A Comparative Evaluation of Podcasting-Based and Mobile-Based Material Distribution Systems in Foreign Language Teaching

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Abstract. This paper examines two independent multimedia distribution systems in terms of user's impression and the download time on the basis of the two experiments which were carried out in English teaching settings in Japan. The two are the podcasting system and the mobile-based system. The results of the two studies indicated that the students feel that mobiles are more friendly and easy to operate. Although it takes them longer time to download digital materials from the server, they do not feel so much frustrated or irritated for being delayed to a certain degree. These implications imply the future possibility for blended-instruction model of foreign language teaching in Japan.

Keywords: e-learning system, podcasting, mobile device, second language acquisition.

1 Introduction

The use of ICT provides learners with opportunities for linguistic input and output especially in a English-as-a-Foreign Language (EFL) environment such as Japan, since there is little chance to communicate with other people in that foreign language. In Japan the use of ICT is strongly recommended as a national policy in schools of both elementary and higher school administrations. On the other hand, how to incorporate ICT into curriculum is an urgent research topic that has be investigated.

This paper considers how the multimedia system for foreign language education should be carried out in Japan, and evaluates two multimedia distribution systems on user's impression which were actually carried out in a foreign language instruction in Japanese national college of technology. One of the traditional issues on foreign language teaching in Japan is how to guarantee a large amount of linguistic input in a foreign language classroom. As Web 2.0 advanced, several ICT-utilized systems to

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distribute digital teaching materials like sound and movie, which we call Multimedia Distribution System (MDS), have been proposed to be incorporated naturally into foreign language classrooms. This study places much focus on the two of such systems that had an impact on the field of foreign language education: Podcasting and Mobile MDS.

Our earlier studies [1-2] reported the actual use of podcasting systems for TOEIC course and other studies [3-5] described the new type of blended-instruction model for reading course with the use of iPod Touch in the classroom and demonstrate the pedagogical effect and validity of incorporating this mobile tool into a non-wired traditional classroom.

The issues to be discussed in this paper include (i) construction of two multimedia tools and evaluation of the systems by learners, and (ii) effect of the length of download time on learner's frustration. It will be shown that the survey on Study (i) suggested that the factors such as "operability" of mobile devices were outstanding rather than that of podcasting, which implies the practicality for mobile-based blended instruction. Study (ii) suggested that the downloading time for the students to wait should be limited to less than 90 seconds. On the basis of these findings, this paper implies the future possibility of blending lecture and mobile-based e-Learning in classroom.

2 Outline of the Two System and Implementations

Our studies [1-2] describe the podcasting system outline adopted in the study. The schematic model of the system and the hardware and software adopted in our administration is given in Fig. 1 and Table 1 below.

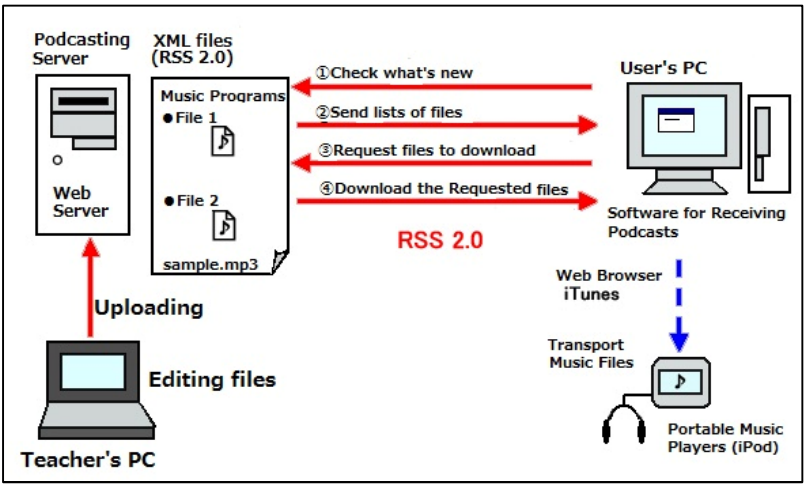


Fig. 1. The podcasting system

Table 1. Hardware and software (podcasting MDS)

CPU	Intel Pentium III 600MHz
RAM	768MB
HDD	20GB
OS	Fedora Core 5
HTTP Server	Apache 2.0.34
PHP	PHP 5.1.6
RDBMS	MySQL 5.0.18
Blog System	WordPress ME 2.0.9
WordPress Plugin	PodPress 3.8

After 15-week course was finished, the questionnaire was given to students. Participants answered all the items asking about the impression in using the system by scoring them on a 7-point Likert scale where 7 was very strongly affirmative and 1 was very strongly negative. The question items are adjectives describing impression in using the system. All the question items were written in Japanese and the translated list of adjectives is illustrated in Fig. 2 below:

feeling as if you were there	slow	desirable
easy to use	enjoyable	friendly
feeling united with others	not intelligent	constrained or uncomfortable
easy to listen to	feering free	dull
one-sided	relieved	feeling emptiness
good voice of speakers	common or ordinary	sociable
direct	causing willingness	dark
easy to understand	not interesting	strong
convenient	unique	negative or passive
familiar	difficult	
beneficial	warm-hearted	

