Introduction

This case study documents the results of a study which examined the potential for using mobile communications technology in the ongoing professional development of secondary teachers in rural Bangladesh. The case study also examines the issues encountered and the lessons learned while using mobile technology in teacher education.

Background

In 2006 and 2007, the Asian Development Bank (ADB) funded a 21-month regional technical assistance (RETA) study in four countries: Bangladesh, Nepal, Mongolia, and Samoa. The RETA study researched approaches to using ICT in education, for improvements in teaching and learning that are not only successful but also feasible and sustainable given the region’s development challenges.

Titled the “Innovative Information and Communication Technology in Education and its Potential for Reducing Poverty in Asia and the Pacific Region” project, the study commenced in April 2006 and was implemented in the four countries by RTI International in partnership with iEARN-USA.

The RETA study built on existing projects in each of the four participating countries. The Bangladesh study was part of the e-Teacher Training component, and complemented the existing ADB-funded Teaching Quality Improvement in Secondary Education Project (TQI-SEP), which has as one of its objectives: to provide in-service professional development at least once during the project period to all serving teachers working in secondary schools recognized by the Ministry of Education (MoE).

This Continuous Professional Development (CPD) component of the TQI-SEP provides two-week, face-to-face, subject-based training programmes that require participants to go to one of the government teacher training colleges (TTCs) for the duration of the training (residential training). Three “Outreach Centres”, serving rural and remote areas, are planned in order to be the link between remote schools and training colleges, but they will still require teachers to take leave from their schools to attend training. The TQI-SEP staff recognize, however, that for many teachers it is difficult to leave their home, family, school, and other obligations for an extended period. The staff were therefore looking for alternative methods of delivering CPD courses.

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44 This summary case study was adapted by UNESCO, with permission, from the full research report: Pouzevara, Sarah and Rubina Khan. 2007. Learning communities enabled by mobile technology: A case study of school-based, in-service secondary teacher training in rural Bangladesh. RTI International. ADB TA6278-REG. Research Triangle Park.
45 RTI International is a trade name of Research Triangle Institute.
Using Mobile Technology in Teacher Training in Bangladesh

The purpose of the study was to explore innovative strategies, including distance learning and the application of ICT, to serve educators in remote areas, in order to inform TQI-SEP of the feasibility of using these strategies to scale up access to quality in-service training.

Two subject trainers, a training co-ordinator, and a cluster of 10 schools were equipped with “smartphones”\(^{46}\) (with video, speakerphone, and three-way calling capabilities). These smartphones were to be used by 20 Bangla and mathematics teachers in 10 schools of the Barisal region in southern Bangladesh. The phones were intended primarily to enhance communication, motivation, and multimedia delivery.

The study sought to examine the use of mobile connectivity in support of distance education (in a country with high population density and wide mobile communications coverage) and determine whether:

- It is an effective mode for teacher training and improvement in classroom practice.
- It is a suitable mode to reach rural and remote teachers, including women and disadvantaged groups.
- It presents other benefits in terms of education administration (including student assessment and costs) and pedagogy.

The study also sought to determine the costs of this model, and the features of mobile phones that would be most useful as a support to distance learning.

The study builds on existing experiences in “mobile learning”\(^{47}\) from other countries but this study was not strictly a “mobile learning” project since it did not use mobile technology for the delivery of the course content. Instead, this project used phone communication as a support for traditional distance learning with print-based self learning materials and active learning techniques.

In this study, the existing TQI-SEP training curriculum was revised from a two-week, face-to-face workshop to a six-week distance-mode training course based on printed materials and practical application of training content with peers, incorporating activities that utilize the features of the mobile phone.

Each week in the six-week course consisted of two instructional units. Each unit contained the following elements and tasks:

- Trainee receives an introductory set of discussion questions and supplemental readings.
- Trainee reviews the readings, reflects on questions, and plans peer group session.
- Trainee leads a peer group session during which discussion and role-play take place. The group is asked to conclude by stating the two most important aspects of the lesson, and the trainee makes notes in a journal.
- During this time there is unscheduled, informal contact with the trainer using the mobile phone, both to verify that activities are being completed and to ask questions as necessary.
- A conference call is held among trainee, trainer, and colleagues to discuss the main questions and outcomes of peer group sessions.

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\(^{46}\) A smartphone is defined as a mobile cellular telephone that has with many of the same functions as a handheld computer, including e-mail, photo and video capture, document viewing, and web-browsing.

