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The 'new' new technology: exploiting the potential of mobile communications and open educational resources

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How to cite:

Power, Tom (2013). The 'new' new technology: exploiting the potential of mobile communications and open educational resources. In: Moon, Bob ed. Teacher Education and the Challenge of Development: a global analysis. Education, Poverty and International Development. Abingdon: Routledge, pp. 212–226.

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Version: Accepted Manuscript

Link(s) to article on publisher's website:
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CHAPTER FOURTEEN

**THE 'NEW' NEW TECHNOLOGY:
EXPLOITING THE POTENTIAL OF MOBILE
COMMUNICATIONS AND OPEN
EDUCATIONAL RESOURCES**

Tom Power

INTRODUCTION

Education is increasingly seen as ‘the’ core component of international development (UNICEF 2005); indeed Gordon Brown identified education as ‘the key to the ultimate development goal: the empowerment of the poor, and of the world’s poorest countries’ (Brown & Benn 2006). But there are multiple and complex challenges in providing free, high quality education to all the world’s children; in most developing nations, there are issues of grade repetition, low leaving age, teacher absenteeism, teacher shortages, building shortages, double shifts and large class sizes (Glewe & Kramer, 2005), as well as a predominance of under-trained or un-trained teachers (UNESCO 2005).

These challenges are often most acutely experienced in rural areas (Mulkeen 2005), where 70 per cent of the world’s poor live (FAO & UNESCO, 2003, p27). Of the seventy-two million children in the world who have no access to even the most rudimentary education (UNESCO 2007, p1), estimates suggest that around 80 per cent of these live in rural areas (UN 2006, p7). Rural teachers face substantial challenges beyond those encountered by their urban colleagues, including isolation, lack of access to reference and other teaching materials, and poor management and support. Indeed, for many, the prospect of teaching in rural communities is sufficiently difficult and daunting that trained teachers try to avoid rural placements or relocate to towns and cities and soon as they are able: ‘...people are going to kick against posting to the very places where their services are needed’ (Hedges 2002).

In poor rural communities across Sub-Saharan Africa and South Asia, there is a pressing need to increase both the number of teachers and the quality of teaching. In

order to achieve Universal Primary Education (UPE) by 2015, another 1.9 million teachers will be needed, with more than half of these needed in Sub-Saharan Africa (Education for All, 2011); some estimates have suggested figures approximately an order of magnitude higher (Global Campaign for Education, 2006). But increasingly, the focus of attention is moving from simply increasing the numbers of teachers, to improving the quality of teaching. ‘One of the most pressing, and neglected dimensions has been the critical issue of quality. The right to education is not merely the right to a place in the school-room, but the right to learn...’ (Global Campaign for Education, 2008).

There is a pressing need to consider how best to train teachers, in order to provide even a basic quality of education; models of Teacher Professional Development (TPD) must be able to operate at sufficient scale, pace and cost to provide the necessary numbers of teachers to meet the need, but must also adequately equip teachers with knowledge and skills such that their classroom practices create genuine opportunities for student learning, agency and growth. This applies equally to creating new teachers through pre-service training (PRESET), and to up-skilling the large numbers of currently unqualified or under-qualified teachers through in-service training (INSET).

Even if it were possible for conventional schools, colleges or universities to physically accommodate the number of teachers to be trained or up-skilled, traditional approaches take new or current teachers away from the classroom for significant amounts of time (Deane, 2006), potentially for up to four years.

There is also some evidence that centre-based ‘face-to-face’ training may not be particularly effective in changing classroom practices. Within the educational

research literature, there are very few examples of TPD programmes that are able to show evidence of improving students' learning outcomes (see reviews by Lawless and Pelligrino, 2007; Wilson & Bryne 1999). Whilst there are many other contributing or limiting factors affecting students' learning outcomes, one possible explanation may be that traditional TPD programmes have limited impact upon classroom practice, and therefore limited impact upon student learning activities and outcomes. For example, in reviewing the outcomes of long-term TPD for English Language Teaching (ELT) amongst rural teachers in Bangladesh, Rahman found 'most reform attempts have suffered from a lack of planning... not providing supportive resources... In spite of a general improvement in Teachers knowledge about ELT... there is little evidence of much difference in classroom practice' (Rahman et al, 2006. Emphasis mine).

