

# SMS Gateway as an Approach for Creating a Mobile Learning System: A Pre-Design Study at Informatics Department Widyatama University

Savitri Galih<sup>1</sup>  
Nilla Rachmaningrum<sup>2</sup>

## ABSTRACT

*The widespread use of mobile phone enables the use of mobile devices for educational purpose. The short message service (SMS) is a popular method of communication among the younger generation. With today's tools, instructors often encounter obstacles when trying to interact with the entire class. Instructors can get responses from only some of students and always struggle with repeating announcements or directing students where to download materials. To solve these problems, we propose the use of the short message service or SMS to support teaching learning activity which greatly enhances interactions between instructors and students and will create a much more effective education environment. The system will provide functions like instant quiz, class material distribution, announcement posting, notifying instructor through short message service (SMS). The SMS based method is chosen based on the analysis on a survey done at Informatics Department Widyatama University. From the survey we conclude that this method is suitable with the mobile learning readiness and learning trends among the students.*

## Keywords

SMS gateway, mobile learning, m-learning readiness.

## 1. INTRODUCTION

We have heard of distance learning, and the use of computers and video-conferencing as teaching tools. But the use of the short message service or SMS to teach students can be the lower cost alternative solution for mobile learning solution. If the short message service (SMS) is a popular method of communication among the younger generation, why not use it to teach students?

With today's tools, instructors often encounter obstacles when trying to interact with the entire class. Instructors can get responses from only some of students and always struggle with repeating announcements or directing students where to download materials. Our proposal aims to develop the use of the short message service or SMS to support teaching learning activity which greatly enhances interactions between instructors and students and will create a much more effective learning environment. The system will provide functions like instant quiz, class material distribution, announcement posting, and notifying instructor through short message service (SMS).

There are several methods / architectures for developing m-learning application. Sharma et.al [1] proposed Web Service

Architecture for M-Learning. In this architecture, the course ware and job aids can be downloaded on PDA. Other method [2] uses Microsoft.NET infrastructure to develop an m-learning management tool in a campus environment. In this architecture, there are four core modules that have been built on mobile web form. Barchino et.al [3] used learning message notification system architecture by SMS. Most architectures in the references, require the internet connection ability of the mobile devices used by students, i.e. PDA or smart phone. In our case, this condition can not be implemented effectively, since the PDA or similar device is not popular among our students. So we choose the architecture similar to [3] with some alignment suited to our condition, i.e. with additional multiport SMS gateway engine to cope with more than one providers as [6].

From the questionnaire that has been filled April 27, 2010, it was found that 61% students at Informatics department Widyatama University use a mobile device. All students in higher education institution have a frequent need for information from their lecturer and their institution about timetable changes, assessment deadlines, feedback from lecturers, and others. Although nearly all of these students carry a sophisticated communication device which they use constantly in daily activity, they do not use it in their educational activity/programme. Usually the announcement from the lecturer or institution is delivered or communicated to the students by direct announcement through notice board, or email. These are not always effective kind of communications, since so many student will miss the notification/announcement.

If a lecture or similar education activity is announced by SMS, all of the students will receive and read the message. The SMS message can be sent either to the whole student body, or faculty or department or a class grouping.

This paper is organized as follows, section 1 gives introduction, a further section explains the common mobile devices used by students, section 2 explains common mobile devices for mobile learning, section 3 shows the result and analysis of survey done with the informatics department of Widyatama University students to determine the readiness, point of view and expectation of students about mobile learning. Section 4 describes the proposed mobile learning architecture, and section 5 is the conclusion.

1 Universitas Widyatama  
[Savitri.galih@widyatama.ac.id](mailto:Savitri.galih@widyatama.ac.id)

2 Universitas Widyatama  
[Nila.rahmaningrum@widyatama.ac.id](mailto:Nila.rahmaningrum@widyatama.ac.id)

## 2. COMMON MOBILE DEVICES FOR MOBILE LEARNING

This section will describe some common mobile device and their usage. [5]

A. iPod – The iPod is a portable media player that allows a user to download music, podcasts, audio books and other video. Students can thus download lecture materials, audio and video lectures. With bigger screen iPods the users can read even e-books. The students can also share information files, work together on a project, provide visual directions or can interface with the iPod through a microphone. The advantages of an iPod is that it helps in teaching support, as the professors in a university could give the audio or video lecture to the registered students as a free download. The disadvantages one that : The cost can be a factor, because not all the students can afford to use one. It also does not provide interactivity and the screen size is generally small to read large chunks of data.