\(^{47}\) Mobile learning is a term used to describe learning through portable, handheld, electronic devices, generally with wireless communications capabilities. It is not limited to mobile phones, however, since it can also refer to the use of personal digital assistants, handheld computers, or mobile gaming devices. It generally implies that all course content is delivered through the mobile device.
Therefore, each week there were four peer review sessions and two telephone conferences. Unit summaries, examples, and other reference texts are included throughout the manual. The curriculum did not differ substantially from the face-to-face course, which also uses peer group discussion; the main work of the instructional designers was to split the course appropriately into 6 modules and 12 units, with opportunities for conference calling among the participants. The design included conference calls between schools and with the trainer.

In order to maintain a focus on training quality and reduce dependency on the technology (and ultimately failure of the project if the technology failed), a blended approach was adopted. A combination of print-based learning materials; a face-to-face orientation workshop; synchronous, on-demand voice communication; asynchronous Short Messaging Service (SMS) text messaging; video and photos sharing; and school-based group discussion activities were all incorporated into the design of the training programme. The adaptation of the curriculum involved contracting the services of a professional instructional designer and SMEs in Bangla and mathematics instruction.

During the study preparation phase, some preliminary research into costs and availability of different types of mobile phones was carried out within Bangladesh. Further research was done by reading reviews over the Internet and asking for recommendations from other experienced individuals, including the local phone service provider. This proved to be a very difficult aspect of the planning process because it was impossible to test the features on a phone that was actually connected to local service, or even charged. In considering the instructional design of the project and the purposes of incorporating mobile technology, the features of mobile phones were reviewed to determine those that could best facilitate learning and communication.

These were seen to be:

- voice, including audio conference calling between multiple sites
- SMS
- video and photo capture
- transfer of photo and video through Multimedia Messaging Service (MMS)\(^\text{48}\)

Since a printed learning package would be provided to the trainee teachers, it was not seen as necessary to have features for printing from the phone, nor were e-mail and Internet connectivity seen as critical in this study.\(^\text{49}\) The final phone model chosen (Sony Ericsson P990i) had a large screen size and a full alphabetical keyboard to facilitate writing text messages.

The study procured the following equipment:

- One laptop computer (for use by the training co-ordinator and subject teachers for administrative purposes, to create electronic materials to send to the teachers, to send messages, and to browse the Internet for learning resources)
- 13 mobile handsets (one for each of 10 participating schools, with two teachers undergoing training from each school, and one for each subject teacher and the training co-ordinator)
- Phone service for 13 phones for 2 months from the Grameen phone network.

A three-day orientation and training workshop was held at the Barisal TTC from 6 to 8 June, to acquaint trainee teachers, head teachers, principals, trainers, and training co-ordinators (TC) to the new

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\(^{48}\) Similar to SMS (text messages), MMS uses multimedia to allow telephones to send audio and video clips from one to another.

\(^{49}\) These are certainly features that can be exploited in the future, particularly for the teacher trainers.
mobile-phone-supported in-service teacher training materials. The workshop also aimed to provide training in the use of smartphones, orient participants to the various features of the smartphone and provide opportunities for simulation, group discussion and asking of questions.

After the orientation workshop, the participants returned to their schools and the six-week training programme was conducted from June 15 to July 30 2007. The trainee teachers completed each module by following the training manual. The weekly teleconferences had been scheduled during the orientation workshop, but the trainees were responsible, with the support of their head teachers, for managing their own learning and scheduling the peer discussion sessions. All trainees finished their modules within the intended six-week period.

A monitoring visit to Barisal was conducted by members of the study team from 8 to 10 June (about halfway through the course), during which time the team visited three study schools in Golachipa and Potuakhali, Sadar.

The visit achieved the following activities in support of the study:
- conducting discussions with the TTC co-ordinator, trainers, head teachers, teacher trainees, and the DEO, in order to verify the progress of the distance training and identify any problems
- gathering views about the learning materials and technology, as well as suggestions for improvement
- observing audio conferencing sessions
- reviewing log sheets and journal notes of trainees
- reaching an agreement with the TC co-ordinator and trainers about practical arrangements for the wrap up and evaluation workshop scheduled for the end of the training period.

It was observed at this time that the phone model chosen was much too complicated for the needs and abilities of the users, and it was also not fully compatible with the Grameen phone network. Nevertheless, the participants reported being able to cope with these constraints, and were pleased with the process overall. The DEO also reported having done some monitoring of the program, which resulted in overall positive feedback from the participants.

