Mobile e-Book for BITEC MOOC
(Bioinformatics Training & Education Center)

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Outline

- Motivation & Background
- Some Lessons from KNOU m-Learning
- BITEC MOOC Project using mobile e Book
- Remarks
Motivation

- Variety of Educational Demand
- Change of Educational Paradigm in ODL
- Increase of Use of Mobile
- Enlargement of Educational Space
- Explore Various Levels in a Teaching – Learning System
Evolution of ICT in Higher Education


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<tbody>
<tr>
<td>Open education</td>
<td>Online distance learning</td>
<td>Connectivist MOOC (cMOOCs)</td>
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<td>Open education resources</td>
<td>iTunes U, Khan Academy</td>
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<td>Open content</td>
<td>Open source software</td>
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<td>Open University – OpenLearn (2006)</td>
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<td>Learning management systems</td>
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<tr>
<td>Computers</td>
<td>Tablets, smartphones</td>
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<td>Directly related</td>
<td>An influence</td>
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</tbody>
</table>
Role of ODL in Higher Education

- Increase access to higher education; compliment and respond to growing demand

- Decrease cost of higher education (lower tuition fee as well as costs related to relocation: allowance, board and lodging, etc), while offering similar quality

- ‘ODL approaches and ICTs present opportunities to widen access to quality education, particularly when OERs are readily shared by many countries and higher education institutions’ (World Conference on HE Communique, 2009)
### A brief history of ICT in ODL

<table>
<thead>
<tr>
<th>Before personal computing</th>
<th>Advent of personal computing (Mid-1980s)</th>
<th>The Internet and WWW Mid-1990s to Present</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Postal courses in the 1920s</td>
<td>• Development of personal computers and institution-based digital communications networks gave individual faculty members their own access to computer power.</td>
<td>• Course materials delivered via electronic mail</td>
</tr>
<tr>
<td>• audio-visual formats such as overhead projectors, audio-cassettes, video, slides, and tape-slide systems used for delivery of lectures.</td>
<td></td>
<td>• Use of a portal LMS for ODL, to include new and emerging digital technologies – multimedia, hypertext, artificial intelligence, the Internet, the web, mobile/cell phones, email, computer-based conferencing, simulations, animations, multiplayer games, virtual worlds, blogs, wikis, podcasts, user-generated design tools, social networking sites</td>
</tr>
</tbody>
</table>

Source: Laurillard, D (2010). Effective Use of Technology in Teaching and Learning in HE
KNOU m-Learning
m-Learning Background in Korea

- National Basic Information System (mid-1980s)
- Edutopia concept (1990)
- Virtual University Trial Project (1998)
- Cyber University Consortium (2001)
- Smart-Learning (2010)
- Mobile e-Book Learning (2016)
m-Learning in Korea

(1) Formal Education Fields
(1.1) K-12: “u-Learning Project”

- Started from 2004 by MoEHRD
- KERIS, KT, MS Korea*, Intel Korea
- 9 u-Learning Pilot Schools
  - 1 Elementary School (5th Grade): Tablet PC
  - 1 Middle School (7th Grade): Tablet PC
  - 7 High Schools (10th Grade): PDA
m-Learning in Korea
(1.2) University: “m-Campus” or “u-Campus”

- **m-Campus** Consortium (64 universities)
  - mobile ID, *mobile library service*, community service, administrative service, personalized service, etc.

- **u-Campus** (more than 20 universities)
  - u-profile, u-message, u-tour, u-class, u-ID (RFID), administrative service
m-Learning in Korea
Archived mLearn conference websites

Mirrors of previous mLearn sites. Please note that some dynamic content will not function as it would have done on the original site.

mLearn 2012, Helsinki, Finland
mLearn 2011, Beijing, China
mLearn 2010, Valetta, Malta
mLearn 2009, Orlando, USA
mLearn 2008, Telford, UK
mLearn 2007, Melbourne, Australia
mLearn 2006, Banff, Canada
mLearn 2005, Cape Town, South Africa
mLearn 2004, Bracciano, Rome, Italy
mLearn 2003, London, UK
mLearn 2002, Birmingham, UK

UNESCO Mobile Learning Week 2016
UNESCO m-Learning Week
<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
</table>
| 1998 | - Starting e-Learning operating program  
- Starting Korea Virtual Campus (KVC) |
| 2001 | - Establishment of e-Learning center  
- Start of Graduate School  
- Program (4 Departments) |
| 2002 | - Building of e-Learning hub site ‘e-Campus’  
- Chairman Univ. of KVC |
| 2008 | - Building of m-Learning hub site ‘U-Campus’  
17 departments of online graduate school |
| 2011 | - OER for ODL |
| 2014 | - KNOU SNU BITEC for Bioinformatics |
u-Campus Operation