As we enter the second decade of the twenty first century, there are many who would argue the need for a new architecture of teacher professional development (TPD), in order to train sufficient numbers of teachers to meet the challenges, and to adequately equip these teachers so that they are able to create spaces or settings in which quality learning activities may take place. Moon (2007) outlines possible foundations for such architecture, with four important assertions:

1. The 'bricks and mortar' institutions of twentieth century TPD cannot hope to meet the needs of the twenty first century
2. Most TPD will happen in schools, not in TPD institutions
3. To impact on student achievement, TPD will be practically focussed on improving the day-to-day work of teachers

4. New technologies, particularly new forms of communication, have the potential to transform professional learning.

The first three assertions beg the question ‘what might a programme of practically focused, school-based TPD look like?’, whilst the final assertion leads us to ask ‘how might new communications technologies support, enhance or transform such a programme of TPD?’

Power, Deane & Hedges (2009) describe a school-based model of TPD as a particular instance of Open and Distance Learning (ODL). They argue that a school-based ODL approach to TPD enables student-teachers to study in their own time, and allows them to keep their employment, continue to care for their families and to hold their responsibility in their community. Such models of TPD allow teachers in remote areas to participate, where-as attending a conventional course would involve long travel (often slow because of poor rural infrastructure), extra cost, and further time away from personal commitments and responsibilities. For these reasons, they argue such an approach is particularly suited to female students (Deane, 2006), possibly reducing barriers to, and improving representation of, women amongst the profession.

Walsh & Power (2011) offer an evolution of this idea, describing a school-based model of TPD not as an instance or ODL, but rather as a specific form of work-based learning. Participation in *new classroom activities* is at the heart of teachers’ professional development in this model, being the primary driver for transforming both their professional knowledge and practice.

<Figure 14.1 EIA's work based model to support changes in classroom practice (after Walsh & Power, 2011) – to be inserted around here>

There are two layers of support provided to teachers, to enable their participation in such activities:

- The first layer of support is always 'on hand' to the teacher while they are in their school; such support includes teaching resources to be used directly within the new classroom activities, and professional development resources for teachers to engage with in preparation for, or reflection upon, carrying out the new classroom activities.
- The second layer provides more traditional *support beyond school*, in the form of workshops and cluster meetings, providing an ongoing programme of training in CLT practices, and providing a forum for sharing, reflecting and problem solving amongst a wider group of teachers.

In such a representation of school based TPD, teachers learn primarily through carrying out new activities in their professional practice. They are supported in this by their peers (in school, and in local networks around their school), and through the materials and tools provided. This is not traditional 'open distance learning' as it is not primarily 'self study', nor is it traditional 'teacher training' in which the training and support is offered at a centre that is physically and conceptually 'distant' from the teachers context of practice: their classroom. Rather, in this representation of TPD, most of the teachers' learning is very 'close' to the context of their practice – their classroom and their school – and support is provided within that context, or close to it.

These examples provide some hints as to what a practically focused programme of school-based TPD might look like, which will be expanded upon further in the subsequent case studies. But what of the communications technologies: in what ways

might they have a transforming role within TPD? I suggest three distinct, but potentially inter-related roles for new communications technology:

1. Supporting the collaborative design of TPD course structure, content, activities and resources, enabling institutions operating in diverse contexts to collaborate (Power, Deane & Hedges, *ibid*), whilst retaining ‘authentic pedagogy’ (Leach & Moon, 2008) for their own student-teachers.
2. Supporting the delivery of, and participation in, TPD courses to student-teachers (Leach et al, 2005; Walsh & Power *ibid*), providing them with materials and tools for:
 - a. Teachers’ own professional learning, providing access to new subject, pedagogic and school knowledge (Banks, Leach & Moon, 1999), as well as tools for planning and reflecting upon teaching practice.
 - b. Integral use within new classroom practices with students
3. Supporting teacher professional networks (Leach et al, *ibid*; Power & Sankale, 2009).