A closing and equipment handover workshop was held in Barisal on 30 and 31 July. The agenda covered the following items:
- Post-test administration (standard, content-related questions related to general teaching and learning strategies and subject-specific questions)
- Simultaneous group debriefing sessions and presentations in plenary
- Handover of phones
- Administration of evaluation questionnaires (process-related, prepared for the study)
- Presentation of video clips taken by trainees in their classrooms, using the phones
- Structured interviews with trainees/trainers/TTC staff
- Certificate award ceremony

Eighteen out of 20 trainee teachers attended, as well as 10 head teachers, four trainers, four TQI-SEP staff, two study consultants, the TTC Barisal principal and training co-ordinator, the Barisal DEO, and two Upazila Education Officers from Patuakhali and Galachipa.
During simultaneous group debriefing sessions, math trainees, Bangla trainees, and head teachers formed three separate groups and discussed assigned questions. They were asked to comment, both individually and as a group, on the strengths and weaknesses of the technology-based training programme (e.g. on the learning materials and technology), to comment on any observable changes, and to make recommendations for future implementation of the distance learning training. Head teachers, were asked to identify strengths and weaknesses of the programme and to provide suggestions about their role in the programme, highlight its impact, and point out changes in classroom practice (if any). In each group there was a note-taker and a leader to organize and present the group work at the plenary session the next day.

Feedback and Issues

Trainees, trainers, and administrators provided feedback and comments on the materials, curriculum, training in the use of the ICT tools, and other areas. The main points raised are summarized below:

- **Training materials**
The distance learning package was generally perceived to be clear and adequate. There were minor flaws, however, such as lack of additional examples, subject specific examples, lack of answers to questions, and spelling mistakes. Some participants mentioned that there could have been more direction and clarity on specifically what to do and when (this is a common concern in distance learning programmes, where learners are expected to be much more self-directed than in the traditional classroom).

- **Curriculum**
The format of the curriculum enhanced interaction between teachers, extended the training opportunity to more teachers in the school, and fostered collegiality between trainers and trainees. In particular, trainee teachers enjoyed the flexibility and independent nature of this new modality. The journals indicate that the main points of the lessons were clear from the printed materials, and the group discussion allowed teachers to debate about the ideas and their application. The journals also showed that trainees were able to keep to the expected schedule, usually carrying out activities six days per week, in some cases even seven. Often, the seventh day was used to review the training process among colleagues in the school and other schools.

- **Integration of phones into the training curriculum**
In the original design of the curriculum, the conference calls with trainees and trainers were to take place among several different groups at different schools. But because the audio conferencing feature did not work well (the sound quality was poor and the loudspeakers did not function properly), it turned out that the trainer called trainees individually or as a small group from one school on a rotational basis, rather than having conference calls with several schools. During these calls, they would go through the discussion questions for each session, do some problem solving, and answer specific questions from the trainees. One difficulty reported was that the phones were often kept with the head teacher, so trainees were not always able to use the phone when they were needed. This was mainly for security reasons, so that the phones could be locked up after school hours. This is the time, however, when trainees most wanted to reach the trainers, but could not. They all highly recommended that in future it would be best to have one phone per person, rather than sharing one phone between two trainees. Analysis of the journals and log sheets shows that the main purpose of the phone calls were:
  - Trainee would inform trainer of progress, reporting on outcomes of readings and discussions.
  - Trainees would receive encouragement and motivation to apply techniques from the lessons.
  - Trainer would call and ask questions, verify lesson comprehension.
• Trainer would answer questions that trainees would have compiled in their group discussion beforehand.
• Trainee would call when they had problems or didn’t understand.
• Trainer would resolve disagreements that came up between peers during discussions.
• Trainees and trainers would exchange ideas for school improvement.

• The technology
Although the participants were not able to use all the smartphone features for training purposes, they were aware of its potential and benefited immensely by talking on a one-to-one basis with their trainer and with other teachers. As mentioned above, conference calling worked, but the sound quality diminished so much that the activity was abandoned. There were some problems with SMS due to the language barrier, since messages could only be written in English (or using the Latin alphabet). Some of the teachers were not comfortable with this alphabet. MMS did not work. Most likely because the network could only transfer clips up to 10 seconds long, but the trainees created clips that were several minutes long.

It had been hoped that because all of the participants were experienced phone users and mobile phone owners, they would be able to adapt to and easily integrate the smartphone and its more advanced features into the training experience. This did not turn out to be the case, however, since the users did not readily use the advanced features of the phone, and they abandoned experimentation quickly, after the first failed attempts. Therefore, much more time and training will be required for the effective use of the smartphones in distance training.

