A Pilot Study on 3G Mobile Phone and Two Dimension Barcode in Classroom Communication and Support System

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Abstract

Mobile phone is one of the devices that attracted and widely used among people especially adolescent. Recently in Japan, two dimensional bar code or Quick Response (QR) code was introduced as a novel accessible media. It provides users to speedily enter any web addresses into the phones using integrated mega pixel cameras. This paper will present the development of a system that combines mobile internet technology with a new viewpoint for the QR code usage in education. This pilot study has been conducted over an intensive lecture and the qualitative result will be used to design more usable system in the upcoming semester.

1. Introduction

1.1 Background and related work

A research survey on learners’ awareness of use of mobile phone in university classes [1] pointed out that around 60% of the targeted students would like to try a mobile phone based system in their class. According to the survey, the most frequently used application is mobile e-mail. Apparently, on average, students are spending more than 1 hour per day using their mobile phone.

A study on a recently developed e-learning system for higher education [2] indicated that m-learning in Japan is getting a lot of interest in the classrooms, as about 85% of the students accessed the class information website and mail every time or at least sometimes. This means that m-learning can increase students’ interest and motivation. It was followed up by a development study on the usage of QR codes and a mobile Java application for classroom communication [3].

1.2 QR code

QR code is a kind of two-dimensional symbology developed by Denso wave incorporated (a division of Denso Corporation, Japan) with the primary aim of being a symbol that is easily interpreted by scanner equipment [4]. Most camera-phones in Japan have the software already bundled into the phone, so users can easily work with QR code to read web addresses, or encoded personal information on a name card or stamp (Fig. 1).

2. Research objective and methodology

In this research, mobile phone application and QR codes were presented as learning support tool. The focal points of this research are

(1) To study a possibility in developing educational mobile phone application with QR code. In order to build a good complementary learning tool which delivers better communication and information access in large lecture classes and to observe student discussion during group work sessions?

(3) To conduct a pilot study using the implemented system in order to obtain practical feedback from student when they use QR code in their class. All of
these results will be used in the lecture-base system for the next spring semester.

The main purpose of this study is to, first, on the developer side; demonstrate the possibility of creating a mobile learning tool and the teacher support system. Second, on the user side; to gauge the student interest and attitude in this new media and to understand how to apply it in a dynamic classroom environment. The pilot study will take place in the group work study. Additionally, QR codes are used to reduce the long input required for any action in the student’s mobile learning tools.

3. Usability test and evaluation

A questionnaire base evaluation was conducted in “teacher training curriculum”. Students who took this class are normally plan to apply for an instructor certification test. About 50 undergraduate and graduate students were grouped in 3s or 4s.

As the mobile learning support tool was used during a class (Fig. 2) and mostly in the poster session, therefore, questionnaires were set in pre and post session. Pre-questionnaire was mainly about student’s mobile phone function and their usage in daily life. By the fact that all students interest in instructional design, we have added some questionnaire item that relate directly to the subject and our system. The post-questionnaire will be more detailed. We make student answer from two standpoint, in the case as if they are teachers who administrating this system and as if they are students who using this system. The overall feedback will be used in system revision.

4. Result

From pre-questionnaire, The service provider that student using was 24% for NTT DoCoMo, 28% for Softbank and 41% as a majority for KDDI au. We found that 53% of mobile phones in this class were capable of reading QR code. Most of the students usually use their mobile phone to send email and they are comfortably input text using numerical key pad. The amount of time they were using mobile phone is approximately 30 minutes per day. Moreover, 39% of these students used QR code, typically for accessing mobile website. Students also answered that QR code is very useful but may have some difficulties when they scan it.