There is a need to consider the deployment of ICTs in support of such roles with significant thought and care. Many approaches to the use of ICT in development have focused upon technology, rather than the social practices and contexts in which the technology is intended to be used; these are typically spectacular in their failure to deliver educational outcomes, with some going as far as to suggest projects which over invest in procurement of technology over development of content and practices should be subject to investigation (Pimienta, 2007). Beyond the mere financial

wastefulness of inappropriate uses of ICTs, some have suggested a more insidious effect: ICTs, particularly computers, are imbued with so many positive connotations that they may take on an almost totemic value, as symbols of ‘modern’ or ‘quality’ education. When *computers in schools* are deployed in ways that fail to deliver positive educational outcomes, this can do significant harm to the self-esteem of teachers and communities, and contribute to a culture of blame (Power & Porteous et al, 2009).

By contrast, the case studies considered in the next section both show uses of communications technology that are driven by the social practices being engaged in, and which are appropriate to the settings in which they are used. In the remainder of this chapter, I focus upon the first two roles identified above. Whilst the third role is well researched and evidenced (as computer mediated communication) in resource rich contexts, most current studies in development contexts are largely restricted to the somewhat limited affordances of SMS text messaging.

The following case studies illustrate how both the collaborative design and the delivery of practically-focused TPD programmes have been enabled through two particular forms of communication technology: Open Educational Resources (OERs) and mobile phones.

CASE STUDIES

Case study 1: Teacher Education in Sub-Saharan Africa (TESSA), and OERs.

‘Perhaps the most successful of all the OER projects we have heard about is TESSA, the consortium on mainly African institutions that are using OERs to empower teachers and change pedagogy in countries all over Africa’.

Sir John Daniel (2008)

TESSA represents Africa’s largest teacher education research community, extending across thirteen Teacher Training Institutes (TTIs) in Ghana, Kenya, Nigeria, Rwanda, South Africa, Sudan, Tanzania, Uganda and Zambia, together with international organizations. TESSA’s key purpose is to use the power of this Africa-wide consortium to improve access to, and raise the quality of, all aspects of teacher education and training. Specifically, the TESSA OERs (including text, audio and other media) focus on developing teachers’ classroom practice in the key curriculum areas of language, mathematics, science, social studies and the arts, and life skills. To achieve this, the TESSA consortium has developed an extensive range of high quality, multilingual OERs and systems. At their heart are activities for teachers to carry out in classrooms, to improve teaching and learning. The resources are designed to support all teachers, including those with little or no formal training.

The TESSA OERs provide a number of starting points for active experimentation within teachers’ own classrooms, the site of teachers’ learning. The activities extend teacher’s understanding of the fundamental principles of effective learning. They

offer connections between ideas, strategies and subjects, and emphasise the importance of teacher's own reflections on their experiences.

Although some teachers have accessed TESSA OERs directly through the project website (www.tessafrica.net) and used them in their practice, most of the almost half a million participating teachers do not have regular access to computers or the Internet. Instead, TESSA teachers typically come across the materials in print, as an integral part of the training they receive through their participating TTI.

‘I have enjoyed using the materials because they make classroom activities simple and easy...Pupils are now improving in their performance and it has helped me improve my teaching skills.’

(Student teacher, Nigeria)

TESSA, using communications technologies and OERs primarily at the level of institutional collaboration and course design, required only minimal access to computers and the internet for those designing and implementing the materials, and no access to technology for participating teachers.

