

## **The Potential for Using SMS to Support Learning and Organisation in Sub-Saharan Africa**

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### **Abstract:**

In developing countries, mobile technologies have the capacity to deliver and enhance learning in ways that are completely different from mobile learning in countries where mains electricity, computer hardware and internet connectivity are stable, reliable, cheap and abundant. They also have the capacity to subvert the received wisdom on the development of the educational uses of ICT.

This paper describes work currently under way in Kenya to support in-service teacher training nationally with a distance learning programme specifically developed locally to meet the infrastructural and organisational requirements of an environment dramatically different than that of most mobile learning projects. Alongside audio and video cassettes developed with BBC WIL support and print material developed with CEL, University of Manchester support, the authors have been working to bring together Kenya policy-makers, technologists and educationalists to develop a targeted bulk SMS system for the 200,000 in-service teacher participants. This will help structure the study programme, address the isolation of distance learners and deliver learning simply, sustainably and cost-effectively. The technologies chosen are the most robust, appropriate and socially inclusive and the development process has been designed to promote dialogue and capacity across the various local communities of practice and expertise.

The project has explored both the business case and the pedagogic case for SMS within the programme. The former has looked at the efficiencies, costs and alternatives associated with SMS whilst the latter has been concerned to map a cross-section of educational transactions, ranging from delivering content to providing study guide material, onto SMS and evaluate them. Some interesting exploratory work has been done looking at porting the ideas of conferencing.

The project has revealed the sophistication and agility of the mobile phone networks in Kenya and the developers of their 'value-added' services, and has been exploring the possibility of running much of the country's schools' statistical returns off SMS. Currently it seems that schools provide regular statistical returns to District and Provincial education offices and that these returns place a vital role in the allocation of resources to individual schools. These returns are currently transmitted by letter-post, courier or by phone conversation. These are potentially slow, expensive and error-prone. Many or most of them are however never used, only stored. Further research would be needed to document the exact nature of the returns, the use to which they are put and the various ways in which they are submitted. The notion of using SMS as the main input medium and also the medium for exception-reporting is still very novel.

The project is supported by DfID, because of its relevance to models of appropriate mobile learning for the countries of sub-Saharan Africa, and is intended not only to explore regionally relevant solutions. More importantly the project is intended to help build capacity locally and challenge models of ICT rooted in Europe, the Far East and America.

This account is based on research and consultancy taking from place in the UK and Kenya in the years 2004 and 2005

**Keywords:** *SMS, sub Saharan Africa, appropriate technology, in-service teacher training*

## 1. Introduction

Most people including administrators, educators and their students are unaware of the facts that SMS text messages can be bought in bulk at a considerable discount and that SMS text messages can be written and sent from a conventional computer, for example a networked desktop PC or wireless-enabled laptop PC, using an interface no more complex than a standard office email client such as Eudora or Outlook. They can also be sent from web-enabled PCs in Internet cafes or business centres. This opens up enormous possibilities for using mobile phones, as cell phones are known in the UK, to enhance, supplement and support student learning.

It is also possible to write and send targeted bulk SMS text from a mobile phone itself and this means that learning can be delivered, supported and enhanced using mobile phones to generate bulk SMS text as well as receive it.

The underlying platform and technology for a sophisticated SMS text system is obviously built around phone networks and computer systems. The dominant model for delivering computer-based and network-based learning shares much of this technology and there is thus the possibility of blending learning that is based around the mobile phone with learning that is based around the computer.

This paper describes developmental work taking place in Kenya exploring these ideas and using SMS to support national in-service teacher training.

## 2. Kenya and Sub Saharan Africa

This section will briefly identify and explain the key physical factors that impede and transform the nature and delivery of education in sub Saharan Africa, for example infrastructure, ICT access and usage, mobile phone acceptance and ownership, and demographics and geography. The section will then use these ideas to explain the specifically Kenyan context.

In common with much of sub Saharan Africa, Kenyan physical infrastructure is characterised by:

- Poor roads and postal services
- Poor landline phone networks
- Poor mains electricity
- Little or no Internet bandwidth outside one or two major cities
  - Often just internet cafes or hotels in cities
- Very few modern PCs or peripherals in the any of the public sector
  - And little user expertise, especially in smaller towns and rural areas.

