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# A Feasibility Study of Applying MMS for Mobile Learning of Cardiopulmonary Resuscitation (CPR)

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**Abstract:** In this paper, we propose a MMS (Multimedia Message Service) -based Interactive Mobile Learning model for adult learners to update their CPR (Cardiopulmonary Resuscitation)-related knowledge and skills. Informed by N. A. Crowder's (1960) branching version of B .F. Skinner's (1958) Program Instruction approach, we designed an interactive learning process that requires the learners to make series of decisions and then be informed by the system of their consequences, thereby achieving "by making and reflecting on mistakes". A feasibility study was conducted in three phases with volunteered adult learners being engaged in the MMS learning process. Through the process of learning content development and our analysis of the learner data, we gained better understanding in the feasible activity modes and the factors that may potentially affect the learning process and learner perceptions toward the learning model.

**Keywords:** Mobile Learning; Cardiopulmonary Resuscitation (CPR); Multimedia Message Service (MMS); Program Instruction

## Introduction

The unique characteristics of the SMS and MMS as compared with other modes of communication are the abilities to offer rapid, proactive and immediate communication. Therefore, by applying mobile technology to learning activities, SMS/MMS could "afford" learners to interact with the learning content in virtual form, and perform decision making tasks for the critical problems pertaining to the learning content. Such learning systems may offer adaptive learning support by providing SMS-based feedback to the learners' "wrong" decisions. Such feedback may result in the arousal of cognitive disequilibrium, and subsequently motivate further learning and knowledge construction through the transmission of MMS-based digital content.

## 1. Literature review

The notion of programmed instruction had been refined from the linear approach in earlier years to the branching approach (Crowder, 1960) which fits the characteristics of individualized learning better. The more recent approach is worked in the way of branching

individual learners to different frames or paths after a common frame is delivered, thereby enabling individualized learning.

According to the simulated content for "learning by doing" as proposed by (Aldrich, 2005), the branching narrative structure is applied to draw all the decision making points and their consequences. Learners would be able to learn by doing – or learning from mistakes, i.e., a wrong decision would bring the learner to the failed consequence; the instructor would then give advice to rectify the learner's underlying misconception.

Incorporating interactivity and pushed media content into SMS and MMS, we then have SMS or MMS 2.0. In this regard, we are keen on investigating the feasibility of delivering contextualized CPR problems through SMS/MMS 2.0 for the learners' decision making practice at anytime, anywhere. According to our exploratory study (Lin & Lee, 2008) of using 3G phones to deliver our self-developed learning content, we identify four types of content communication modes potentially suitable for the MMS Mobile Learning process that we subsequently developed four communication modes of learning content.

## 2. A MMS-based Interactive Mobile Learning model

In general, individual SMS/MMS communication is unidirectional – from a sender to a recipient. In the context of SMS/MMS-based mobile learning program with "mass" learners, the sender (typically the instructor) could hardly sending feedback to every single response from the learners within a reasonable time frame. The multi-level questioning approach is a plausible solution to this. The lesson developer may predict a variety of possible learner responses to each question, assign unique index numbers (ID's) to these (typically multiple choice) questions and their associated responses, and specify the next question or feedback ID that the system should send to the learner upon receiving a response with a particular ID. Thus, the automation of learner-system interactions could be achieved.

## 3. Content Design of the MMS-based Interactive CPR Lesson

Informed by our analysis of the up-to-date CPR principles and skills as well as the design principles for mobile learning materials as proposed by Zobel (2001) and Young, Chang and Liu (2005), we worked out seven pairs plus one messages to cover the entire interactive CPR lesson. The first message is for inviting the learners to commence on the learning process. The last message pair is to inform the learners the end of the process. The six message pairs in between offer a URL each for the learners to download and study multimedia learning materials, and subsequently reply to the system with their answer (one of the multiple choices) to the associated question in SMS. The system then recognizes the learner ID and the answer ID, and sends back to the learner's appropriate feedback and the next URL to download learning materials.

## 4. Evaluation Tools and Methods

We developed the learner evaluation instruments based on the updated CPR principles. The instruments consist of two components. The first component is compromised of the pre- and post-tests with the same set of 13 contextualized problems respectively. Target users took the tests for us to compare and determine their learning gains. Table 1 shows that the target users of Phase 1 and 2 have improved their performances by answering 2.78 questions (or 21%) correctly in average.

Table 1 Analysis of the Phase 1 & 2 target users' learning gains

|  | Pre-test: correct answers/% | | Post-test: correct answers/% | | Improvement | |
|---|---|---|---|---|---|---|
| Phase 1 users (n = 18) | 5.78 | 44% | 8.00 | 62% | 2.22 | 17% |
| Phase 2 users (n = 29) | 5.90 | 45% | 9.24 | 71% | 3.34 | 26% |
| Mean | 5.84 | 45% | 8.62 | 66% | 2.78 | 21% |

The second component is a post-survey that consists of 24 questions in the Likert Scale of 5 to investigate the target users' attitudes and perceptions.(5 for "strongly agree", 4 for "agree", 3 for "neutral", 2 for "disagree", 1 for "strongly disagree"). The results show that for the items pertaining to the users' attitudes toward the learning content, the mean value of the users' positive responses is 3.7 (SD = 0.49).

## 5. Conclusion

In this study, we investigated various viable modes for facilitating SMS/MMS-based interactive mobile learning. In order to cater for highly varied configurations of learners' mobile devices, we recommend against adopting the more interactive .swf format and instead making use of .mp4 and .3gp to deliver the learning materials. The software for playing .mp4 and .3gp files has its control panel on the screen, which is good for full-screen playing. However, the auto-hiding of the panel buttons may often causes the learners too late to press the pause button when they need to do so to control their learning pace. The learners may alternatively use the non-full screen playing mode, though the sharing of the device screen between the video frame and the control panel will scale down the video display size. Mobile devices have been enjoying huge user base. Although the cost of MMS is considerably higher than SMS at present stage, we see the former's multimedia form of presentation having a great potential in motivating the learners and helping them to better understand the content.

## Acknowledgements

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