B. Personal Digital Assistant (PDA) – PDAs form a good combination of digital storage along with computing power, internet access, wireless network access through Wi-Fi or Bluetooth, and pen or stylus input interface, along with other word processing tools. It lets the users access email and web content and can play audio and video files. It supports interactive and group learning. The advantages of a PDA : Since text and data entry is possible through the screen keyboard or stylus, the PDA with its relatively large screen stands as a favorite choice, since it integrates communication tools. The disadvantages one that: It may be slightly bulky for overall a normal sized pocket.

C. Smart Phone – A Smart phone integrates telephone features, along with camera, PDA and MP3 player. It also supports access to Internet. Users can download audio or video lectures, flash movies, edit text documents, send IM and use the phone for storing data. It supports interactive learning as it enables global collaboration. The advantages of a Smart Phone : It combines a host of options and features in one easily portable device. The disadvantages one that : The issue of small screen makes reading the text and web browsing quite difficult. The cost of some advanced smart phones is quite high.

D. Notebook or Tablet PC – A Notebook or tablet PC is the most functional of all the mobile devices and it has all the features of a workstation PC. It comes with the network support for Bluetooth, WI-Fi and Ethernet. Tablet PCs also integrate handwriting recognition, voice to text conversion etc for input. These computing nodes could support email, web surfing, word processing, Instant Messaging, VoIP connections and many other application programs. Lot of interactivity and collaboration in research can be thus supported. The advantages of a Notebook : The laptop provides the most powerful computing environment with mobile devices. The disadvantages one that : The relatively large size and lack of mobility-on-the-run limits its network usage to spots where mobile network services are available.

## 3. M-LEARNING READINESS SURVEY

### 3.1 Survey Design

We conducted a survey similar to [4] and [5] and gave the questionnaire to a population of 64 informatics department students to determine some parameters, like availability and accessibility of devices, device usage manner, mind set to mobile learning technology, opinion about device price and internet service. These parameters were then used to determine the students' readiness for Mobile Learning and the best m learning architecture/method suited to the condition.

To observe the extent of the different types of mobile device usage and mobile activity, and the possibility of including smaller mobile devices (PDA or smart phone) in mobile learning, we give questions for which multiple answers could be chosen:

- (1). Which of these devices do you have?
  - a. Cell phone
  - b. Smart Phone
  - c. Videotelefono
  - d. Palmare (PDA)
  - e. Comp portatile (Notebook)
  - f. Computer personale (PC)
- (2). What do you use the cell phone for?
  - a. Conversations
  - b. Video-conversations
  - c. To send and receive SMS
  - d. For connecting to Internet
  - e. To send and receive e-mails
  - f. Play games
  - g. Other

### 3.2 Survey Result Analysis

Fig. 1 shows that the most owned devices among students are cell phones. The Notebook is the next highest mobile devices owned by the students. A PDAs and video telephones are the least owned mobile devices in the list. This result confirms that cell phones will become most prospective device to implement mobile learning activity.

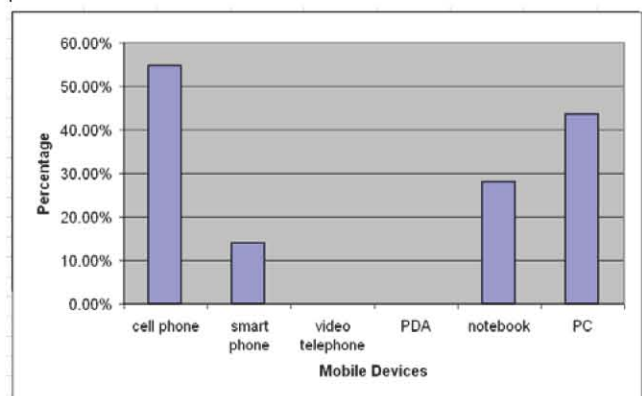
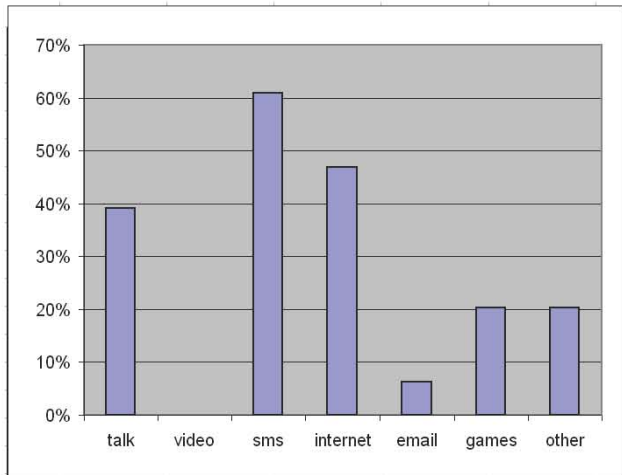


Figure 1. Different Mobile Device Owned

Fig.2 shows the activities done with cell phone by the students. It shows that sending SMS is on the top of list of the activities and the next common mobile activity is connecting to the internet. This result confirms that the students already familiar with getting information through SMS and internet by cell phone.