These characteristics are balanced by

- Lively and energetic mobile phone networks
- The potential for solar power
- A regulatory and licensing system in a state of flux
- High levels of mobile phone ownership, acceptance and usage

It is worth noting that the state landline network in Kenya does not have the same energy and capacity as the privately owned mobile phone networks and in the Government of Kenya has recently relinquished its shares in the leading mobile network in order to fund a radical programme of restructuring and redundancy.

The two dominant networks in Kenya, namely Safaricom and Celtel, appear to operate contrasting business models in their tariffs and coverage, and this is significant in terms of access and equity. Safaricom take the view that the base of the socio-economic pyramid, including obviously the less affluent rural areas, represent a massive business opportunity and price network access on a 'per second' basis to attract less affluent and cost-conscious customers. Their competitors Celtel apparently take a different view and use a 'per minute' tariff that seems less economically effective in gaining market share. Both networks are extending their network coverage into rural areas and the limiting factor currently appears to be the rollout of mains electricity by the 'parastatal' producer and distributor. Safaricom currently cover 70% of the country's population in 30% of the country's area and this includes all towns with more than 10,000 inhabitants, major roads, borders, coasts and NGO centres. At a local level coverage is still incomplete and unreliable and rural users often charge their phones and receive SMS text on their weekly trips to the local market town. There is a 'lively' market in imported 'grey' handsets exerting downward pressure on the cost of ownership and networks attempt to ensure subscribers can replace lost SIM cards quickly to keep business and maintain stability in the subscriber-base. Tariff structures mean many Kenyans use two phones (or SIM cards) to exploit intra-network calls and minimise inter-network ones.

As a prelude to the current project, Digital Links International undertook a scoping study in the autumn of 2004 looking at aspects of ICT attitudes, access and usage amongst teachers in eight case study areas. This showed teachers to be likely early adopters of SMS technologies as soon as they received network coverage and generally an interest and acceptance of using SMS in learning (but that teachers would be understandably unhappy with SMS schemes that displaced message costs onto them). The study also considered the professional, institutional, logistical, and cultural and equity issues of access to information and communications technologies. In particular, it examined the likely feasibility and effectiveness of using multi-media to deliver the in-service training programme. The conclusion was that this approach would be successful, but would need careful organisation at district level to take into account the challenges posed by constraints in equipment and infrastructure.

In practical terms, Digital Links believed it was likely to be feasible to use videotape as part of any programme for primary head-teachers throughout the country, with secondary schools willing and able to provide the key points of delivery. However, in some areas where distances were great and communications poor a back-up plan would in their view be needed, and the teachers' colleges would have offer help.

The use of audiocassettes as part of any key resource teachers' (KRTs) programme was also felt to be likely to be feasible throughout, provided that there was a clear plan to cover the costs of batteries for the cassette players in schools without a source of electrical power. Between 60 and 96% of rural schools were without any source of power.

At the same time, there was almost universal interest among teachers in becoming computer literate and having access to computers. The potential of a laptop with Internet access as a resource for TAC tutors was widely recognised though the significance of the GPRS roll out went un-remarked.

### **3. Free Primary Education in Kenya**

This section will explore the nature and extent of the challenge represented by Free Primary Education (FPE) and its place amongst the Millennium Development Goals. A major challenge is the need to rapidly increase the numbers of trained teachers whilst at the same time improving the quality of the school system and using it as a vehicle for radical social and cultural transformation across a range of issues including child-marriage and other tribal practices, endemic corruption, poor communications, an over-centralised education system and widespread adult illiteracy (and general poverty and disease).

In January 2003 the new democratically elected Government of Kenya placed the highest priority on education, announcing the introduction of Free Primary Education (FPE) from January 2003. This led to an increase in primary enrolment of nearly one million, with the number of pupils increasing in individual schools between 10% and 25% and placing great demands upon the Ministry of Education (MoEST) at all levels. The subsequent fall of the school population pointed to a retention problem aggravated by over-crowding.