What is particularly interesting is the way in which the use of OERs enabled TTIs to collaborate and pool their strengths, whilst at the same time being able to adapt the materials to their own particular settings and purposes. Collaborative materials creation started with an initial core of study units across the five curriculum areas. In each curriculum area, a multi-national team of authors worked to create the first iteration of the TESSA materials. Teams drew on case studies, experiences and existing resources from across the region. Curriculum authoring teams were facilitated by a team leader from an African institution, supported by a partner from

the Open University, who worked together to ensure consistency and progression within the materials.

These draft materials were refined through consortium workshops and developmental testing in each of the nine countries and subject to rigorous quality assurance procedures. A key feature of this common core is its highly structured nature. This is designed to enable efficient creation of materials, as well as cost-effective and easy localization for particular contexts.

‘The TESSA materials are easily located in the environment around us without having to travel long distances at high cost, thereby having first hand experience at less cost’

(Teacher, Tanzania)

The original core materials have then been contextualized or localized into ten country-formats, including versions in Arabic, French and Kiswahili. The localization, undertaken by teams of teacher educators in each country, adapted the materials to reflect the local place and culture, curriculum, school environment and language. In total the TESSA consortium has created seven hundred and fifty study units.

The capacity and flexibility of TESSA OERs allows for a wide variety of implementation models, for both pre- and in-service courses and at informal, institutional and national levels. Through the TESSA collaboration, all consortium institutions have well developed plans for integration and use of the TESSA OERs into a range of different courses and programmes, involving up to 500,000 teachers in 2009 to 2010.

‘Using these resources is the best way to teach... I have used group discussions which resulted in good responses from my students, who have thoroughly understood the lessons... I have found myself as a teacher...’

(Student teacher, Sudan)

Case Study 2: English in Action (EIA) and mobile phones

English in Action is a 9 year DFID funded programmed, requested by the Government of Bangladesh, to improve the English language competence of twenty five million people in Bangladesh, with approximately half of those being adult learners in the general population, and half being students in primary and secondary schools. The BBC World Service Trust is delivering broadcast, newsprint and online services for adults; the Open University is working with local partners to deliver school-based TPD, with overall project management by BMB Mott McDonald.

Materials for adults are provided through a low cost Interactive Voice Recognition (IVR) service ‘BBC Janala’, available through any mobile phone, and also through the mobile website www.bbcjanala.com. Janala, which provides brief English language learning audio clips and activities on demand, has proved extremely popular, with over 750,000 calls being made to the mobile phone service in its first month alone (December 2009). Janala currently has over two million users.

Whereas in Janala, EIA uses the mobile phone to provide breadth (providing small amounts of audio content to large numbers of people - anyone with a mobile phone), in it’s TPD activities, EIA uses the mobile phone to provide depth (providing extensive content in audio and video, but only to participating teachers).

For primary teachers, principal teaching resources are a series of audio materials on the Nokia C1-01, a cheap and relatively basic mobile phone developed primarily for African and South Asian markets. The audio resources are pre-loaded onto a micro-SD memory card, providing several gigabytes of storage capacity; this enables EIA to provide audio resources designed to accompany every lesson in the national textbook series, for all five years of the primary curriculum. In total, each primary teacher has access to 355 audio files on their mobile phone, including dramatizations, songs, stories and a cast of characters from a fictional school. In some ways, the audio resources for primary are similar to those that might be used in Interactive Radio Instruction (IRI), but with much greater emphasis on teacher and pupil agency, creativity and independence than typical IRI materials. Teachers have a printed ‘activity guide’ for each year, that suggest a range of activities for each lesson, to do before and after using the audio resources; these activities have also been developed for every individual lesson. Additionally teachers have associated ‘hard copy’ classroom materials, including posters and flashcards. All of the materials are designed to accompany and extend the lessons in the national textbook series, and to help teachers adopt a more communicative approach to covering the proscribed content.

