>HKU</td>
<td>Mathematics</td>
<td>2011/2012</td>
<td>Linear algebra, matrix theory, statistics</td>
</tr>
<tr>
<td>3</td>
<td>Material dynamics</td>
<td>HKU</td>
<td>Mechanical Engineering</td>
<td>2011/2012</td>
<td>Mechanics of materials, solid mechanics, fluid mechanics</td>
</tr>
<tr>
<td>4</td>
<td>Microprocessor and practice</td>
<td>HKU</td>
<td>Computer Engineering</td>
<td>2011/2012</td>
<td>Computer architecture, microprocessors, operating systems</td>
</tr>
</tbody>
</table>

**Notes:**
- **KOCW:** Korea Open Course Ware
- **HKU:** Hong Kong University
- **Division:** Various divisions including Psychology, Mathematics, Mechanical Engineering, and Computer Engineering
- **Offered in:** Various years and offering periods, e.g., 2011/2012
- **Objectives:** Specific learning outcomes for each course, covering a range of topics from basic principles to advanced applications.
Content Creation and Management

- Creating
- Managing
- Measuring
- Delivery
- Developing
- Optimizing
- Extending
- Modifying

**Crowd-Sourced Contents**

- QA, Peer review *
- QA *
- Peer review *
- Student-Created Content (SCC)
- Faculty-Created Content (FDC)
- OER, OCW, MOOCs

**Content life cycle**

**Content sources**

Source: Dae Joon Hwang, Management of Content and Academic Knowledge Based on Metadata A Master Class on KM and Metadata, 29 Sept. 2014, MESI, Moscow, Russian Federation.
Online learning tool based on Wiki
- Group study
- Individual study

Powerful editing system developed using the Daum web editor

Collecting and integrating contents using SNOWNOTE

Sharing contents and ideas with members

Source: SNOW, SookMyung Women’s University, Sept 2014, http://SNOW.or.kr
Higher education institutions are demanded to transform into learning organizations to meet the challenges of the 21st century.

**De-synchronization** problems
- Students face **ever-increasing challenge**, who seek to learn current developments and technology: de-synchronization between what to know and how they are educated.
- Teachers: challenged to incorporate **leading-edge content** to their courses: de-synchronization of content development and use in courses.

**Unbundling** teaching role of the faculty in universal stage of higher education due to changes to faculty scholarship.

**New framework** for recognizing students as content creators
- Delineating the skills that students need for creating content within the disciplinary context.
- Convergence of literacies: written, information, technology, new media/visual that would be affordable to student’s content creation.

Define **new roles of students** in a learning organization.

**Impact** of new roles of students.

The **conditions** for student’s participation to content creation.
Content

I. Background
II. Ecosystem of Education 3.0
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Establish education ecosystem to challenge issues of (future) higher education and HEIs

- Recognize students as an enable to change education
- Leveraging ICT to challenge higher education issues in pervasive connectivity-based education environment: accessibility, efficiency, scalability, and satisfaction of stakeholders
- Data-driven student support and decision making: Learning Analytics, Academic Analytics, Predictive Analytics, Institutional Research (IR)
- Pay attention to culture and assessment in new education environment
감사합니다
Thank You

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