The DFID East Africa Senior Education Adviser played a key role in brokering the support of major development partners to help the Kenya government meet the demands of Free Primary Education. Discussion also began between the DFID Adviser, the MoEST and Imfundo as to possible areas of Imfundo support.

In 2003 the World Bank offered a grant of \$55m to assist the implementation of Free Primary Education in Kenya. The World Bank's Free Primary Education Support Programme (FPESP) has four sub-components:

- school based teacher development
- school accounting system
- education management system
- system design and programme preparation

The School Based Teacher Development Program uses the modality of distance learning, with face-to-face support is proposed to train the following groups:

- 35,000 additional Key Resource Teachers in Kiswahili and Guidance and Counselling
- 54,000 already trained Key Resource Teachers (KRTs)
- 7,500 Head teachers
- 1,500 Teacher Advisory Centre (TAC) Tutors and Zonal Inspectors

Imfundo has been supporting the implementation of Free Primary Education (FPE) by the Ministry of Education Science and Technology (MOEST) in Kenya since September 2003. This support built on earlier engagement with the MoEST since 2002. The Imfundo Education Adviser designed a programme of support for the MoEST, which involved partners International Extension College, BBC WIL and CEL.

#### **4. The School Empowerment Programme**

Imfundo, a unit within the UK Department for International Development (DfID) set up to use education and ICT to address extreme deprivation in sub Saharan Africa, has helped the Kenyan Ministry of Education, Science and Technology (MoEST) build capacity, specifically in the development of the School Empowerment Programme (SEP), an in-service distance learning programme with content and delivery specifically intended to meet Kenyan needs. The BBC are supporting Kenyan video, radio and sound studios produce video cassettes, audio cassettes and radio broadcasts, whilst the Centre for Educational Leadership (CEL) Manchester University are working with local writers on print material. This section will explain and discuss the final component, SMS broadcasts, as a method of support, guidance, contact and content for SEP.

In discussion with the MoEST INSET team in 200,3 the need for Imfundo support in developing the School Based Development Program was identified and endorsed by the Senior Education Adviser. MoEST established a team of stakeholders from schools, TACs, Inspectorate, Teacher Training Colleges, Kenya Institute of Education and Teacher Services Commission. This team worked with Imfundo on the design and development of the School Based Development Program in a number of Imfundo facilitated workshops in September, October, December 2003 and May and August 2004. With the support of Imfundo, the School Empowerment Programme was conceptualised. This directly targets 17,500 Head Teachers and the 54,000 Key Resource Teachers (KRTs) -that is the Head teacher and three KRTs from every school in the country.

Imfundo has been supporting MoEST in the design and development of a component of the School Based Teacher Development Programme called The School Empowerment Programme (SEP). Imfundo has been working in particular with the INSET unit within the MoEST.

The School Empowerment Programme is a distance learning course designed to develop the capacity of the whole school by training Head Teachers and Key Resource Teachers to deal with the challenges of free Primary Education

in Kenya. The programme will be mainly delivered through print based material and supported by multi-media (audio, video and radio).

The material is designed to meet the needs of two key groups:

- The Head Teacher materials will reflect the areas relevant to them in bringing about change in the school, working with the community, management and leadership etc.
- The Key Resource teacher material will support classroom practice and delivering this training on to the rest of the teachers.

Imfundo is continuing its support to MoEST INSET unit by assisting them to prepare to deliver high quality teacher training through new emerging ICT platforms i.e. online teacher educational materials and SMS mobile technologies. They have also been monitoring developments in handheld computers and mobile learning.

The School Empowerment Programme (SEP) is an exciting and innovative approach to the training of Head Teachers and other teachers. The aim of the SEP is to strengthen management structures within each school and to develop a shared ethos and school vision amongst its staff. SEP is a blended learning package that uses in this first stage. Nine themes have been identified which form the focus of a distance learning module for the Head Teachers and an INSET package for the KRTs to deliver to the whole school. These are:

- School Leadership
- Ethics and Integrity
- Special Needs
- Alternative Teaching Approaches
- Guidance and Counselling
- Capacity Building
- Teaching and Learning
- Effective use of Resources
- School Health and Nutrition

Embedded in these broad themes SEP tackles child-marriage, corruption, over-centralisation, bullying, HIV/AIDS, retention, women teachers and over-crowding, building around a theme of 'leading from the middle'.