- Graduate School Program
- Undergraduate School Program
- International e-contents
- OER
- Prime College
- m-Learning
Does ICT promote student learning?
Access to ICT and Student Achievement

Achievement of Problem Solving

Percentage of Students Using Computer at Home

Source: PISA 2003 Data Analysis
• **ICT Transforming Education: A Regional Guide**
  to guide the teachers to move upwards the four-stages of ICT-Pedagogy Integration

• **ICT for Higher Education**

UNESCO Bangkok
Future m-Learning

Learner oriented education

Active Interactivity education

Continuing & Lifelong Education

Media based distance education

⇒ Just in Time

⇒ Just For Me
Smart Learning in ODL
Smart Learning

Smart Technology with ICT

A conductive & effective IT-based, learner oriented learning for learner’s different learning style & abilities with mobile devices

S : Social, Self-directed, Speed
M : Module, Mobility, Micro-learning
A : Autonomy, Active, Assessment
R : Relationship, Reflection, Remix
T : Transfer, Time-saving, Trendy
Smart Learning model for HE

- Prefer technology for HE
- Smart Learning characteristics

Value and Role of Smart Learning for HE

Smart Learning Model for HE
Layout for Smart Learning System for HE
m-Learning at KNOU

(a) Main menu
(b) My courses
(c) Video lecture
System Configuration for Mobile Learning

Provide Composite Solution of On and Off line Direct Connection between the LMS for KNOU U-Campus and KT Mobile Solution

Professor/Student

Students Mobile Phone

Pop Up Cmpus

Student PC

KNOU Homepage

Web server

DB

KNOU Academic Affairs DB

Data management

Contents Server

Mobile Server

Database Management

LG SK KT WCDMA Networks

LG SK KT

UNESCO
Support for the student’s Mobile Learning for degree

- Provide the useful academic information for compensate the limit of off line campus activity by Mobile phone

- Mobile Lecture: Provide the Web courses and Multimedia lecture by wireless Mobile phone and connect to the on line courses as individual learning speed.

- Provide learning community for the real time sharing of the learning resources for credit

Mobile KNOU

- Mobile Student ID
  - User Guide
  - Manage Student ID
  - Student IDDL
  - Academic Affairs
  - Directory
  - Student/Alumni

- Campus News
  - My Email
  - Academic Calendar
  - Event Announcement

- My Page
  - Grades
  - Course Registration
  - Classes/Exams
  - Student Records
  - Seasonal Class
  - Theses
  - Personal Information
  - Certificates
  - Class Schedule

- Study tutor
  - On-Line Class Schedule
  - Tutor System
  - Dept. Tutor
  - Internet Tutor
  - Regional Tutor
  - Students’ Board
  - Student Association
  - Clubs
  - Study Clubs
  - Class Study Room

- Mobile learning
  - Mobile Lecture I

- Library
  - Library Guide
  - Book Search
  - Book Request
  - My Library
  - Checkout List
  - Checkout/Extension/Reservation

User Guide

- Manage
  - Student ID

- Student IDDL

- Academic Affairs

- Directory

- Student/Alumni
Mobile Based Campus solution

- Student Daily Check
- Uni Entrance Check
- UNI member check
- Restaurant
- Library
- Issue the ID
- Internet shopping
- Subway
- Bus Card
- Parking

Academic ID, transport Card, Cash Card,
Campus in Hand
Some Lessons from KNOU m-Learning Services
u-KNOU Service

• KNOU m-Learning Services

• Three Generations
    • u-KNOU Service
    • Upgraded u-KNOU Service
  – The 3rd Generation (Apr. 2012 ~ present)
    • u-KNOU Plus Service
Improved u-KNOU service

- Satisfying the user requirements
  - Expanding the service to **various mobile devices** (e.g., smart phones with iOS and Android OS, PMPs, tablet PC)
  - Upgrading user interface
  - Upgrading display methods (page ➔ scroll)

- Other service functions:
  - ID and password saving, message encryption, seamless display, variation of play speed, and so on.
The 2nd Generation Problems in Upgraded u-KNOU Service

- Communication network dependency
  - Exclusively by KT network

  To-Be: The service should be on any networks.
  Open the next generation of m-learning service in KNOU to any mobile communication networks

- Device and OS dependency
  - Students use a variety of mobile devices that use a variety of mobile OSs.

  To-Be: The service should be on any devices any OS.
The 3rd Generation

- As-Is: Too much long content for m-Learning
  - One content consists of a 45-min lesson
  - Not effective learning content for mobile learners

To-Be: The service should be in efficient ways.

