# AAOU2012

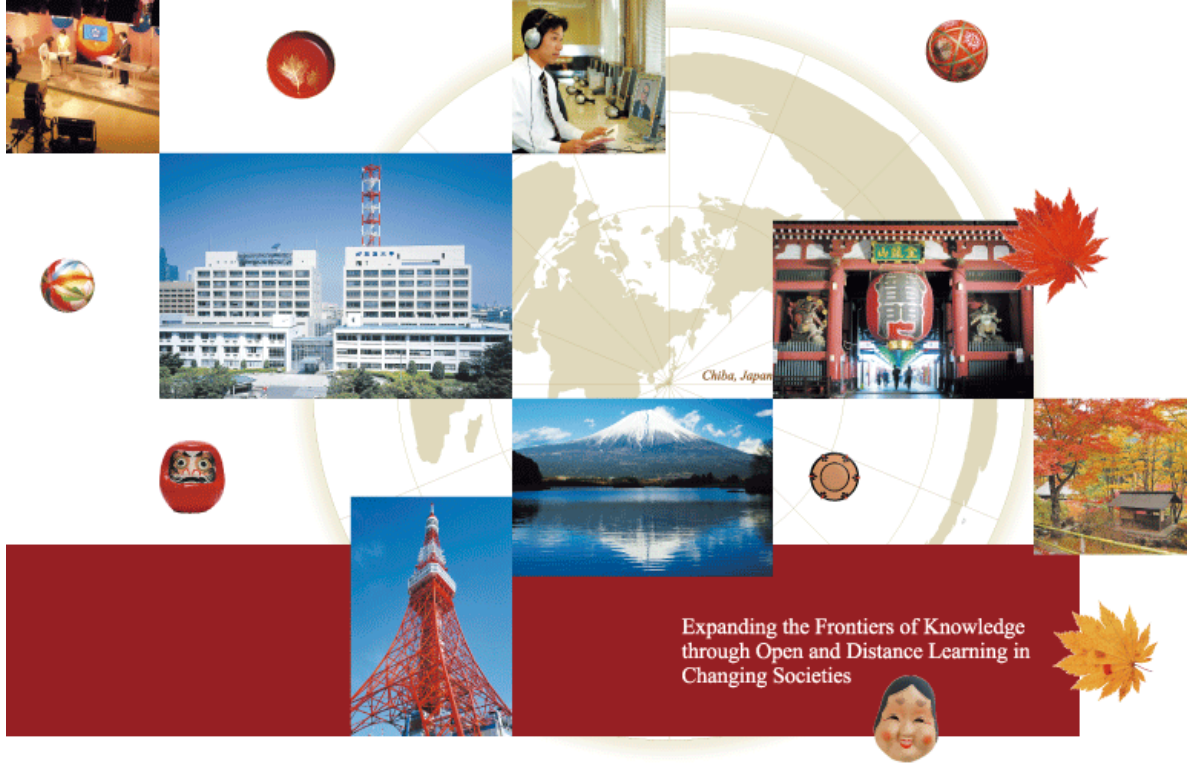## The 26th Annual Conference of Asian Association of Open Universities

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ASIAN ASSOCIATION
OF OPEN UNIVERSITIES

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# Development of a video-based mobile learning system

Yoshiaki Hada

Center of ICT and Distance Education, The Open University of Japan,

2-11, Wakaba, Mihama, Chiba, 261-0014, Japan

hada@ouj.ac.jp, +81-43-298-3262

*Abstract: The Open University of Japan (OUJ) is a university by distance education with broadcasting via TV and radio. Students take the courses by the broadcast lecture. The broadcast lecture courses are provided by TV or radio based on the schedules for the TV and the Radio. Recently, the learning environment is changing with the rapid progress by information and communications technology (ICT). The OUJ starts to provide some study supports via internet by e-learning system. One of them is the webcast of broadcast lecture courses experimentally. The webcast of the broadcast lecture courses focuses on Windows PC as a device and the courses gotten permission from all TV and Radio courses. However, students are required the skill to use PC and internet. We focus on mobile device such as feature phone (cell-phone) and tablet device to make the webcast user-friendly. Some of mobile devices have network function such as 3G network without difficult configuration from the beginning. In this paper, two video-based learning systems for mobile devices to deliver the broadcast lecture courses are described. Most mobile devices do not have the use-interface such as keyboard or mouse which PC has. In order to operate the mobile devices, the ideas are required to make the most use of the small screen and limited buttons. One is the system for feature phone (cell-phone). The broadcast lecture courses by TV are different lesson structure by teacher. For example, some teachers give an explanation by PowerPoint, the others one explains by blackboard with handwritten or without use of tools. In the screen of mobile device, it is often difficult to express the text on a flip chart or a blackboard. The system has learning support functions such as caption, embedded picture and embedded link. And the system can access from other systems: mobile web-site, syllabus, and QR code. Another one is the prototype of learning system for tablet device. The system has the learning support functions such as caption, feedback written by the learner through touch panel on the screen playing the broadcast lecture courses.*