For secondary teachers, the main teaching resources are also audio files, representing all of the English readings within the textbook series, and enhanced by additional stories, songs and other materials; the secondary materials bear no resemblance to traditional IRI materials, and are simply resources for teachers to use in classroom activities. To this extent, the mobile phone plays the role of ‘the classroom in your pocket’ (Power & Thomas, 2007), providing a rich range of classroom resources that teachers can carry ‘in their pocket’.

In addition to the classroom resources described above, there are further teacher professional development materials, provided in audiovisual form on the mobile phone. These include examples of ‘classroom language’; videos showing suggested activities, making explicit possible approaches to classroom management and organization; and examples of techniques being carried out effectively, or problematically, for teachers to see and discuss. To this extent, the mobile phone acts as the ‘trainer in your pocket’ (Walsh, 2011).

The first cohort of 700 EIA teachers (2010 – 2011) took part in an extensive research, monitoring and evaluation programme seeking to:

1. understand views and experiences of teaching and learning English
2. monitor changes in classroom practice
3. independently evaluate any gains in the ability to communicate in English.

Studies focusing upon teachers included quantitative observations of almost all teachers’ classroom practice, together with in-depth observations, interviews and questionnaires with approximately a fifth of the teachers taking part. In addition to this, over 1500 secondary students responded to a questionnaire, and 900 students took part in individual and group interviews.

Findings indicate some success in changing views on English language teaching and learning, establishing the necessary pre-conditions for a more communicative approach: most teachers now agree that the focus of their English classes is on communication, explaining grammar as necessary to aid understanding (EIA, 2011a).

Furthermore, there is strong evidence of basic changes to classroom practice, including substantial increases in the use of spoken English (now accounting for 71 per cent - 88 per cent of all speaking in English lessons, by teachers or students, across primary and secondary phases), with student talk time increasing from minimal levels to approximately a third of all lesson time (EIA, 2011b).

Perhaps most strikingly, there is also strong evidence of improvements in teachers and students proficiency in spoken English. Assessors from Trinity College carried out diagnostic (GESE) interviews of English language competence, providing a comprehensive baseline and post-intervention assessment of almost half of the teachers and over a thousand students. Findings show statistically significant improvements in teachers' and students oral / aural communication in English language (EIA 2010a, 2010b, 2011c), as shown in figures 14.2 and 14.3.

<**Figure 14.2 Primary student's GESE pass rate pre-/post- EIA** - to be inserted around here>

<**Figure 14.3 Secondary student's GESE pass rate pre-/post- EIA** - to be inserted around here>

Fig. 3: Secondary student's GESE pass rate pre-/post- EIA

In 2012, a further five thousand teachers will be begin TPD with EIA, making it one of the largest ELT TPD projects in the world. By 2017, EIA aims to have trained over 100,000 teachers in Bangladesh.

ANALYSIS

In the first case study, we see that OERs have provided a mechanism through which TTIs from diverse countries, languages and cultures have been able to work together to collaboratively develop ‘practically focused’ TPD activities and materials. I would suggest that working in such a collaborative manner has enabled each institution to contribute to the production of a quantity and quality of materials and activities that would have been almost impossible for any individual institution to achieve. But the flexible nature of OERs has meant that whilst the essence of each module or activity would be the same, in whichever institutions’ materials a teacher might encounter them, much of the exemplification and illustration has been adapted to fit the particular culture and context of that institution. However, whilst the power of OERs underpins much of the design and development of TESSA resources, and any teacher may access the resources with access to the Internet, most teachers using TESSA materials do so through print materials, made available through their TTI.

Since the early days of TESSA materials development, a number of other OER initiatives are being developed for African educators, perhaps most notably OER@AVU (<http://oer.avu.org>), a project hosted by the African Virtual University, and recently voted ‘best emerging initiative’ in the OpenCourseWare ‘People’s Choice Awards’ (Education-Portal, 2011). The Commonwealth of Learning is also currently developing materials for a new project ‘*OERs for ELT*’, working in partnership with institutions throughout Africa and the Commonwealth to develop open educational resources (OERs) in multimedia and traditional text formats to support school-based training for teachers working in the upper basic education sector.