After all, we found only 8 mobile phones that compatible with our system (DoCoMo phone with QR code reader). By insufficient number of subjects, the result from post-questionnaire will be shown mainly as qualitative aspect. (Score in parenthesis indicates average and standard deviation calculated from usage rank out of 5)

Figure 2. QR code in the classroom

From student’s standpoint

(1) Group registration: In student’s attitude about QR code in group register function, they think that it is a new tool which is convenient to use but they doubt that it may not be necessary to do so. (3.29, 1.38)

(2) Theme registration: It is convenient for them to check themes’ duplication. The disadvantage is that the display is small and they can not see all themes in one page (3.14, 1.06)

(3) QR code in poster session: The majority do not think that QR code is suitable to use in poster session since they have to get very close to the code in order to read them. And they comment that it would be useful in larger class. (2.71, 1.25) and QR code is easy to be scanned (3.71, 1.60)

(4) Software usability: Students think that this software is easy to use; colors help them easily understand what function they are using (3.86, 1.07). They can operate the application without reading manual

(5) Handwriting vs. mobile phone: In poster session, students prefer voting paper since it is hard to input text using mobile phone (1.57, 0.53)

(6) Mobile phone application in classroom: Although handwriting is better and the usage of QR code is somewhat bothersome, students think that it would be convenient to collect much information in short time. (2.86, 1.57)

From teacher’s standing point

(1) Using mobile phone in classroom: It would be easy for teacher to get large amount of data conveniently. A mobile phone usage in classroom can be seen as uncertain or misuse. We got low rating (2.71, 1.49) from using QR code in group register function because students did not clearly understand the point of using this (Please refer to the discussion
section). For theme register function, we got only inessential comments (3.71, 0.95).

(2) QR code usage in poster session: It may take time for teachers to prepare the QR code (2.71, 0.95).

Finally, we analyze the same item used in pre and post questionnaire in

(1) Mobile phone as a convenient tool in university class: we received (2.71, 1.50) from pre questionnaire and (3.43, 0.98) from post questionnaire. ANOVA analysis shown that these 2 data sets are not statistically significant ($p=0.31$)

(2) Mobile phone software as a support tools in classroom: from (2.86, 1.57) to (3, 1.29). One student has stated that it was not necessary to use mobile phone software in classroom since it would be better to use web-base application. ANOVA analysis shown that these 2 data sets are also not statistically significant ($p=0.85$)

(3) Suggestion: Students suggested that we should build some input assistant function to help them type faster. Moreover, attendance registration function would be very useful in classroom.

(4) Other comments: one of the student comments about data packet communication charges.

5. Discussion

Factors that might affect the experiment result are

(1) Notebook computer were given to all groups in this session. Therefore, student might consider that web base application will be more useful in this class.

(2) Mobile phone application in this survey could not be used in every mobile phone as paper and other form of registration/voting are also being used for example we already grouped the student before they electronically register from their mobile phone by the fact that we have to spread out the DoCoMo phones holder to each group. Student might doubt the capability of the mobile learning support tools since it was presented as an additional task for them.

6. Future Work

As mentioned, all functions used in mobile learning support tools in this pilot study were taken from the full lecture-base support system. We are developing a system which contains

(1) Mobile client which consist of an attendance check system, in-class evaluation system, QR hint that can not be scanned in locked timeframe, QR note which will turn your note into QR code and QR communication that let students share their QR code.

(2) QR Embedded worksheet which contains attendance QR code, evaluation QR code and hint QR code for mobile phone to scan.

7. Conclusion

We have developed a new opportunity to support a communication in a larger classroom environment. The application we have built in this study applies recent advances in mobile phone technology to m-learning. We hope that using QR codes in this system will allow us to achieve our goal of making an easy to use tool which will motivate student’s interest. In this scenario, the teacher will be facilitated by the administration server. However, much information still has to be manually prepared. We plan to add more functions and revise some of the usability aspects of the system to make it more suitable for students and instructors.

The evaluation and revision on the upcoming phrase is continuing at this moment. In addition, by enabling these features through widely used J2ME libraries, we can open more prospects in mobile learning worldwide than ever before.

8. References