Fig. 2. Question items on impression

As to the mobile-based MDS, owing to the strict security policy of our school, access from outside the school was prohibited. So we built up a server inside the classroom (a small lecture room), where the LMS software was installed. What was adopted in our study is computerized testing software optimized for iPod Touch, "starQuiz server" by Cosmicsoft co. An outline of our system and software is given in Fig.3and Table 2 below. For details about the system, please refer to our earlier studies [3] and [4].

The course model and implementation of the system was described in [3] and [4], where the aim of the course is to enhance learner's vocabulary through reading various types of passages in preparation for TOEIC test. In our course, movies are installed into each iPod Touch to help students to repeat the materials individually for shadowing activities. After 6-week course, we carried out the questionnaire research asking the same questions on impression.

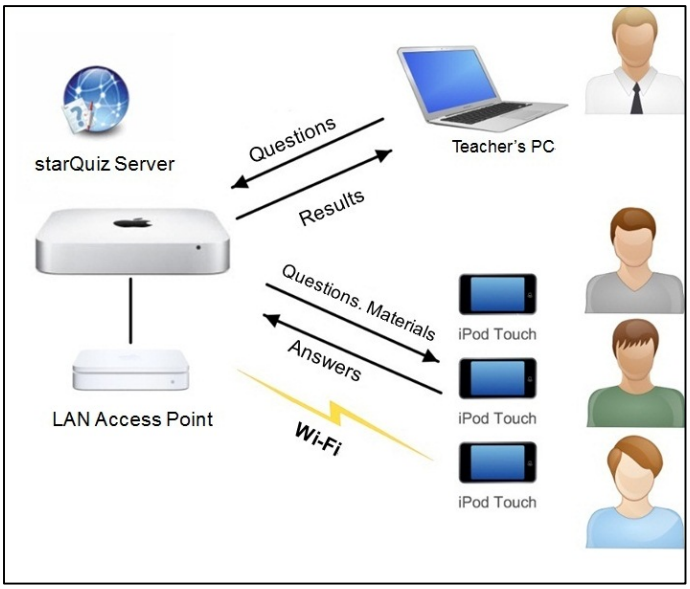


Fig. 3. Outline of mobile-based MDS

Table 2. Hardware and software (Mobile MDS)

CPU	Mac Mini Server	Intel Core 2 Duo 2.53GHz / 4GB Memory / 500GB ×2 HDD / Mac OS X Server Snow Leopard
Back-up HDD	Buffalo HD-CL1. OTU2	
Wireless LAN × 2	AirMac Extreme base station	IEEE 802.11n
Software	starQuiz Server	
USB Hub	ELECOM U2H-Z10SWH	10 port ×2
iPod	Touch iPod Touch 8G	

3 Study (1): Difference between Two Systems

79 forth-year students of national college of technology participated in this study. The aim of Study (1) is to find the difference of learner's impression on these two systems. The fourth-year student of college of technology is equivalent to first-year students in college or university. After completing the course, we carried out a survey on the basis of "Image Evaluation" method [6]. The 31 question items given in Fig. 2

were created with reference to the previous studies [7]. Statistically significant items resulted from out t-test were retained and subject to factor analysis.

The result showed that 19/31 items showed a statistical significance. This means that students think that the two systems are different in terms of usability and operability. Moreover we found that the students are feeling that the iPod Touch is more "friendly", "easy", and "usable", suggesting the higher operability of iPod Touch than podcasting, independent of the difficulty of task and teaching materials, as illustrated in Fig. 4 below. The result of our factor analysis using Principal Factor Method with Promax rotation of the significant items is illustrated in Table 3 below. (Total factor loading = 55.7 %)

Table 3. Factor analysis of significant items

		Factors		
		1	2	3
10	familiar	**.821**	.206	−.094
13	enjoyable	**.811**	.090	−.109
15	feeling free	**.755**	.156	−.129
24	friendly	**.708**	−.034	.079
2	easy to use	**.644**	.022	.030
9	convenient	**.643**	−.012	−.105
19	not interesting	**.555**	−.268	.132
23	desirable	**.538**	−.386	.128
11	beneficial	**.484**	−.181	.102
18	causing willingness	**−.401**	.157	.182
20	unique	**.370**	−.338	.066
27	feeling emptiness	.079	**.842**	.015
26	dull	.006	**.738**	.029
31	negative or passive	.063	**.624**	.244
29	dark	.113	**.597**	.281
4	easy to listen to	.212	**−.446**	.127
21	difficult	−.076	−.091	**.917**
25	constrained or uncomfortable	.027	.306	**.524**
17	common or ordinary	−.061	.142	**.415**