However, whilst the power of OERs to support the collaborative development of practically-focussed, school-based TPD programmes is increasingly recognised, most of the teachers who might benefit from using to such OERs, at least in Sub-Saharan Africa and South Asia, are currently unlikely to have individual access to the tools (computers and the Internet) that these OERs are currently designed to be accessed through. Instead, teachers typically access the OER materials in traditional printed text formats, or through occasional use of internet cafes or IT centres within TTIs.

By contrast, EIA has designed mutli-media materials specifically to be accessed through the communications technology that most of the target audience do have regular independent access to: the mobile phone. It is evident from the literature that mobile technologies offer significant flexibility in relation to ‘anytime / anywhere’ learning (see Naismith et al., 2004, Leach et al 2005). Some have also suggested that language learning may be one of the disciplines particularly likely to benefit from widespread ownership of mobile devices such as phones and media players (e.g. Kukulska-Hulme, 2006, Power & Shrestha 2010).

Yet whilst the use of mobile phones for TPD may hold significant promise, particularly in development contexts, it is largely absent from the literature. Most studies demonstrating the potential of mobile phones are outside the field of education, with notable exceptions such as the work of Hendrickz (2006) or Sankale (Power & Sankale, *ibid*), both of whom have explored the use of SMS for student support.

EIA has powerfully demonstrated at least a ‘proof of concept’ for a fuller use of mobile phones as a learning technology within school-based TPD programmes. EIA is already operating at large scale, at least by the standards of educational studies, and

should soon be operating at a scale proportionate to the ELT TPD need in Bangladesh.

The question I want to explore in the final section of this chapter is whether or not the power of OERs and mobile phones, might be combined in supporting TPD within a development context. To address this question, I will hypothetically apply aspects of the TESSA and EIA methodologies to the current ELT TPD needs of South Sudan.

APPLICATION

Why South Sudan? As the most recent nation state to be recognized by the United Nations, emerging from the longest running conflict in Africa, with arguably one of the poorest performing education systems in the world, the challenges facing South Sudan exemplify issues that are common to many settings in Sub-Saharan Africa and South Asia. I have also had opportunity carry out fieldwork immediately before and after South Sudan's very recent independence, reviewing some of the current donor funded education initiatives and scoping the ELT needs for possible future funding (Power & Simpson, 2011).

In a listing of net primary enrolment rates, South Sudan is ranked second lowest; and for secondary enrolment, South Sudan is the lowest ranked of 134 countries, with only 34,000 secondary students in the country. Half of all 18 year olds have never attended school. The situation for girls is predictably worse, with just 37 per cent of primary students and 12 per cent of teachers being female. In a system that should offer eight years of primary education, only 13 per cent of schools offer the whole primary cycle. 60 per cent of teachers did not complete primary education themselves. (UNESCO, 2011).

Many schools were abandoned or damaged over decades of fighting. Figure 14.4 below shows a typical classroom in such a school. The classroom is still in use, for primary grade 4 children. You can see the teacher being interviewed in this class at <http://youtu.be/H8cFomBMdVg>.

<Figure 14.4 Classroom damaged by fighting and neglect, but still in use for teaching 47 primary children in P4 - to be inserted here>

In most states there are over 500 school aged children for each classroom; in Jonglie state, there are over a thousand children for each classroom; in Unity State, there are over two thousand children for each classroom. The national Education Management Information System (EMIS) estimates that of the 24,000 primary teachers supported by the Ministry of Education, 96 per cent have no formal teaching qualifications, and 63 per cent have had no teacher training of any kind (Power & Simpson, *ibid*).