This is why it is important to concentrate training and advanced didactic use of the phones at the level of the trainers, since the trainees do not have time to effectively learn all of the phone features, nor would it be desirable to spend time training them for these limited purposes (unless they will be able to access this type of technology in the future).

• Attitudes towards the training
Regardless of the technology, an important finding of this study is that teachers are highly in favor of CPD through distance learning because it allowed them to remain in the schools and with families during the training period, and the training content could be immediately applied. The main advantages of the distance-mode training compared to the face-to-face mode:
  • Participation in the training programme without disruption to their students, their school, or their family life.
  • Allows the trainee to immediately apply the concepts in the classroom.
  • Saves time (the trainee’s) and money (the training provider’s).
  • Requires shared responsibility between trainer and trainee (i.e., cannot be a passive learning experience since they must prepare for conferences).

Further research is required to know the long-term effectiveness of the training, the benefit of the technology to the distance learning environment, and the full didactic potential of the phone features. The following could be starting points for further research:
• Visiting the control and implementation trainees who participated in this study to observe their classroom teaching practice and compare the extent to which the trainees of each learning method are implementing what they had learned.
• Compare the study schools (using the same equipment and curriculum) to a set of control schools that would use only the print-based learning materials in order to isolate the added value of the technology to the distance learning mode.
- Document the usability of the phones and phone features over a longer period of time, to determine the value of different features (synchronous and asynchronous voice, video, text) for the learning experience, and possibly recommend a particular model of phone for the intended purposes.

**Added Value of Technology**

From the feedback gathered from trainees, trainers, and administrators (data was collected using questionnaires, interviews, focus groups, journals, and log sheets kept by the trainees) the ICT-enhanced training course was considered to be a success.

Trainers and trainees alike have been very receptive to the idea of training at a distance with support of smartphones, and adapted easily to the constraints encountered such as the lack of adequate training to use technology, occasional technical failure of phones, rigid conference timing and insufficient number of phones.

Participants noted benefits of using this new modality of training for professional development, including:
- Convenience – easy access to training from their workplace, and not being separated from their families or having to take leave from school. Participants strongly prefer training that allows them to remain in their homes and classrooms.
- Opportunities for ongoing communication with the trainer and fellow trainees at other schools.
- It is a modern and exciting approach, as opposed to the traditional approach, so was more interesting to trainee-teachers.
- Increased face-to-face interaction between teachers and school administrators at the school level, due to the school-based nature of the professional development training course.
- Fostering of collegiality due to the need to work together and provide feedback to one another.
- Participating trainees have discovered a learning community within their own school, and have realized that they can learn through group discussion and self-directed methods.

The experience has generated interest and enthusiasm on the part of participating teachers, other subject teachers, and even neighbouring schools, who enquire about the process and use of new technology.

The trainees, when compared with a control group of trainees who completed the face-to-face training at the same time, demonstrated equivalent content-knowledge gains based on pre- and post-training scores. Head teachers also report that they have observed new teaching methods being applied in the schools, indicating that the distance-mode training is as effective as the face-to-face mode for improving knowledge and skills.

There is reason to believe that the training concepts will be more effectively put into practice among the distance-education trainees (compared to the face-to-face trainees who were trained away from their schools) since the distance-education trainees were trained at their schools so could immediately apply and experiment with the techniques that they are learning, rather than waiting until after the training period to do so. Follow up research would help to confirm that hypothesis.

The mobile technology project has helped to achieve the TQI-SEP objective of strengthening in-service teacher training by providing a solution for reaching the large number of untrained teachers through in-service training. The project also contributed to the improvement of the existing professional
development training materials by providing an example of how the existing materials could be adapted to distance training, while making improvements at the same time. The project also enables female teachers to participate in training courses more readily because they are not required to leave their homes and families for a two-week, face-to-face training course.

The training programme was considered particularly successful because of the distance mode, and the interactive design of the school-based training program. However, the precise added value of the mobile communications technology is two-fold. First, it gives the trainers and training providers confidence that the trainees will complete the training program effectively, because they have a way of providing regular follow-up and ensuring that the trainees stay on task. Second, the possibility for on-demand communication between trainees and trainers, as well as among trainees, helps to keep the trainees motivated and improves content understanding and application through question, answer and debate. Research in distance learning indicates that that feelings of isolation and difficulty with self-motivation can lead to drop out or failure and that ‘blended’ learning environments which maintain some face-to-face contact are more effective. The mobile phones are clearly a solution to this problem, where phone service is available and affordable.