Videos and Audios to enhance the printed learning material are being developed by Kenyan ICT companies such as the Kenya Institute of Education (KIE) and Alwan Communications Limited, a development media company involved in the production of video, radio productions, print and general materials to promote learning, awareness and public relations. Since 1986 this company has developed and produced over thirty video films and a number of audio/radio productions, including Metamo, a project funded by The Netherlands Embassy and Our World, an international award winning video sponsored by UNICEF. Radio and television experience includes radio programmes for Gender and Development Centre, Institute of Education in Democracy (IED) and television series for the United Nations Development Programme (UNDP) and the Kenya Government.

All aspects of the content and materials development have been based on capacity building and DfID Imfundo involvement has focussed on supporting local pedagogic, technical and organisation structures and expertise.

## **5. The Potential for SMS in the Kenyan School System**

SMS has come late to SEP but has considerable potential to catalyse, reinforce and complement the other strands of the project. The attractions of an SMS component within SEP include:

- SMS is not 'frozen' (compared to pre-recorded radio, video, print components) thus enabling topical content and responses to emergencies and contingencies
- SMS can be used peer-to-peer, in local decentralised groups, as long as message costs were reimbursed; SMS is not just top-down, centre-out; not such broadcasts
- SMS has a high acceptability, coverage and ownership amongst teachers, SMS is socially inclusive
- SMS can give a sense of local 'ownership' and control, SMS does not need demystifying
- The costs of SMS
  - Capital: negligible, unlike other ICT interventions students buy or already own the necessary hardware
  - Running: minimal, basically SMS messages
- In general, SMS is personal, mobile and flexible and is low-tech, accessible, universal and scalable

In general terms, SMS within SEP or a comparable distance-learning programme can be used for delivering

- Study guide material, giving week-by-week support, maintaining momentum, contact, morale and continuity
- Content such as hints, tips, outlines, lists, summaries, revision
- Reminders for assessment, contact, broadcast, discussion, video, meeting
- Discussion in the form of feedback, seminar, query
- Pastoral work giving support, encouragement
- Urgent messages about errata, cancellations and changes

Whilst the use of SMS to support a model of teaching and learning based around the transmission and delivery of content (the 'didactic' model) is probably quite unremarkable, the use of SMS to support a model of teaching and learning based around collaboration and discussion (the 'discursive' model) is more exciting and challenging. The authors have been exploring how to transfer the ideas of e-moderating (that transform groups of online students dependent on a tutor into communities of self-sufficient learners) into the SMS domain, m-moderating.

One major practical overhead with any large-scale or distributed SMS system is setting up the system, particularly capturing and entering all the students' phone numbers and details. The details needed are the details that categorise

the teachers and define the different potential targets groups for targeted bulk SMS. These details might include the teachers' subjects, their districts, their names and their status. As a manual data entry problem, capturing and maintaining, this volume of data would be prohibitively expensive and other solutions are needed.

Fortunately the technology and the VAS organisations have a solution: if the students can all receive one extra sheet of paper in their initial mailing the problem is solved. This piece of paper would ask them to send an SMS text to a specified number in a specified format, giving for example, their name, school, district, subject and role. These details would be transferred automatically to a database (effectively a searchable address-book) that would then underpin subsequent targeted SMS broadcasts and enable messages to be sent by district, by role etc.

Because many of the events in SEP occur at predictable dates (starting a new module, assessment due, seminar to be arranged for example), much of the proposed SMS traffic can be written and stored on the system in advance and broadcast at appropriate pre-determined times with no human intervention. Any traffic that is by its nature unpredictable (cancellations or errata for example) could be entered into the system by local officials or national organisers using their mobile phones. They would merely need to send the proposed SMS text with codes identifying the target groups to a prescribed number.