In the period following Sudanese independence in 1956, English played a role as the medium of instruction in most schools in the southern states until, under immense pressure from Khartoum, it was supplanted by Arabic in the mid-1990's. In the newly independence South Sudan, the constitution refers to English 'as a major language of South Sudan', positioning English as an official working language, and as the medium of instruction in schools. Yet South Sudan is linguistically very diverse: although four major ethno-linguistic groups (Dinka, Nuer, Zande and Bari) account for two-thirds of the population, there are some fifty mother tongues present. In addition, there is a continuum of Arabic running from north (Khartoum Arabic) to south (Juba Arabic, a creole).

Although the language education policy is for children to be schooled in two languages – the mother tongue and English –there may be insufficient learning materials or trained teachers to implement either aspect of such a policy effectively at this time. Whilst utilising English may represent the easiest choice for government, in so far as it allows for a uniform set of teaching materials to be produced in a single language for the entire population, most teachers do not have adequate English Language skills to benefit from pre-service or in-service training related to the new curriculum, or to engage with new curriculum materials written in English.

The lack of English language skills amongst the teaching workforce is likely to be a significant obstacle to implementing the new curriculum. In four of the ten states (Upper Nile, Western B.E.G., Unity and Warap), up to 80 per cent of teachers are reported to be Arabic trained, with very low-level English Language skills.

Windle Trust International (WTI) is the largest provider of ELT TPD, currently working with approximately 3,000 teachers. WTI use face-to-face training with groups of 25-30 teachers, typically running over 3 months, during which time, teachers attend two hours training at the end of each school day. From observation, much of the training provided appears to be in the form of ‘grammar translation’; the teachers I spoke to found it difficult to identify any changes in their practice as a result of the training.

Participating teachers (many of whom are ‘volunteers’ receiving no salary from the state and only small ‘contribution’ from the community via school fees) typically have significant journeys to and from the training each day. WTI offer support through the funding of bus-fares or the provision of bicycles. Most of the teachers I spoke to at one WTI training session had spent around two hours cycling from their

schools to attend the training; this suggests teachers are spending approximately twenty hours a week travelling, in order to participate in five two-hour training sessions, after finishing their morning teaching.

<**Fig 14.5 WTI Teachers bicycles, outside a training session** – to be inserted here>

The South Sudan Interactive Radio Instruction (SSIRI) service, provided through the Education Development Centre, has also worked with a cumulative total of about three thousand teachers, although the project director notes that there is high ‘churn’ amongst the teaching workforce, believing many who had participated may have moved out of the education system.

SSIRI hope to participate in the English language component of USAID’s forthcoming *Teacher Professional Development Initiative* (TPDI), which is likely to reach about one third of the current teaching workforce (9,000 out of 26,000) over the next 3 years.

According to the national EMIS, South Sudan has approximately two million children of primary school age, and 26,000 primary teachers, including volunteers. Therefore, to reach the government target ratio of one teacher to fifty students, 14,000 additional teachers would need to be trained. There are some notable TTIs involved in INSET, including Yei, Kotobi, and there is an established English Language Centre at Juba University, but current rates of training are barely above replacement, and are insufficient to begin to close this gap within the foreseeable future.

In addition to this, a further one million school aged children are expected to be added to the population in the coming years, as refugee families return to South Sudan

following independence. This would suggest a fifty per cent increase in the teaching workforce, just to maintain current student-teacher ratios.

So, in such a context, might practically focused school-based TPD, OERs, and mobile phones be of any relevance?

I think perhaps the most important thing to note is the significance of Moons' first assertion: in such a context, traditional 'bricks and mortar' institutions, and 3-4 year full time teacher training courses, are simply incapable of meeting the scale of need presented. Such an approach alone would struggle even to maintain replacement, and cannot realistically hope to either keep pace with likely student population growth, or reduce the student teacher ratio. The need for an alternative architecture for TPD in South Sudan is both real and pressing.

