Socio-Economics and Educational Case Study with Cost-Effective IoT Campus by the use of Wearable, Tablet, Cloud and Open e-Learning Services

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Content

1. Two Implementations of Educational Systems on University Campus
   • Use of Tablet PCs for Over Six Years
   • Use of Wearable Devices for Maintaining Physical Conditions

2. Conclusion for ITU Standards on Education
Moor’s Law on Campus and Open Applications

Performance/Cost Ratio

Year

2000 2010 2020

iPhone 2007
Android 2008
iPad 2010
Android Tablet

MOOC Since 2009
SNS Since 2014

Moodle Learning Management System

2007 2008 2010
ICT Environments on Campus

- Coursea, edX, Udemy (MOOC)
- Moodle (LMS)
- Cybozu Live LINE (Group Ware, SNS)
- IT Passport, gacco (JMOOC)
- PC 500 iPads
- Wearable Devices (BYOD)
- Internet
- Wi-Fi
- Campus
- Off-Campus
- class
- office hour
- private
- Space
- Time
- Network
- Device
- Application
ICT Curriculum Reform

Motivation

Skills for Content Creators and ICT Professionals

One iPad for Every Student e-Learning & LMS

ICT Literacy as Good Consumer

Daily Use of iPad at School and Home

• Collection of Contents at home
• Motivation Editing of Contents
• Desire to Creation of Digital Contents

ICT Skill Training

Year 1
Presentation Practice
ICT Skill Training

Year 2
Seminar for Research

Year 3
Seminar for Thesis
Study for Professional Licenses e.g. High School Teacher, IT passport

Class Attendance Automated Record

Career after Graduation

ICT Professional Contents Creator, Educator on ICT, Librarian, Skilled Office Worker, Good Citizen....
ePub Format Documents
(Electronic Publication)
ITパスポート試験ドットコム

http://www.itpassportsiken.com/

HOME > ITパスポート過去問道場

出題設定

1. 試験回を指定して出題

- 29年秋期
- 29年春期
- 28年秋期
- 28年春期
- 27年秋期
- 27年春期
- 26年秋期
- 26年春期
- 25年秋期
- 25年春期
- 24年秋期
- 24年春期
- 23年秋期
- 23年特別
- 22年秋期
- 22年春期
- 21年秋期
- 21年春期

全項目チェック：ON/OFF
Change of Distribution

Distribution of first test results

Distribution of test results in 2 months

Moodle Quiz
IT Test Results

Nanjing, China
27-29 November 2017

After iPad

Before iPad
The Use of Wearable Devices

World Wide Use
In thousands

Domestic Use
in Japan

Eye glass type
Wristband type
Watch type
Health Support System for Sharing Vital Data and Life Log

Campus Network

- PC
- Wifi
- Wearable devices
- Sync
- Data flow

Cloud

- Moves
- Fitbit
- API
- R Shiny

Data flow diagram showing connections between devices and cloud services.
Web Application Using R Shiny Server

Vital data from fitbit and moves

participants:fitmove team 2016B
- No. 01
- No. 02
- No. 03
- No. 04
- No. 05

vital data
- heart_rate
- walking_steps
- sleeping_hours
- moves
- sd/mean_analysis

beat difference or analysis period

weeks for walking_steps and sleeping_hours
- 1
- 2
- 3
- 4

date
- 2017-03-03

The heart rate on 2017-03-03
- 4 times x 10 beats increased
- 2 times x 10 beats decreased
- high = 111 beats
- low = 66 beats

<table>
<thead>
<tr>
<th>One day</th>
<th>startTime</th>
<th>endTime</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>walking</td>
<td>20170303T002912+0900 20170303T002935+0900</td>
</tr>
<tr>
<td>2</td>
<td>walking</td>
<td>20170303T071555+0900 20170303T071603+0900</td>
</tr>
<tr>
<td>3</td>
<td>walking</td>
<td>20170303T091301+0900 20170303T091305+0900</td>
</tr>
</tbody>
</table>
Four-week Walking Steps and Sleeping Hours

The last 4-week walking steps
Total Steps 277,118

- mean 9,897 steps exclusive of 1,000 steps or below
- standard deviation 3,538 steps
- sd/mean * 100 = 36.7

The last 4-week sleeping hours

- mean 7 hours exclusive of 2 hours or below
- standard deviation 1.1 hours
- sd/mean * 100 = 16.1
Life Log

<table>
<thead>
<tr>
<th>One day</th>
<th>Duration (sec.)</th>
<th>Distance (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 walking</td>
<td>3032.0</td>
<td>3344.0</td>
</tr>
<tr>
<td>2 cycling</td>
<td>887.0</td>
<td>2793.0</td>
</tr>
<tr>
<td>3 transport</td>
<td>1359.0</td>
<td>3806.0</td>
</tr>
<tr>
<td>4 running</td>
<td>2762.0</td>
<td>5739.0</td>
</tr>
</tbody>
</table>
Contract with Students Data Sharing

- Contract based upon university ethics rules
  - moves PIN input
  - Permission of data use
  - Sharing R Shiny URL
    - Rejection of data use
  - Revoke Access
  - fitbit notification of Identification, Password
  - Password Reset
Success Case of Daily Activity Pattern

sd/mean x 100 transition from 2016-10-09 to 2016-12-31

Correlation between walking and sleeping

\[ r = 0.708 \]
1. Motivation was kept by data visualization.
2. Walking steps increased.
3. Educator’s advice worked to maintain the motivation.
4. Student checked BMI constantly.
Analysis of the Success Case (ARCS)

(Attention) Use of a wearable devices for data visualization
(Relevance) Inherent necessity of improving BMI
(Confidence) Recognition of effectiveness
(Satisfaction) Improved fitness with peer support

• One of three students has succeeded.
• Student engagement in health consciousness as basis for achieving productive study.
• The use of wearables improves student engagement with possible enhancement with shared data.
Conclusion (1)

• Need for Standards in reference to Fundamental Requirements for Applications, as well as ICT Devices and Services for Learning on Campus
  – ISO standards
    • 9000 quality management
    • 27000 security management
  – Lower costs
  – Increase quality
  – Openness to Technology
    • Application
    • PC, Tablet PC and Smartphone
    • Cloud service
Conclusion (2)

• Worldwide Framework on the Proliferation of Good Practice in Education

• ITU’s Educational Initiative for Every Student to Take Quality Education in a Cost-Effective Manner

• ITU Standards on Guidelines on the use of ICT Devices and Open Content on Cloud for Education