- Finding out the most efficient learning time for each subject in KNOU m-learning environment
- The lesson plan form, which should be filled by very ‘atomic’ elements of the lesson at most 5 minutes.
- This atomic element can be easily used again and again, especially in KNOU m-learning service.
User Requirement Analysis

- **Period of survey**
  - from July 2, 2012 to July 21, 2012

- **Participants**
  - 1,251 undergraduate students of KNOU

- **The survey questions**
  - m-learning experience,
  - preference of m-learning type,
  - when and where to use m-learning,
  - barriers to m-learning
  - preference of m-learning *time length*, etc.
**User Requirement Analysis**

- **Results**

<table>
<thead>
<tr>
<th>Questions</th>
<th>Possible answers</th>
<th>Number of response</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preference of mobile learning time length</td>
<td>5 minutes or less</td>
<td>24</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td>6 minutes ~ 10 minutes</td>
<td>92</td>
<td>7.7</td>
</tr>
<tr>
<td></td>
<td>11 minutes ~ 15 minutes</td>
<td>168</td>
<td>14.1</td>
</tr>
<tr>
<td></td>
<td>16 minutes ~ 20 minutes</td>
<td>308</td>
<td>25.9</td>
</tr>
<tr>
<td></td>
<td>21 minutes ~ 25 minutes</td>
<td>321</td>
<td>27.0</td>
</tr>
<tr>
<td></td>
<td>More than 25 minutes</td>
<td>278</td>
<td>23.3</td>
</tr>
</tbody>
</table>
• Results

✓ Many researchers have emphasized that mobile learning plays roles of additional value creator for existing e-learning and supplementary tool for traditional lecture.

✓ Learners actually perceive mobile learning as a subsidiary tool to conventional e-learning.

✓ Mobile learning contents should encompass, besides conventional e-learning contents, supplementary contents for regular lecture.

✓ Two types of m-Learning content model
  segment type
  supplement type
• The **segment type** provides mobile learners with several segmented partial sub-lectures of one lecture, does not provide one whole lecture of e-learning.

• The segment type content is just segmented sub-lectures of the existing e-learning material, the same content in which learners who can access e-learning.
With **segment type** content, learners can:

- focus on a specific concept
- manage learning activity on m-learning
- make the best use of short spare time to study efficiently while moving
- take an advantage of learning by repetition.
• The **supplement type** provides additional learning contents to support regular e-learning lecture.

• Introduction, quiz, enrichment program, remedial program, FAQ, summary, etc.
With **supplement type** content, learners can

- become interested in m-learning to get additional learning contents
- get valuable resources which were not handled in regular classes
- acquire a knowledge of up-to-date information of certain field.
Summary

KNOU m-Learning Platform

Interoperable Interface

N-Screen Service

Social Learning Service

Cloud Computing Interface

Open API

Cloud Computing Infrastructure

Smart Phone

Tablet PC

PC

IP TV

Smart TV
Mobile e-Book for Teaching Statistics
## KNOU e-Book Pilot Models

<table>
<thead>
<tr>
<th>Type</th>
<th>Basic e-Book</th>
<th>Extended e-Book</th>
<th>LMS e-Book</th>
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</thead>
<tbody>
<tr>
<td>Characteristic</td>
<td>Simple e-Book (Text/Image)</td>
<td>Various Learning Materials (Audio/Video)</td>
<td>SNS Service</td>
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<td></td>
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<td></td>
<td>LMS Interworking</td>
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<tr>
<td>Example</td>
<td>Inkling</td>
<td>TED Books</td>
<td>iTunes U</td>
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<td></td>
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<td></td>
<td>Daouincube System</td>
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<tr>
<td>Consideration</td>
<td>Digitalization of Paper Books</td>
<td>Professionals in the field of Education and Digital Publication</td>
<td>Upgraded Version of LMS</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>(Being Able to Record and Manage</td>
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<td></td>
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<td></td>
<td>Student’s Learning History and Process)</td>
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<tr>
<td>Cost</td>
<td>Development Cost of KNOU Viewer</td>
<td>Type 1 Investment Cost</td>
<td>Type 2 Investment Cost</td>
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<tr>
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<td>(Considering Learning Environments</td>
<td>Cost of Hiring Professionals in the field of Education and Digital Publication</td>
<td>Cost of LMS Platform</td>
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<tr>
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<td>and Students of KNOU)</td>
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<td>Development</td>
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<td>Cost of DRM</td>
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<td>Effect</td>
<td>KNOU e-Book Pilot Models</td>
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<td></td>
<td>Department of Education</td>
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<td>Instructional Technology</td>
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<tr>
<td></td>
<td>• Chronology/Illustration</td>
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<tr>
<td></td>
<td>• Link Lecture Content</td>
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<td></td>
<td>English Teaching Method</td>
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<td></td>
<td>• Link Phonetic Content (TTS, Text to Speech)</td>
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<td></td>
<td>• Link Lecture Content (Video)</td>
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<td>Department of Nursing Process</td>
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<td>English Teaching Method</td>
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<td>• PC</td>
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<td>• iPad</td>
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<td>• Adobe Content Viewer</td>
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</tbody>
</table>

Printed book conversion eBook

Available for PC, Android and iOS platform

Printed book conversion eBook

Available for PC, Android and iOS platform
We Are Planning...