**Introduction**:

The Open University of Japan (OUJ) is a distance learning university (The Open University of Japan, n.d.). Students take the courses by the broadcast lecture and face-to-face. The broadcast lecture courses are provided by TV or radio based on the schedules for the TV and the Radio. The schooling courses in the study centers around Japan provide the environment to study with the teacher by face-to-face. The study centers have the equipment to restudy the broadcast lecture by the media such as DVD or CD because the students sometimes miss to study by the broadcast lectures for certain reasons such as jobs, family matter etc.

Recently, the learning environment is changing with the rapid progress by information and communications technology (ICT) (Hada et al, 2005, Ogata et al, 2007). The OUJ starts to provide some study supports via internet by e-learning system. One of them is the webcast of broadcast lecture courses experimentally.

The webcast of the broadcast lecture courses focuses on Windows PC as a device and the courses gotten permission from all TV and Radio courses. The contents delivery method is by streaming. Students can use the webcast from the campus support website called "Campus Network." Some of webcast of the broadcast lecture courses are provided as the open learning contents of Japan Opencourseware (JOCW).

Without reference to the open of the study center, students can access to the broadcast lecture courses via internet over webcast. However, students are required the skill to use PC and internet.

We focus on mobile device such as feature phone (cell-phone) and tablet device to make the webcast user-friendly. Some of mobile devices have network function such as 3G network without difficult configuration from the beginning.

By the way, most mobile devices do not have the use-interface such as keyboard or mouse which PC has. In order to operate the feature phones (cell-phone), the ideas are required to make the most use of the small screen and limited buttons. Most tablet devices have the larger touch panel display but they do not have keyboard. The touch panel will improve the more interaction between the learner and the device than PC because the touch panel facilitates the intuitive operation on the screen.

In this paper, two video-based learning systems for mobile devices to deliver the broadcast lecture courses are described. One is the system for feature phone (cell-phone). The system has learning support functions such as caption, embedded picture and embedded link. Another one is the prototype of learning system for tablet device. The system has the learning support functions such as caption, feedback written by the learner through touch panel on the screen playing the broadcast lecture courses.
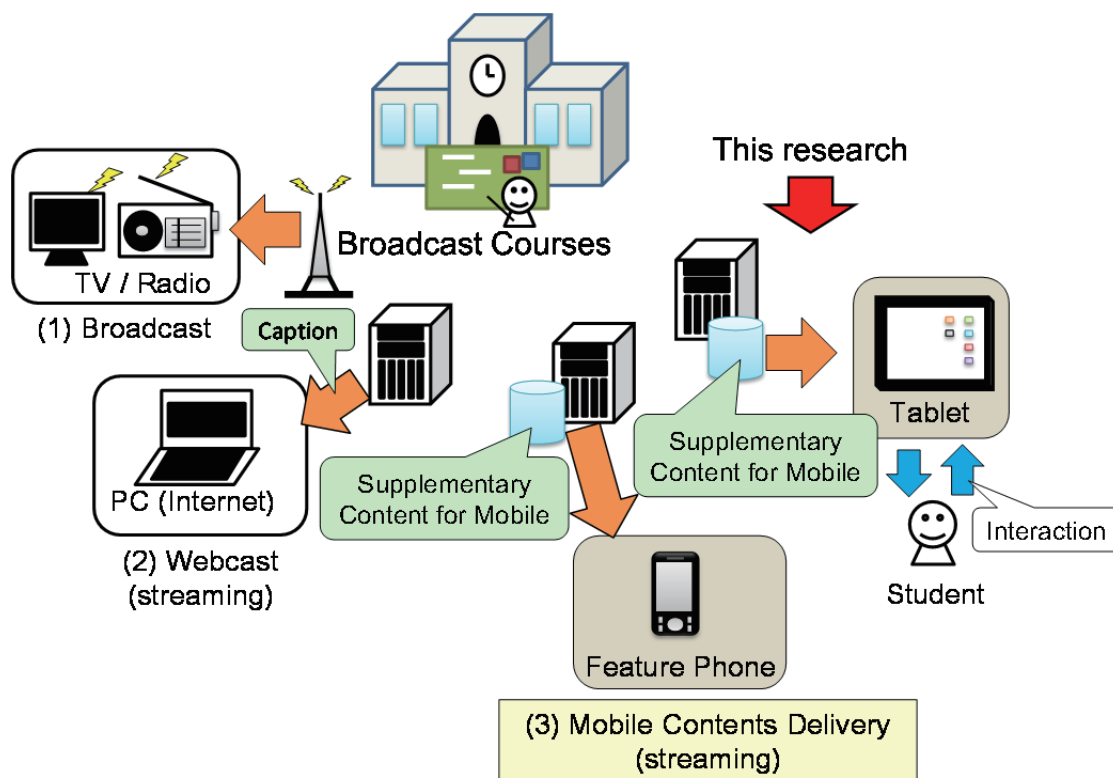
Figure 1:   Deliver of Broadcasting Courses

