

# TWITTER MICRO-BLOGGING BASED MOBILE LEARNING APPROACH TO ENHANCE THE AGRICULTURE EDUCATION PROCESS

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## ABSTRACT

The study intends to see how to introduce mobile learning within the domain of agriculture so as to enhance the agriculture education process. We propose to use the Activity theory together with other methodologies such as participatory methods to design, implement, and evaluate mlearning activities. The study explores the process of introducing twitter based mlearning among a group of young farmers by following a series of steps: A situation analysis to explain the mobile technologies or tools available among study community, developing lessons, introducing mlearning among the study group, and evaluating the outcome. It concludes that twitter as a potential low cost ICT solution to facilitate informal learning among the study group.

## KEYWORDS

Mobile Learning, Activity Theory, Agriculture, Twitter, SMS

## 1. INTRODUCTION

Mobile technologies are found to be providing cost-effective and efficient solutions in addressing the information needs of agriculture-stakeholders (Aker and Mbiti, 2010; Dhaliwal and Joshi, 2010; Fafchamps, 2011). The recent experiences in Sri Lanka have also showed that the market prices of agricultural products could be easily delivered to interested stakeholders using SMS alerts (“Dialog Axiata PLC”, 2012; Mobitel, 2012). However most of these approaches were limited to sending updates on market prices, weather information but the use of mobile devices in mlearning has got little attention. This study was conducted to see the possibility of introducing a twitter based mobile learning approach to deliver short lessons on agriculture, among a group of young farmers. We have thus, defined mobile Learning in an ‘agricultural and informal extension context aimed at the farming community. The context of learning referred to in this work tailors mostly guided informal learning related to in-situ practice of agriculture compared to classroom learning.

## 2. LITERATURE REVIEW

### 2.1 Mobile Learning

Keegan (2005) defined mobile learning as ‘the provision of education and training on PDAs/palmtops/handhelds, smart-phones and mobile phones. The main focus of this definition was ‘mobility. This concept of mobility was elaborated as learning mediated by mobile devices, mobility of the users, and the mobility of contents and resources in the sense that it can be access from anywhere (Impedovo, 2011; Taylor et al, 2006). Another widely accepted definition for mobile learning is using mobile technologies to facilitate learning (Hwang and Tsai, 2011).

Mobile learning via SMS initiative was successfully implemented with a group of distance learners to enhance blended learning by the Open University of Malaysia (Lim et al, 2011). The learners have appreciated the text messages and felt that the SMSs had helped them to stay focused, engaged in their studies, and had provided them with useful information related to the course. The system had been able to deliver information related to course contents, motivate the students, and provide useful announcements etc. The study has used question answer format in some of the places e.g. multiple choice questions, answers and feedback system which is very much similar to our study.

According to the findings of a meta-analysis (Wu et al., 2012) mlearning has most frequently supported students in various professions and applied sciences. Agriculture is also considered as an applied science, however, the authors have not come across a single research on mlearning related to agriculture. Another review study (Hwang and Tsai, 2011), which focused on mlearning literature from 2001-10, suggests that studies focused on science domain have increased over the years however the evidence of using mobile learning in agriculture has never mentioned. Is this suggesting that the value of mlearning was not yet being fully realized by the agriculture sector?

## 2.2 Agriculture Education Process

Farmers in rural areas are lacking the access to latest technical information related to agriculture on how to produce an economically profitable crop. By providing this information their yields can be considerably improved (Rosegrant and Cline, 2003). Such efforts, i.e. transferring latest technical information related to agriculture, is known to be agricultural education. It is regarded as mostly a non-formal and out of school education process towards the farming community so as to impart knowledge, skills and attitudes. The ultimate objective of farmer education is to empower farmers so that they will make better decisions leading to improve productivity. Although non-formal trainings are mostly arranged to enhance the knowledge, and skills of farmers, a major part of learning is also include informal and life-long learning. Usually farmers gather a great deal of knowledge and understanding through their experiences, by observing and listening to knowledgeable farmers around them. Thus being mostly an informal learning process, agriculture education process can be particularly benefited by introducing mlearning as reported in Jones et al, 2012.