Table 3 indicated that four factors were abstracted. Factors 1, 2 and 3 were labeled as "Holistic impression toward the system", "Task" and "Materials" , respectively, on the basis of the items related. These results suggest that participants seem to recognize these three factors to be independent factors. Fig.4 further suggests that the operability of mobile devices seem to be highly evaluated, which has an implication for the

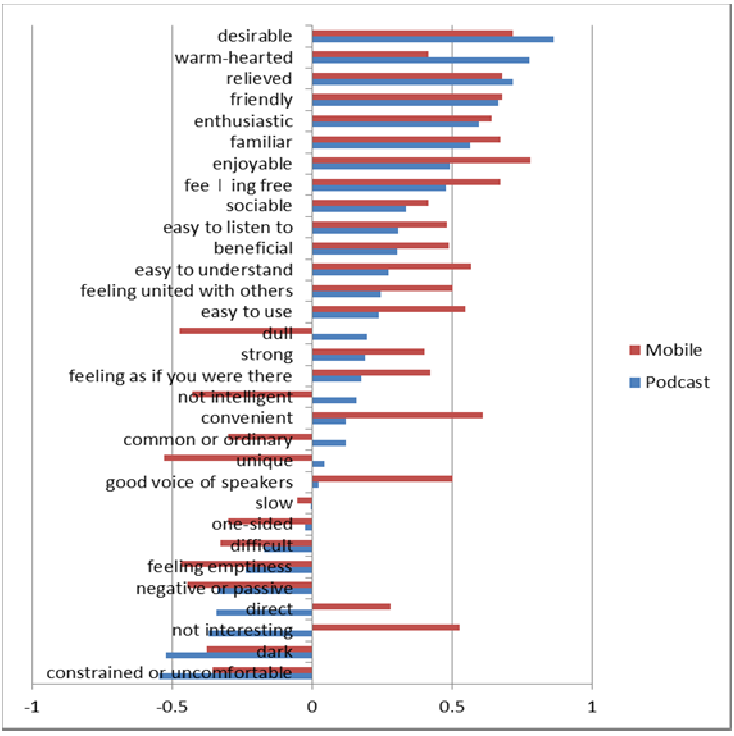
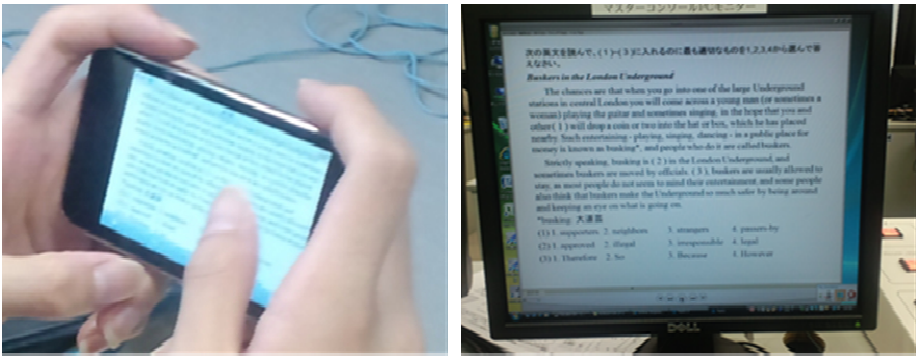


Fig. 4. Comparison of each item on Factor 1

possibility of introducing mobile MDS into a traditional classroom in foreign language teaching.

4 Study (2): Download Time and Frustration

As a pilot study, we made an attempt to deliver 10MB movie file on mobile-based system. As was expected, more than one-third of participants were not able to receive the digital materials within three minutes. This situation is really hard to manage in real classroom settings. Therefore, we gave up sending a digital movie file and decided to send only compressed digital picture files from the server instead (about 300KB) so that the time would be within about one minute. Each participant recorded the time taken to receive the file, and answered the questions about the impression and feelings about the time on a 5-point Likert scale. The pictures on both devices are given in Fig. 5 below.



(a) Material on iPod Touch (b) Material on PC

Fig. 5. Downloaded pictures on iPod Touch and PC

We calculated to produce the average scores on each devices and conducted t-test to see if there is a significant difference. The result is given in Table 4 below.

Table 4. Result of t-test

	iPod Touch		PC		t-test
	Mean	SD	Mean	SD	(two-tailed)
Download Time (sec)	53.11	38.26	9.44	2.63	**
took longer time	2.40	1.33	2.31	1.31	*ns*
comfortable	3.57	1.29	3.39	1.36	*ns*
frustrated	2.29	1.32	2.14	1.40	*ns*
found it easy	3.54	1.15	3.92	1.30	*ns*

(*:5% **:1%)

Although we can see a significant difference as to the time between the two devices, we find no significance about the impression or feeling toward the difference.