## How to Learning by Mobile Device:

The OUJ provides the broadcast lecture courses such as 45-minute TV/radio program and textbook for students by distance education. In addition, some courses provide teaching aids such as web pages. Learners study the courses with a combination of these learning materials.

The distribution of the broadcast lecture courses are three styles shown as Figure 1. The most basically distribution is (1) broadcast. In the broadcast, the broadcast lecture courses are sent on the air based on the TV/Radio schedule. The student receives the TV/Radio program for the target course. The broadcast media are TV and radio such as digital terrestrial television broadcasting, broadcasting satellite (BS) digital broadcasting and community antenna television (CATV) and FM broadcasting. Some students learn by timeshift with recorder. The digital terrestrial television broadcasting and the FM broadcasting are for a part of Kanto region in Japan. In addition, in April 2012, the service called radiko (Radiko.jp, n.d.) started as IP simulcast radio via network. The service realizes to use PC and mobile devices that are iPhone/iPad/Android as a radio.

The next style of the distribution is (2) Webcast. Students access the broadcast

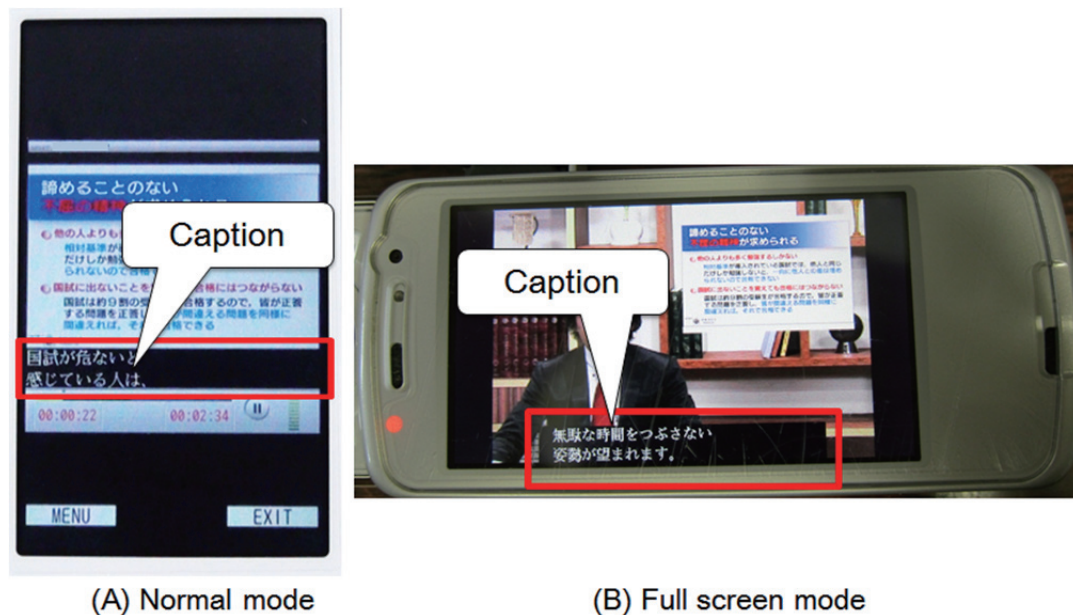(A) Normal mode        (B) Full screen mode

Figure 2:    Interface

lecture courses by Windows PC by streaming from the Campus Network via internet at any time. In webcast, students can learn without reference to TV/Radio schedule. In addition, some of broadcast lecture courses are provided with caption on Windows Media Player.