- To Set Up Mobile Website and App System for ePub 2.0/3.0, and KNOU LOD Contents Service
K- Plot for K-12 Data Analysis
Figure 3. Several graphs can be linked with the Data Sheet.
Mobile e-Book (K-plot)
Mobile e-Book (K-plot)
2. K-PLOT Software Summary

© 2 Direction Bar chart (Census Pyramid)
2. K-PLOT Software Summary

◊ Boxplot & stem and leaf
GIS based graph

◎ Web/ Mobile Dynamic statistical graph

- 1960  1965  1970  ...  2010
Mobile e-Book for Teaching Bioinformatics
게 및 남방계 아시아 10개국, 총 1,000명을 대상으로 개인별 유전체 분석을 수행한다. 이것은 한국인의 조상의 이주 경로를 역추적하는 작업으로서 한국인의 유전적 정체성을 밝히고, 더 나아가 아시아인의 이주 경로를 파악하는 일을 가능하게 할 것이다. 본 작업은 또한 아시아 각국의 미래 개인별 의학을 구축하는 데에도 큰 도움을 주게 될 것이다. 서양인 중심의 질병 바이오 표지자들을 아시아인에게 특이적인 표지자들로 바꿔줌으로써 아시아인을 위한 예측의료를 가능하게 할 것이다.

지금까지의 유전체 관련 연구의 진행 과정은 연대별로 정리하면 다음의 표로 나타낼 수 있다.

<그림 1-9> 연대별 유전체 연구 진행 과정
BIOINFORMATICS has 60 units. Each unit consists of Text, Lecture, Quiz, Audio (Optional), and Lecture Note (Optional).
BIOINFORMATICS has 60 units. Each unit consists of Text, Lecture, Quiz, Audio (Optional), and Lecture Note (Optional).
Mobile Service
BiTEC MOOC contents
Medical Informatics
HEALTH BIG DATA

이태림 교수
한국방송통신대학교 바이오정보통계학과
Health Informatics
HEALTH INFORMATICS

이태림 교수
한국방송통신대학교 바이오정보통계학과

보건복지부 지원
유전역학이란?

Genetic Epidemiology

서울대 원성호 교수

보건복지부 지원
고급보건빅데이터

Health Big Data란?
유전체생존분석

Genetic Survival Analysis

세종대 이승연교수

보건복지부 지원
Genetic Survival Analysis

K-M Plots for 6-MP vs. Placebo groups

<table>
<thead>
<tr>
<th>Log rank test</th>
<th>Chisq</th>
<th>df</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log rank</td>
<td>16.7929</td>
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<td>&lt;0.0001</td>
</tr>
<tr>
<td>Gehan-Breslow</td>
<td>13.4579</td>
<td>1</td>
<td>0.0002</td>
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<tr>
<td>Tarone-Ware</td>
<td>15.1236</td>
<td>1</td>
<td>0.0001</td>
</tr>
<tr>
<td>Peto-Peto-Prentice</td>
<td>14.0841</td>
<td>1</td>
<td>0.0002</td>
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<tr>
<td>Fleming-Harrington</td>
<td>12.7415</td>
<td>1</td>
<td>0.0004</td>
</tr>
</tbody>
</table>

Bioinformatics, KNOU, 2016. 06
Genetic Survival Analysis

K-M Plots for DLBCL groups

![Image of survival plots showing differences in overall survival between different groups: GC B-like, Activated B-like, Low clinical risk, High clinical risk, Low clinical risk patients.](image-url)
강의개요

Health Big Data 특성

Genetic System

Network Model Selection

Application
LMS Configuration
PRIME College LMS connection

Prime College LMS Install

- Health Informatics
- Genetic Epidemiology
- Survival Analysis
- Advanced Health Bigdata

Streaming
CMS
Learning Process
Learner Management
Remarks

Construction of m-Learning for BITEC MOOC

- m-Learning in Korea
- u-KNOU
  Upgraded u-KNOU
  u-KNOU Plus
- m-Learning e-Book for teaching statistics & Bioinformatics
- Mobile BITEC MOOC
Thank you!
Mersi!