Next, we considered the relationship between items on feeling and the actual time. The correlation was listed in Table 5 below.

Table 5 suggests that there is a significant tendency on the correlation between the download time and frustration in the case of iPod Touch. The reason, it seems, comes from the fact that iPod Touch took longer time than PC. However, interestingly, there is a significance between the time and the feeling that it took longer time on the part of PC. Clearly PC took less time in downloading. It can be considered that students expect the PC-based system to be quicker in operation than iPod Touch.

Table 5. Correlation among items

Correlation(iPod Touch)

	Download Time	took longer time	comfortable	frustrated	found it easy
Download Time	1.0000	0.1562	-0.1769	0.2657	-0.2258
took longer time	0.1562	1.0000	-0.5691	0.4614	-0.2714
comfortable	-0.1769	-0.5691	1.0000	-0.5670	0.5253
frustrated	0.2657	0.4614	-0.5670	1.0000	-0.3653
found it easy	-0.2258	-0.2714	0.5253	-0.3653	1.0000

p-value(*:5% **:1%)

	Download Time	took longer time	comfortable	frustrated	found it easy
Download Time	-	0.2503	0.1921	0.0478	0.0943
took longer time		-	0.0000	0.0003	0.0431
comfortable		**	-	0.0000	0.0000
frustrated	*	**	**	-	0.0056
found it easy		*	**	**	-

Correlation(CALL PC)

	Download Time	took longer time	comfortable	frustrated	found it easy
Download Time	1.0000	0.4828	-0.2973	0.0992	-0.0893
took longer time	0.4828	1.0000	-0.5524	0.4931	-0.3562
comfortable	-0.2973	-0.5524	1.0000	-0.5865	0.3437
frustrated	0.0992	0.4931	-0.5865	1.0000	-0.5617
found it easy	-0.0893	-0.3562	0.3437	-0.5617	1.0000

p-value(*:5% **:1%)

	Download Time	took longer time	comfortable	frustrated	found it easy
Download Time	-	0.0029	0.0783	0.5649	0.6045
took longer time	**	-	0.0005	0.0022	0.0330
comfortable		**	-	0.0002	0.0401
frustrated		**	**	-	0.0004
found it easy		*	*	**	-

Lastly, we carried out the cluster analysis using Ward method with Euclidean distance on the basis of the data and how participants of each cluster recognized the situation. Four clusters were created for iPod Touch and three for PC. We calculated average scores on each cluster. The result was given in Table 6 below.

In this Table, we can observe that the cluster 1 of iPod Touch is the group for shortest downloaded time and that the cluster 2 has the most people, almost on the average. The clusters 3 and 4 are those who took longer downloaded time. Especially, people in cluster 4 spent more than 140 seconds. Looking at the "frustrated" row, we can find a clear difference in average scores between clusters 2 and 3. This means that

here is a boundary on the scale of frustration; the estimated "comfortable" download time is less than 90 seconds. On the other hand, the cluster 3 of PC reveals that they were as frustrated even in 29 seconds. This is an interesting result again, and the students seem to expect PC will operate more quickly.

Table 6. Averages of each cluster

Cluster	Size	Download Time	took longer time	confortable	frustrated	found it easy
1	10	20.200	2.500	3.700	2.000	3.500
2	16	42.063	2.125	3.813	1.813	3.563
3	6	91.667	2.833	3.000	3.333	3.833
4	3	144.667	2.667	3.000	3.667	3.000

Class 1 **(iPod Touch)**

Cluster	Size	Download Time	took longer time	confortable	frustrated	found it easy
1	7	21.400	2.000	4.600	1.200	4.400
2	15	4.667	1.417	4.250	1.833	4.167
3	8	29.000	3.833	2.833	3.500	3.000

Class 2 **(PC)**

5 Concluding Remarks

This paper evaluated two multimedia distribution system actually carried out in a national college of technology in Japan in terms of usability and downloading time. The mobile-based MDS as proposed in our project showed that students feel friendly and easy to use, independent of the contents and difficulty of the materials, according to our factor analysis. This will provide an interesting implication that the in-class blended instruction, a combination of face-to-face lecture and the use of e-Learning, can be properly introduced in a foreign language teaching setting. This seems to be a very important point to be discussed. There are at least two major reasons for this. First, the cost for managing the Computer-Assisted Language Learning (CALL) System and such classrooms is surprisingly expensive. Secondly, it is a heavy burden for many foreign language teachers who are not familiar with computer use to conduct and manage the system. The use of friendly mobiles in a non-wired classroom can be a substitute for cheaper and more friendly post-CALL "one-to-one" learning environment. Although there are a lot of things to solve for implementation of the new system, this trend seems to be much worth pursuing in the future.

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