The 3rd style of the distribution is (3) Mobile Contents Delivery in this research. In feature phone, students can access to the courses anytime and anywhere within the coverage area from the mobile syllabus of the broadcast lecture courses. The delivery is by own streaming in consideration of the copyright and longtime course. Students require to download and to install an exclusive mobile application for his/her feature phone from the website of the courses. The server delivers the broadcast lecture courses and supplementary content for mobile via 3G network. In 2012, four TV broadcast lecture courses of the JOCW courses are provided.

The tablet device system is developed as prototype. The broadcast of the broadcast lecture courses is delivered by the generalized method. However, the player with learning functions is developed.


**Feature Phone-based Learning System**:

The feature phone has the smaller screen and the more limited user-interface than PC. The interface of the feature phone-based learning system shows as Figure 2.
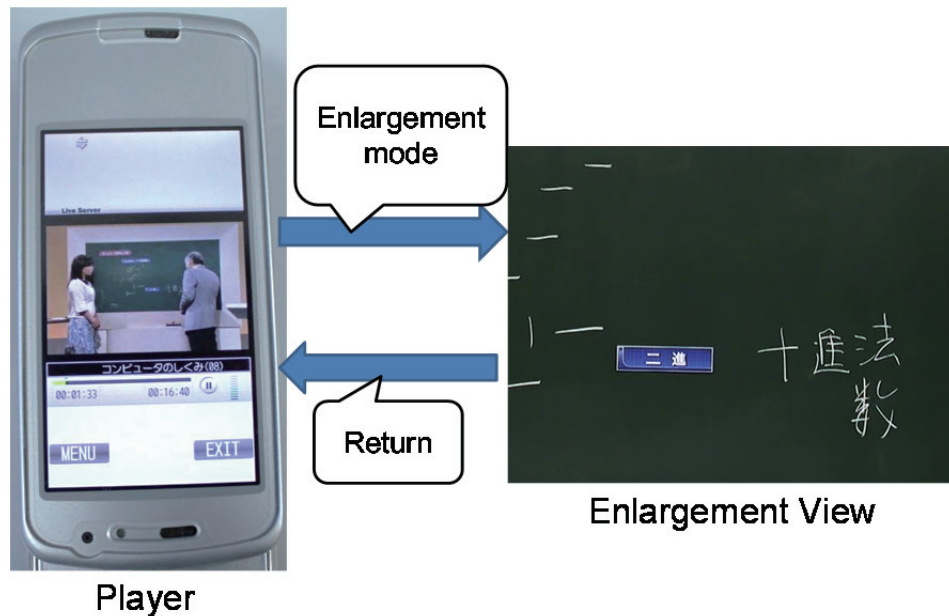
Figure 3: Video Switch Function

The interface has normal mode and full screen mode. To support the situation under niche time on the job and in the transportation on the road, the caption function is added. The caption function is able to show the voice or the auxiliary information etc. on the screen in the playback. A broadcast lecture course has nine kinds of the caption. In the playback, students select one caption on learning.

The broadcast lecture courses by TV are different lesson structure by teacher. For example, some teachers give an explanation by PowerPoint, the others one explains by blackboard with handwritten or without use of tools. In the screen of mobile device, it is often difficult to express the text on a flip chart or a blackboard. Therefore, the video switch function is prepared shown as Figure 3. The function is able to switch the video part from the broadcast lecture course to embedded still picture such as enlargement view. Students are able to switch the video part of broadcast material in the embedded scene in playback.