When considering the farmer education process, learning could take place along four paradigms; technology transfer, advisory work, human resource development, and facilitation and empowerment (NAFES, 2005). Technology transfer involves a top-down approach, which delivers specific recommendations related to innovations, that the farmers should adopt. These practices are brought to the attention of farmers using direct methods of transferring knowledge and skills such as demonstrations, field days, exhibitions etc. Advisory service is when the farmer directly contacts the Extension Officer (EO) in the area to clarify issues related to the crop. For example one might be asking about a remedy for the disease outbreak in his vegetable plot. Human resource development involves mostly the formal training given to rural farmers by government institutions and universities, etc so as to improve their knowledge. Top-down teaching methods were mostly used but the participants were free to choose how to use the knowledge they acquired.

The government appointed field extension officer is responsible for delivering information related to latest technologies to the farmer community. She is the key facilitator for the agriculture education process to run smoothly at the grass-root level. The young farmer clubs which we identified as the study community of our study were usually guided and convened by the EO in the area.

## 2.3 Twitter

Twitter is a free, Web2.0 technology, which allows the users to communicate online brief text updates. It is known to be one of the most popular social networking and micro-blogging applications, (Wikipedia.org/Twitter). The twitter users can send and receive messages via the web, SMS, instant messaging clients, and etc. Posts are usually limited to 140 text characters in length. Micro-blogging enables a real-time interaction between users, using different devices, technologies and applications (Grosbeck and Holotescu, 2008). Twitter can also be accessed through mobile phones SMS facility. Twitter has so far being used for various purposes including disaster communication (Mills, 2009), as a teaching practice to promote active and informal learning (Kassens-Noor, 2012), marketing (Burton and Soboleva, 2011), and assessment

of training (Chen and Chen, 2012). Potential educational uses of twitter has been listed by (Grosbeck and Holotescu, 2008) which reflects some of the important aspects that is going in line with our study e.g. creating a learning experience, micro-blogging in informal settings, creating learning networks. Using twitter in educationally relevant ways has increased student engagement and improved grades (Junco et al, 2011). This shows the possibility of using twitter as an educational tool to help target communities towards desired outcomes. One of the primary barriers for adopting Twitter as a pedagogical tool could be the student resistant use twitter for educational purposes. Thus users sometimes have to follow creative methods so as to convince students of benefits such as arousing curiosity, and establishing formal or informal rewards (Rinaldo et al, 2011).

The main reason for selecting twitter for this study was that it is freely available in the region, facilitated by three major mobile operators in the country. Besides it is simple and can be operated with minimum instructions. We capitalized on the 'Twitter for SMS' option, which is an instant infrastructure for mobile communications, which allows the users to connect directly with anyone using a mobile phone. This was necessary that most of the participants had no access to internet and most of them had only basic phones.

## 2.4 Activity Theory

Activity theory has been widely used in designing mobile learning environments (Uden, 2007). One of the basic principles of Activity theory is mediation, which suggests that human activity is mediated by a number of tools both external and internal (Kaptelinin, 1997). Computers or any other device such as mobile phones, PDAs, can be considered as a group of external tools mediating the human interactions with the world. According to (Kaptelinin and Nardi, 1997) activity theory suggest to studying the principle of tool mediation from two angles; structural properties of tools, and knowledge on how the tools are used. Knowing how to use a tool is as much important as the possession of a tool as a tool comes fully into being when only it is used. Thus the knowledge on tool use becomes a crucial part.

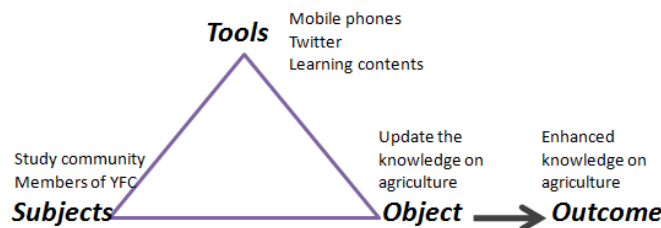


Figure 1. Mediated relationship between study community and object

Activity Theory is also considered as a powerful and clarifying descriptive tool which provides an ideal framework to study the major dimensions of mlearning i.e. learner, devices, and outcome as separate components as well as their interactions (Nardi, 1995). Figure 1 shows how we planned to apply the Activity theory framework to illustrate the mediated relationship of study community and their learning objects. We considered tools such as mobile phones, twitter network, and mlearning contents with the present learning methods of the subjects in order to educate the subjects.