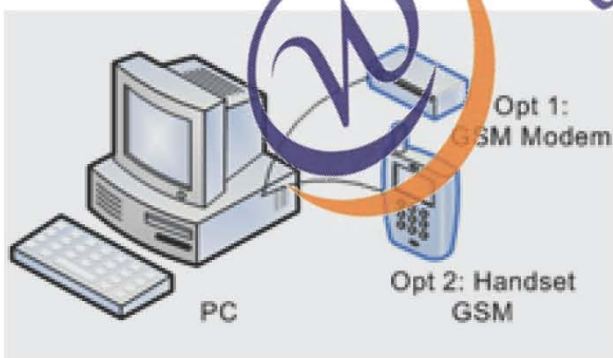
**Figure 2. Different Students' Mobile Activity**

From the survey result we can verify that the devices most used are cell phones and the mobile activity mostly done is sending and receiving SMS. As consequence of this result, we propose that the best suited mobile learning architecture is SMS based mobile learning, using SMS Gateway implementation.

#### 4. SMS GATEWAY MOBILE LEARNING ARCHITECTURE

The SMS is the most common and frequently used mobile service; it is present in every kind of mobile device and offers the possibility of reaching all mobile users. An SMS gateway is a simple SMS enabled mobile phone or an SMS server accessible as a web service. Some business process and public services which can be handled by SMS Gateway application is the Call center and complaints SMS service for public/government service as PLN, PDAM, police dept, TV station etc. :

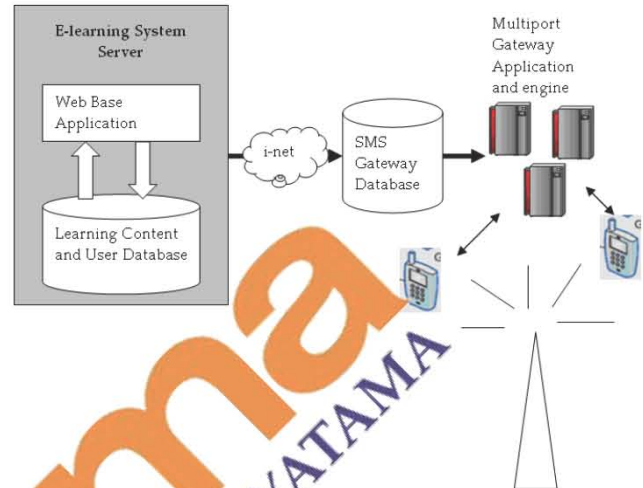
SMS Gateway diagram is described below [6] :



**Figure 3. SMS Gateway Diagram**

The SMS Gateway utilizes the SMS communication technology architecture for implementing a value added application which can optimize the operation of the institution/company's business process and improve quality of service of public service institution. Standard features of an SMS gateway are : interactive SMS communication, SMS info on demand, SMS Service Setting, SMS Automatic Registration, SMS Polling, Broadcast SMS

Sending, Call Group SMS Sending, Scheduled SMS sending, personalized SMS and Access Security System The advanced features of SMS the Gateway are : dynamic interface to integrate with the company database, SMS remote control, e-mail to SMS, SMS to e-mail, GSM modem expansion and direct connection to SMSC via MPP.



**Figure 4. SMS Gateway based Mobile Learning Architecture**

Fig. 4. describes the Multiport SMS Gateway. It is shown that for collecting some information, such as knowledge sharing, the system will report and notify via sms to the students about anything relevant to the teaching-learning process, such as new lecture schedule, change of lecture content, exam information, instant quiz, class material distribution, announcement posting, notifying instructor. On the lecturers' side, they can receive feedback from students.

As shown at fig. 4 this application need data from the e-learning database and the cell phone numbers of users. The cell phone numbers are then used as a starting point to determine which gateway port will be used. To distinguish one port from others during knowledge sharing sending process, the special application is needed to crack the number, so it can match the provider code [6].

#### 5. CONCLUSION

The widespread use of the mobile phone enables the use of mobile devices for educational purpose. We have heard of distance learning, and the use of computers and video-conferencing as teaching tools. But the use of the short message service or SMS to teach students can be the lower cost alternative solution for mobile learning solution. The study for determining the most suitable architecture for the students at the Informatics department of Widyatama University was done by through questionnaires. The analysis of the students survey showed that the most popular used mobile device is cellphone and the activity engaged most often is sending and receiving SMS. Due to this analysis the authors conclude that the most suitable architecture for this situation is The SMS gateway based mobile learning. This research is the pre design study for implementing the mobile learning application. The future plan is to design and develop the mobile learning technology at Widyatama University.

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