The jump function to a web site is able to embed some events to broadcast material shown as Figure 4. The event makes the shift to the related learning web site by the students' operation. The event is shown as a banner on the mobile learning system. Students are able to make the shift to a web-site by selecting the banner appeared in learning broadcast material. The students can also return to this system from the moved web-site.
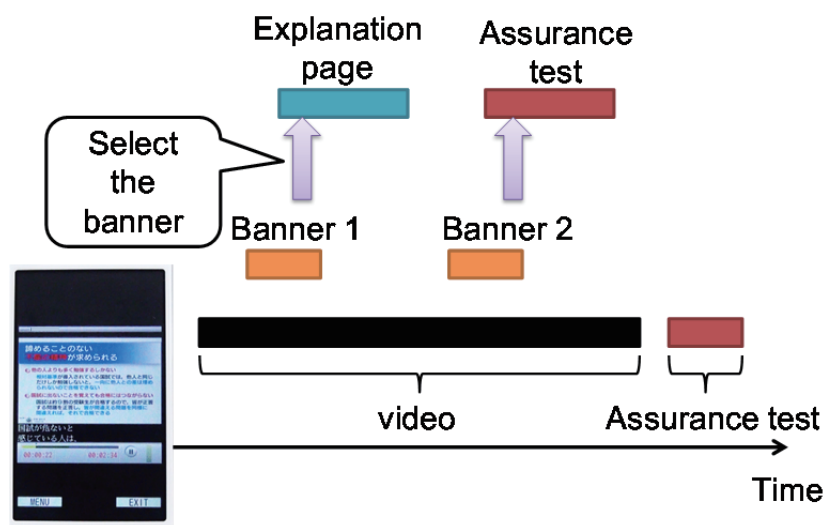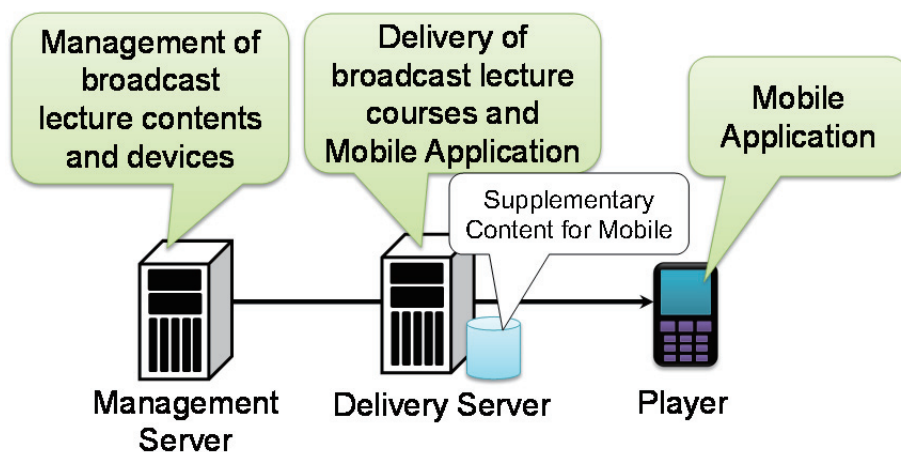
Figure 4: Jump Function



Figure 5: System Structure

The feature phone-based learning system consists of three parts: a management server, delivery server and player shown as Figure 5. The player is made by the mobile application for three Japanese carriers: NTT DoCoMo, Softbank and au. The mobile application is prepared based on cell-phone carrier and the screen size of cell-phone. The usage of the mobile learning system is shown as Figure 6.