## 2.5 Focus of the Study

Our study aimed to investigate the use of twitter micro-blogging based mlearning in the domain of agriculture. Having Activity theory as a conceptual framework the following research questions are addressed:

- i. What are the mobile/ IT based applications and technologies presently available among the study community, and in what ways we can use these technologies in mlearning?
- ii. How can we enhance the agriculture education process using Twitter micro-blogging facility based mLearning?
- iii. Is mlearning a possible alternative that can support the target community in fulfilling their immediate training needs?

### 3. METHOD

#### 3.1 Scope

The study group consisted of the members of Young Farmers Club (YFC) Ancumbura AI range, in Kandy District, Sri Lanka. This YFC group was purposively selected for the study based on their active involvements in agriculture activities for the past 3 years. The main object of the study group was to improve their knowledge related to agriculture and farming practices thus the learning outcome was that the study group acquires enhanced knowledge on agriculture. The tools, or the instruments which mediated the learning process, was regarded as mobile phones, Twitter micro-blogging facility, and the mlearning contents.

#### 3.2 Procedure

The study was conducted in 3 stages; (i) preliminary survey, (ii) introducing twitter, (iii) use twitter network to introduce mLearning.

##### 3.2.1 Preliminary Survey/ Situation Analysis

An initial survey was conducted among the YFC members to see their familiarity with mobile technology, education level, willingness to involve in mLearning, and exposure to twitter or any other SMS based communication methods. A short questionnaire was used for the data collection while about half of the membership, 22 out of 44, was randomly selected for the survey. Then follow-up interviews were conducted with selected respondents to further study the present communication methods used among the YFC members and the EO.

The information coming from the survey was used in the design of the mlessons. For instance, since most of the study group members had access to basic phones, we had to choose SMS based approach for the learning activity. The language we used was Sinhalese, and because they did not have facilities to read Sinhala types, we had to type using phonetic characters. We also had to collect information on income and affordability of mobile technology when we decide upon what type of technologies that would be suitable to offer the mobile lessons. We also looked at the low cost ICT technologies available among the study area considering the economic back ground of the respondents.

##### 3.2.2 Introduce Twitter among the YFC Members and the Extension Officer

Twitter network was established using a series of workshops, in which twenty YFC members and the EO were trained on setting up Twitter accounts, and using them for posting messages. This was done only using their mobile phone. Initially all the YFC members' twitter accounts were set to follow only the tweets posted by the EO and the researcher (Figure 2). Similarly when the members tweeted, it was followed only by the EO and the researcher. This was necessary to avoid members getting too many messages at a time to their mobile phone, and to make the system be as simple as possible for the novice users to understand.

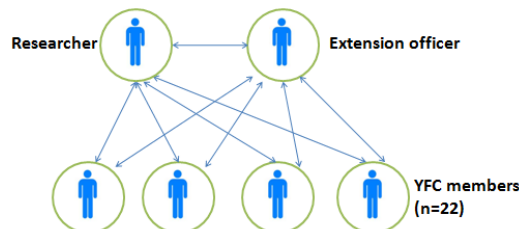


Figure 2. Twitter network developed for the mlearning programme

During this stage, the members were given clear instructions as to how they are going to use twitter, by imposing a few rules:

- i. The users should not follow the twitter accounts of each other. They will only follow and followed by the Extension Officer and the researcher.
- ii. This twitter network will only be used as an information exchange mechanism, and mlearning platform.

### 3.2.3 Introducing mLearning

Then we have prepared a series of short-lessons based on primary data sources and were later verified by a subject matter expert. The lessons were split into 2 components as question and answer to as to overcome the 140 character limitation in Twitter. Sending the question first was also helpful to motivate the participants in learning process and stimulate their thinking, before we present with the answer to the question. At this stage members were informed that they could send as many answers and they could get the help of external members to find answers for the questions. In this manner, they will develop their own network to collaborate during the learning.