Some form of school-based TPD seems essential, in order to reach the numbers of teachers required (both INSET and PRESET), within a reasonable timeframe and cost. A school-based programme of TPD may save teachers enormous amounts of time, vastly reducing opportunity costs, compared to centre-based training, freeing up perhaps 20 hours of teachers time per week, compared to the most common current format of ELT TPD. Such an approach may also be significantly more likely to result in improved classroom practices, than current TPD initiatives.

At the moment, approaches appear quite piecemeal – there are a number of different donors, projects and interventions, all with various strengths and weaknesses, but all tackling similar challenges. If the various TTIs, NGOs and donors could be brought together, in a similar way to the collaboration within the TESSA consortium, there is a possibility that they could all 'punch above the weight' of any individual institution

or project, whilst significantly lowering the costs of materials development, and thereby increasing the value for money, of their own TPD activities. Yet as demonstrated by TESSA, the flexibility of OERs may allow the same ‘core’ of materials to be adapted to the needs of centre-based full time PRESET in TTIs, school-based INSET supported by NGOs, and even school-based PRESET.

The growing ‘OER movement’ in Africa means that the institutions and projects operating in South Sudan need not take on such challenges alone. They could potentially also draw upon the strength of other institutions across Africa and beyond, perhaps through existing OER networks such as TESSA, OER@AVU, or COL.

EIA demonstrates the potential of the mobile phone, as a delivery mechanism for bringing audio visual TPD and classroom materials into the hands of rural teachers. Within an appropriate context of support (see fig 1.), these materials have contributed to substantial changes in classroom practice and learning outcomes. If donor funding were used to support the participation of Sudanese institutions and NGOs in developing OERs for ELT and TPD, the resulting AV materials should be developed from the outset with the intention of being used flexibly by teachers, through their mobile phones, for ‘anywhere / anytime’ learning, and for use with students. This would mean that teachers and students could have exposure to appropriate model language, and new classroom practices, directly in their school setting.

SUMMARY

The argument for a ‘new architecture’ of TPD for development seems compelling; in some contexts, such as South Sudan, it is hard to see how traditional twentieth century approaches to teacher training could provide a response that is appropriate to the scale

of need. At the end of the first decade of the twenty first century, there are a number of large scale projects emerging, that are beginning to provide some indication both of the nature of this new architecture, and the potential scale and impact that such approaches may be capable of.

School-based approaches to TPD, which leverage the power of OERs to facilitate institutional collaboration, and of affordable mobile phones to facilitate delivery and support new classroom activities, have the potential to reach very large scale (TESSA materials are currently reaching approximately half a million teachers; EIA aims to reach over ten million students), whilst driving down per-capita costs of training, in comparison to predominantly face-to-face methods.

However, whilst reaching large scale, TESSA also shows the importance of ensuring local relevance of TPD materials: that a ‘one size fits all’ approach is neither desirable, nor necessary. In EIA, the TPD materials are *highly* localized to the particular culture and context of the Bangladeshi teachers, and very tightly adapted to the national text book series. OER collaborations may provide a means for national institutions, NGOs and projects to tap into the expertise and effort of wider Pan-African and global endeavors, yet produce a materials that have the ‘flavour’ of their own country.

Of course, the most significant issue for TPD, is whether or not it is effective in changing the knowledge, beliefs and practices of teachers, and through that, the learning outcomes of students. EIA at least demonstrates a ‘proof of concept’ for practical school-based TPD being effective in changing teachers’ minds and practices, and students learning, at scale.

Further work is needed to continue the conceptual and practical development of this new architecture for TPD, through projects and collaborations operating at appropriate scale to deliver impact.

Current OER projects for TPD in African context (e.g. AVU, COL ELT) should research and develop ways that their AV materials, currently requiring computer access to internet, could be adapted for access by teachers through mobile phones.

Future projects must ensure they have robust, independent research, monitoring and evaluation, to be able to demonstrate impact on classroom practice and learning outcomes, and further work is required to explore the comparative costings and cost effectiveness of school-based TPD against traditional face-to-face methodologies.