There is also considerable potential for addressing problems associated with the statistical educational data needed to manage and finance the school system. Accurate and up-to-date statistical returns are needed from every school in order to allocate per-capita funding for the schools, to monitor schools for local and national attendance and enrolment problems and to provide central government with appropriate management information to support planning. At present, these returns reach the district and provincial offices by courier, by phone call and by post. This is often slow, error-prone and costly.

Currently data analysis is often non-existent because of the data entry overhead involved in transferring un-standardised paper-based returns to a computer system. The state of the computer infrastructure would mean large-scale analysis would still be vastly problematic even if data were entered.

Here too, SMS can provide solutions because mobile phones in each school could be used. Head teachers would merely send a standard format message each week, perhaps giving pupil numbers by age and gender, to a specified phone number. The system would automatically validate this incoming data (that is, check for any that were obviously defective) and message the sender in the event of any queries or anomalies. It could easily remind head teachers of late returns and could also automatically text schools inspectors and ministry officials in the event of any pre-determined situations that might require personal intervention, such as a sudden decline in girl-child attendance in a particular school. This functionality would be supported by conventional data processing technologies hosted either in the networks'

massive and secure servers or in the ministry itself and able to deliver routine management reports as emails to officials or as presentations available via secure access at Internet cafes or business centres.

Recent changes in emphasis in the development community have moved away from un-coordinated and ad hoc projects, however worthwhile, towards embedding innovation within sector-wide planning. This is especially sensible in the case of large-scale data processing projects where a system-wide perspective is paramount. The case for small-scale projects is not so much that they might scale up to larger projects or become incorporated into other parallel initiatives (they won't - it won't work!) but that they will serve to inform policy-makers and catalyse collaboration and discussion. With educationalists and technologists. Small-scale IT projects must be viewed as potentially 'throw-away prototypes'.

Both these strands of SMS texting are likely to involve little or no direct development costs because the VAS organisations involved would recoup their costs from the networks on the basis of increased network traffic.

## **6. The Proposals**

Key findings from the first phase of consultancy were that:

- SMS texting is potentially an imaginative component of School Empowerment Programme delivery and support and, in the longer term, a viable and innovative technology for improving EMIS operations.
- The resources, expertise, systems and technology to develop this potential all exist locally and cheaply.
- There are simple arguments in favour of SMS in terms of its cost, speed and accuracy, and in terms of its educational power and flexibility and some reservations about current network coverage and reliability.
- Implementation of a large-scale SMS system to support and deliver education and administration would represent a considerable national asset in terms of know-how, reputation and profile.
- There is however insufficient awareness of the exact nature of these opportunities and challenges amongst the various different groups of potential stakeholders.
- There is therefore a strong case for further discussion and interaction between policy makers, budget holders, technical experts and teaching professionals to create and sustain the necessary synergy.
- In the coming months, the work of connecting the potential stakeholders must continue.

The process described in the preceding section will lead to a set of proposals that will be embedded in national educational plans, to be implemented and delivered within SEP.

## 7. The Wider Picture

We conclude by examining the wider significance of the project for mobile learning in sub Saharan Africa and exploring some of the wider but unanswered policy issues raised by mobile learning in developing countries.

The project raised a variety of questions and possibilities, for example:

- Inclusion – would SMS technologies within in-service teacher training enhance inclusivity
  - What about rural areas, different tribes and cultures
  - .... and what about women teachers?
- Development – do SMS and other mobile technologies have the potential to create a new paradigm for educational development
  - Must we re-enact Developed Countries evolution of ICT and technology supported learning?
  - Do mobile and handheld technologies enable an alternative to the centralised, massive, static and expensive technologies and infrastructures of ICT in the Developed World?
- Pedagogy
  - What pedagogic models can SMS support? Will SMS facilitate different styles of learning and conceptions of teaching?
  - How can SMS ‘blend’ with other formats and media? What are the affordances of these new technologies?
- Evaluation
  - What is the most efficient, appropriate, authentic, effective format for evaluating innovative mobile learning? What do we most need to know?

## Further Reading

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