The question was tweet around 8am in the morning. Those who wish to answer the question may do so by replying to the tweet. These answers will be viewed by only the researcher and the Extension officer. At the end of the day, the lesson was tweeted which explains the answer to the question. Immediate feedback was given for those who answer the question to encourage their participation. Following the comments made by Rinaldo et al (2011) a reward system was being introduced to further motivate the YFC members those who take part in the mlearning programme.

The learning was evaluated using ongoing assessments and focus group discussions. Ongoing assessments were conducted using the twitter network. Six members from the learning community participated in the focus group discussion. Key informant discussions were held with the EO to learn the progress. So far used to study how the AI and members of YFC using twitter to communicate agriculture related information. The user feedback was also obtained during the discussions.

## 4. RESULTS AND DISCUSSION

The findings of the study are presented based on the research questions.

### 4.1 What are the Mobile Based Applications and Technologies Presently Available among the Study Community, and in What Ways We Can Use These Technologies in mlearning?

Majority (72%) of the respondents had a mobile phone in their possession while the rest of them had CDMA connections shared with the family. The major mobile operators in the area were two private companies and both these operators acted as carriers of Twitter using short code 40404. The respondents those who possess mobile phones, including the school children, were quite familiar with sending and receiving SMS. These young people were quick to pick this type of technologies and all of them had used SMS options to communications.

We also looked at the types of facilities available in their phones in addition to the SMS facility, and their familiarity of using these facilities. This knowledge was necessary for the planning and development of mlearning lessons for the study community. They were familiar in using the camera (36%), video camera (31%), phone book option (45%), voice recorder (22%) internet (17%), and radio (31%) available in the mobile phone. The types of the phones used among the YFC members were also investigated. Only one member had a smart phone, while six members had java enabled phones. The average monthly expenses for the phone LKR 440 (range LKR 150 - 3000). This indicates their familiarity with technology, which would be useful when designing the initial mlearning contents.

None of the respondents were aware on twitter micro-blogging facility neither over the internet or using mobile SMS facility. However there were very few YFC members who had used other social media such as Facebook on their mobile phone. The same YFC members had email accounts and were seen using them in day to day communications.

The study community mainly consisted young people whose age ranged from 16 -31. These included both school going, and school leavers. Almost all were well educated having attended school education for more than 11 years. Nine out of 22 (41%) had studied agriculture as a subject in the school. The young farmers were mainly in floriculture business and home gardening. School going YFC members were seen helping their parents for the family’s ongoing farm/ floriculture business. The members had favourable attitudes towards using mobile technology based mechanism to exchange agriculture related information. An SMS based information exchange mechanism was preferred by the study community mainly due to the lower cost, familiarity with SMS, accessibility to mobile phones, and literacy.

## 4.2 How Can We Enhance the Agriculture Education Process Using Twitter Micro-Blogging Facility Based mlearning?

The twitter group has been developed to link 3 parties namely YFC members, The EO, and outside sources such as researchers, universities, NGOs, or private sector. As shown in figure 3, twitter provides a low-cost platform to communicate among the involved parties. This need to be a two way communication process so that participants can interact with each other to share important information. These interactions will be helpful for the YFC members to learn different aspects of agriculture, which ultimately contributes for enhancing the agriculture education process.