The advanced features of the technology (i.e., MMS, SMS and photo sharing), though not utilized during this study, should not be too quickly discarded as superfluous. As users (especially trainers) become more familiar with the technology, and if the initial orientation to the technology and processes is improved, then there are still many ways that alternative communication tools, including multimedia, could further optimize the training programme. The emerging theoretical basis for using the phones for supplementary, multimedia prompting is found in ‘micro-learning’, which suggests that people learn more effectively if information is delivered in small units that are easy to understand and apply. Complementing the complete, and perhaps intimidating, printed-course pack with these small multimedia experiences could help reinforce overall learning outcomes.

**Recommendations**

Given the ambitious task of TQI-SEP to provide training to all teachers nationwide, it would be worthwhile to consider implementing this experience on a wider scale, keeping in mind that the phone technology should be considered a supplement to traditional distance learning based on pedagogically sound curriculum materials and active learning, and not as the main mode of delivery of course content. Some considerations for future use of mobile technology are:

- Use a simpler and more low-cost model if more phones would be purchased. Or, consider using the trainees own personal phones by finding a way to provide reimbursement for the cost of the calls that they make.
- Ensure that teachers have access to the phones at all times, including taking responsibility for them after school hours, if phones must be shared. Teachers can plan a schedule (on a school-to-school basis) to share the phones and schedule conference calls.
- Encourage schools to consider financing this type of experience using the Innovation and Development Fund.

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50 Fozdar, Bharat Inder and Lalita Kumar, 2007. Mobile learning and student retention. The International Review of Research in Open and Distance Learning. 8(2).
51 See, for example, Roval, A. and Jordan, H. 2004. Blended learning and Sense of Community: A comparative analysis with traditional and fully online graduate courses. The International Review of Research in Open and Distance Learning, 5(2).
• Improve the orientation programme by providing more effective training on the use of the phone features, and developing a trainers’ manual that specifically suggests how and when they might use the phones to prompt discussion, provoke reflection, assess progress, etc. Experienced trainers could be called upon to help develop this manual.

• Continue to experiment with the didactic application of different phone features, including preparation of clips of model teaching examples that are very clear and short, or photos of unique teaching aids and other learning materials or classroom configurations, to the extent that smartphones are still available and the network can accommodate MMS.

• Ensure that the trainers take the lead with advanced use of the phone features, so that the trainees can concentrate on the course content and not the use of the technology. For example, trainers could still make use of MMS and SMS features of the phones to send content and instructions to the trainees, even if trainees only respond through traditional person-to-person calls.

• Utilize the laptop more effectively, if possible. The laptop should be linked to the Internet and e-mail in order to correspond with TQI-SEP and other education administrators at the central level.

• This may be possible using the phone as a router to connect through Global System for Mobile Technology (GSM) or Global Packet Radio Service (GPRS) technology.

Major factors contributing to the success of the training were:
• The enthusiasm, patience, and resourcefulness of the participating trainees, head teachers, trainers, and training co-ordinators.
• Support and supervision of the teacher training college principal and local education officers.

The study findings and recommendations are more relevant to research in open and distance learning, rather than mobile learning. They contribute to existing research by providing lessons learned concerning:
• The advantage of school-based distance learning for in-service teacher professional development
• The possibility of telephone communication as a support for distance learning (particularly relevant in Bangladesh for the Bangladesh Open University, which enrolls over 200,000 students per year) or other formal learning situations involving a trainer and trainee.
• The feasibility of using advanced mobile phone features in place of desktop computers or other large multimedia projection equipment for delivering additional course content in a distance learning programme.

Although many current case studies in m-learning utilize the mobile phone as the primary means of content delivery, this study does not recommend, at this time and in this context, that smartphones be the only mode of distance learning delivery. The blended mode, combining printed self-study materials and school-based peer group discussions and content application is important, and more suitable to the low-resource context.

It is with this principle in mind that this study has also developed the idea of ‘learning communities’ enabled by mobile technologies. That is, communities of practice among teachers in the same region or of the same subject matter who meet regularly and share knowledge and practical experiences. This is a concept to be explored further both within Bangladesh and elsewhere.

53 This is a technology that allows communication between mobile devices and internet service providers. The connection to mobile internet is permanent, but data transfer takes place through radio link.