In order to cooperate with other mobile learning system, the mobile learning system prepares some access way to this system shown as Figure 7. In order to cooperate with other system, QR code and web link are used.
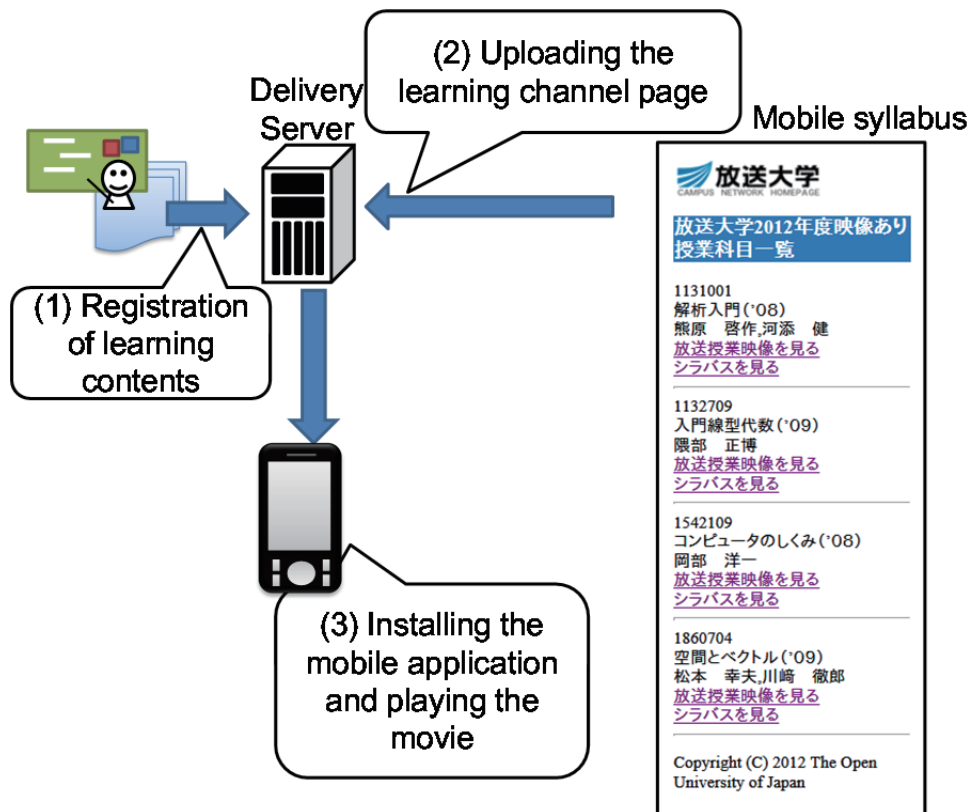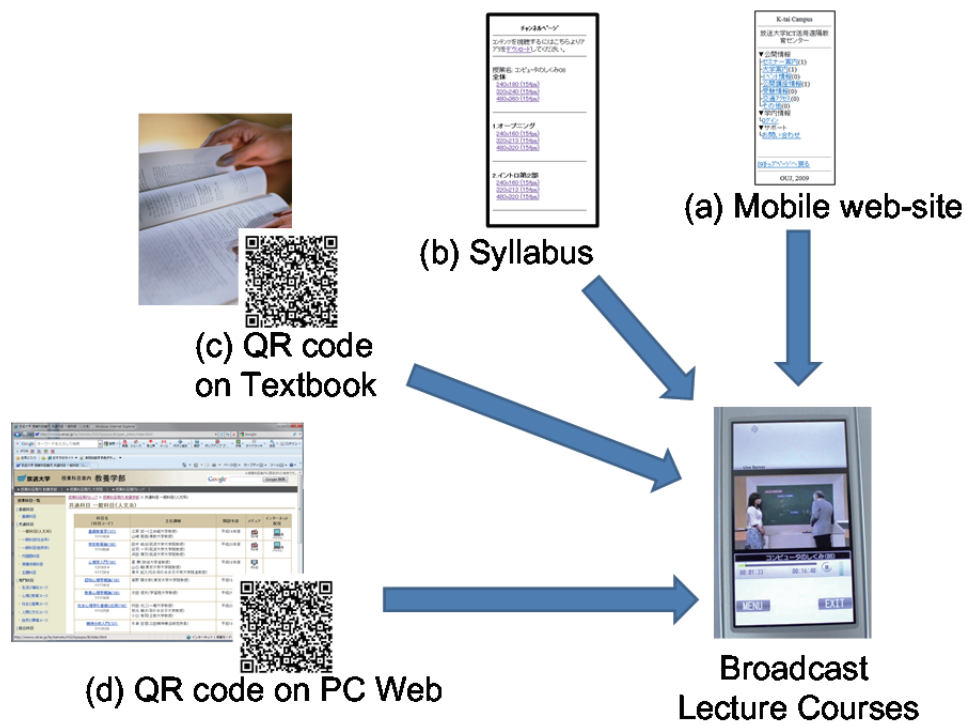
Figure 6:  Flow of usage
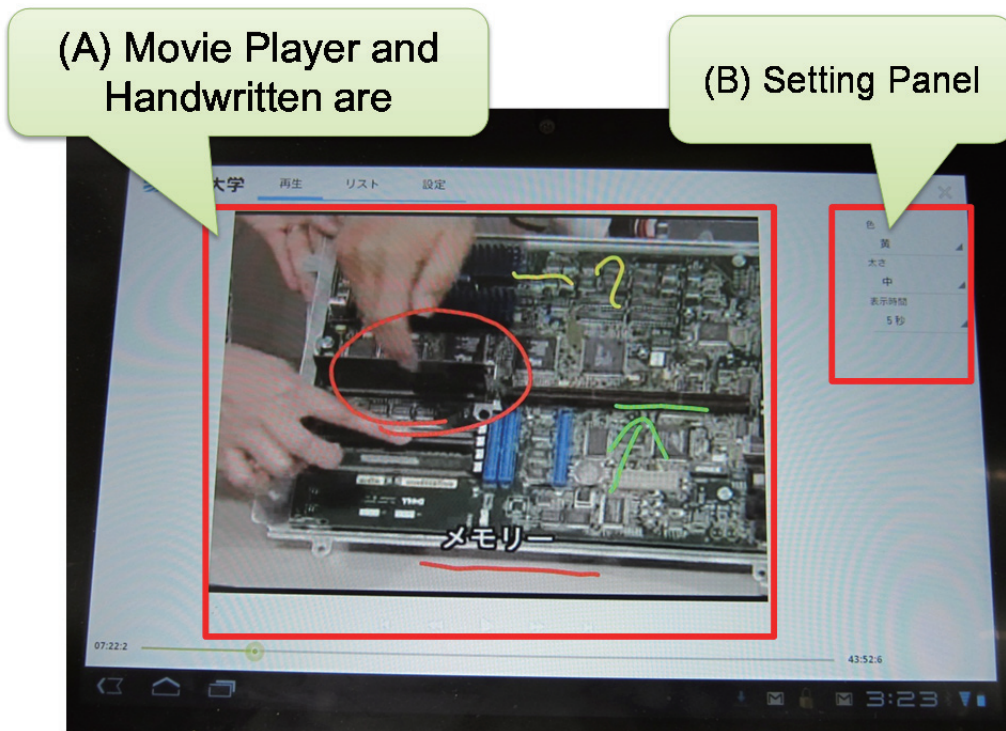