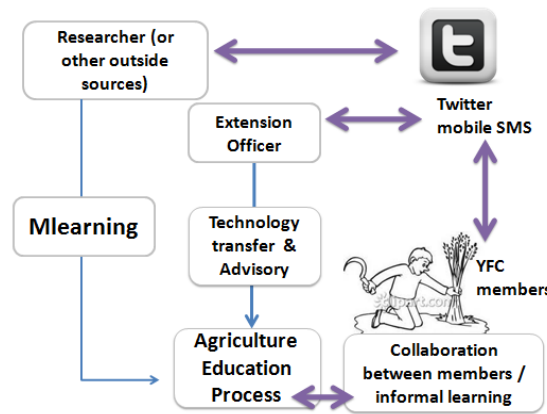


Figure 3. Proposed Model to enhance agriculture education process using Twitter based mlearning

## 4.3 Is mlearning a Possible Alternative that Can Support the Target Community in Fulfilling their Training Needs?

Our Twitter group consists of 24 members including 22 YFC members, the EO and a researcher representing the outside community. We have run this Twitter network since August 2012 to date, and so far we have used the network to post general announcements by the Extension officer and to post nearly 80 mlessons. The EO had used for variety of purposes; aware the members on agriculture radio programmes broadcast on local radio channels, related training programs, plant clinics, exhibitions etc and scheduling YFC meetings. Most of these messages were to direct the members towards learning opportunities, which they would not aware on otherwise due to the rural areas they were based on. For instance figure 4 shows one such occasion where the Extension Officer tweeted on a radio programme directing the members to listen to it.

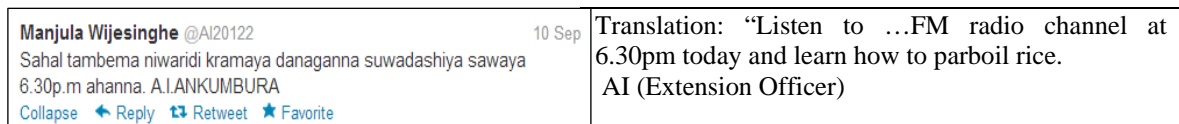


Figure 4. A tweet posted to aware YFC members on a radio programme

Secondly the network had been used the mlearning plat form. One of the MCQ questions and the answer posted in the system is given in Figure 5. We have used both MCQ and open ended question formats. Average 10 members out of 22 actively participated in the programme by every day while 3-4 members provided answers occasionally. The rest 8 were very irregular in their involvement and a few did not participate. Immediate feedback was given to those who answer the day's question, using twitter's direct messaging option, so as to prevent other members getting loads of unnecessary messages. The YFC members were allowed to send as many answers possible, however most members were able to provide the correct answer within maximum of 2-3 attempts. The users have developed their own a network of outsiders to help them with finding the answer for the question. The names of users who provided correct answer were tweeted each day for motivation.

<p><b>Uvasara Dissanayeke</b> @UIDissanayeke 3 Dec          Q36: 'Perakum' prabhedaya ayath bhogaya kumakda? a. Thala b. Kavupi          c. kesel d. ratakaju</p>	<p>Translation          Q36. Which of the following crop has 'Perakum' as one of its recommended crop-variety a. Gingelly, b.Cowpea, c. Banana, d. groundnut</p>
<p><b>Uvasara Dissanayeke</b> @UIDissanayeke 3 Dec          Q36:pilitura: 'Parakum' yanu kesel prabhedayaki.</p>	<p>Translation          Q36. Answer: "Perakum" is one of the Banana varieties recommended by the Dept of Agriculture</p>

Figure 5. Tweets in QA format used for mlearning

The users were overall satisfied on the learning programme. We have asked their comments to improve the program and the necessary modifications were made based on their requests. One of the limitations in the study was that users were only allowed to interact with the EO and the researcher. Character limitation of 140 for a tweet was another concern, as we used Singlish typing which could further limit the effective number of characters we could use. We were able to meet this challenge by breaking the mlearning lesson into two components as a question and answer. The contents we have selected for the study were simply to increase their knowledge, and were not to go for deeper level of learning.

## 5. CONCLUSIONS

This study highlights the process of introducing twitter based mlearning among a selected community. Activity theory was so far used to structure the study, while using its main concepts in planning the various stages of the research. Participatory research methods were used along with Activity theory to capture the dynamics in the mlearning situation. Twitter mobile SMS option provides a simple and low cost information exchange mechanism to initiate mlearning among the study community. However this needs proper planning and closely following the study community to identify their immediate training requirements. The twitter direct message option was used to form rich interactions with users to offer them feedback for learning. In future, it is important to test the applicability of same learning procedure among other communities.

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