Figure 7:  The use from other system

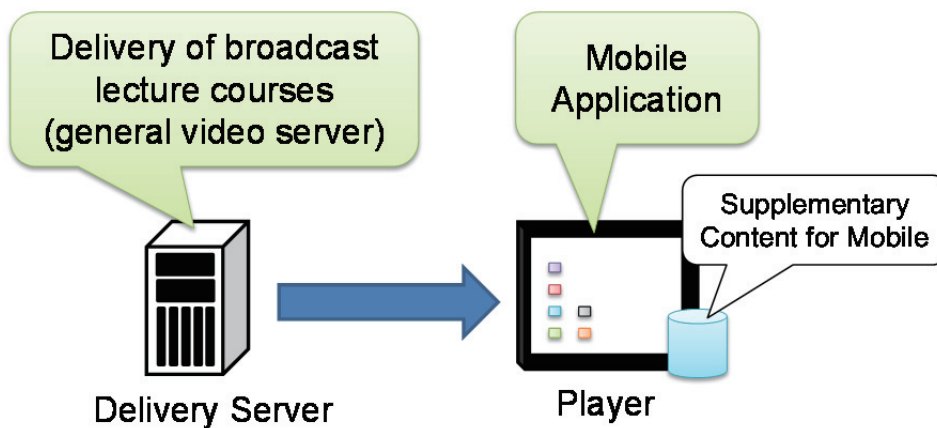Figure 8: The interface of Tablet based learning system



Figure 9: System Structure

**Tablet-based Learning System**:

The tablet-based learning system is a prototype. The interface shows Figure 8. The system is designed based on the functions of the feature phone-based learning system. The system consists of the player on tablet and the broadcast lecture courses delivery server shown as Figure 9.

The developed system is a player on the android tablet. The player has two

layers: video player layer and comment layer. The player layer is a general video player. The comment layer is written by handwritten and shown the caption. Students can write on the broadcast lecture course by touching the panel with the students' hand. The written lines are rendered on the panel for a given length of time.

The system has the interface shown as Figure 8. The broadcast lecture course is shown as (A) area. Students can write the comment by tracing the panel on (A) area. The setting of the written line and the display time is used shown as (B) area. Students can watch the tabulated record of the written comments and the caption. In addition, the comments can be record.

## Conclusion:

In this paper, we proposed a feature phone-based learning system and the tablet-based learning system. The systems support the mobile learning by the broadcast lecture courses of the OUJ.

We start the delivery service by the feature phone-based learning system. We will investigate the status of utilization and improve the service by subject to availability. In the tablet-based learning system, we will validate the evidence from the prototype.

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