Project summary

AIMSSEC (www.aimssec.za) has previously run mixed mode teacher development courses for South Africans from deprived areas, with sustained success (Joubert and Kenny 2018; Golding, 2018). This project aimed to adapt and evaluate the foundation such course for use with mathematics in East Africa. There are obvious issues of context-specific content and framing, including effective 'low tech' delivery and approaches to overcoming the digital divide. The University of London Centre for Distance Education supported research to focus on the adaptation and efficacy of distance learning resources for this context and purpose.

Introduction

METEA ('Mathematics Education ط'

The research in particular probed the student (mathematics teacher educator) experience, progression and achievement, the programme development, technological capability and innovations made, and the dissemination of good practice. It focused on the technological aspects of the development and evaluation of a 'solution study' relating to East African capacity in effective mathematics functioning for the 21st-century. The lead researcher was the author of this report. She was supported by a local researcher and teacher educator, Marjorie Batiibwe, from Makerere University, Uganda, so supporting also the development of local mathematics education research capacity.

Background

African attainment in mathematics is very low in global terms (e.g. Bethell, 2016), and that severely restricts access to economic and personal thriving in a global 21st-century. The researcher had volunteered with the South Africa-based AIMSSEC (www.aimssec.za) for ten years, developing research-based materials and teaching approaches for mathematics teacher in-service courses that build on an intensive 6-10 day face to face foundation with 3 months' supported distance learning as teachers develop, evaluate and adapt the promoted in-class approaches to modern mathematical imperatives. Careful initial selection of applicants as local (maybe potential) leaders in education means they have then successfully used these to impact local provision. METEA is responding to East African community priorities (e.g. the global mathematics education ICMI 'capacity network building project' (CANP) working in East Africa https://www.mathunion.org/icmi/activities/developing-countries-support/capacity-networking-project-canp) to now prioritise the development of East African mathematics particularly those working at upper primary and lower secondary levels.

Classroom-based sessions focused on pedagogies and mathematics learn with active participation by learners and focused on meaning- and connection-making. IT sessions built on participants' existing resources and focused on email communications and harnessing of web-based resources for professional purposes, and in particular the materials available 4 n ל

building on other work she had done with teachers and with policymakers in East Africa and elsewhere, and on local documentation and literature (e.g. Halai and Tennant, 2016).

We know that in synchronous webinars mathematics teachers learn mathematical content far more effectively than they do new pedagogical approaches (Golding and Bretscher 2018), so the proposed approach needed very careful design and longitudinal evaluation if it is to be built upon. Further, pedagogical approaches for empowerment need to be very clearly communicated during face to face elements of the course, so as to compensate for the limitations of distance learning for pedagogical change.

The approach

The focus course offered places to ten primary teacher educators from across East Africa (at least two each from Uganda, Tanzania, Rwanda and Kenya), as well as 16 primary teachers and 28 lower secondary teachers, though the reported research focused on the primary teacher educators, some of whom were school-based and some, college based. All participants were fully funded by METEA for all elements of the course, and as part of their post-course learning and formative assessment undertook and reported on action research as they used and adapted the resources and approaches for their own context. All participants were supported on the distance learning part of the course by a tutor: for the teacher educators, this was the lead researcher. The additional funding from CDE allowed her to devote time to more detailed rigorous analysis, synthesis and probing of the outcomes, including via an additional participant survey (as an App) and small number of spaced case study interviews focused on the technological affordances and constraints of the locally available technology, for these purposes – and contributed to the dissemination of those. Primary teacher educators (typically educating teachers of 6-14 year olds in East Africa) are the group whom the East African CANP have identified as having the greater potential for enhanced impact.

Previous attempts at distance synchronous communication with East African teachers have proved challenging (e.g. Golding 2018), but alternative approaches such as surveys are known to typically yield less rich data, especially in a second language, even in the ideal scenario where respondents know the questioner, as they will here. One area discussed with teacher educators face to face, was what technology was best suited for the espoused deep ɑthe great

supplemented by in-depth audio-recorded and transcribed interviews conducted with one school-based MTE.

Findings

The intended curricula across East Africa have something in common with one another, but are not well aligned one with another in terms of target year group. However, it was possible to focus on material common to all primary curricula. The approaches used in South Africa were very well received and assignments/reflective journals showed them often interpreted in ways aligned with intentions, although language remained an obstacle through all aspects of the course for Tanzanian participants, who teach in Swahili, and also for Rwandans, only recently transferring from French to English as language of instruction. As in South Africa, of the pedagogical intentions so

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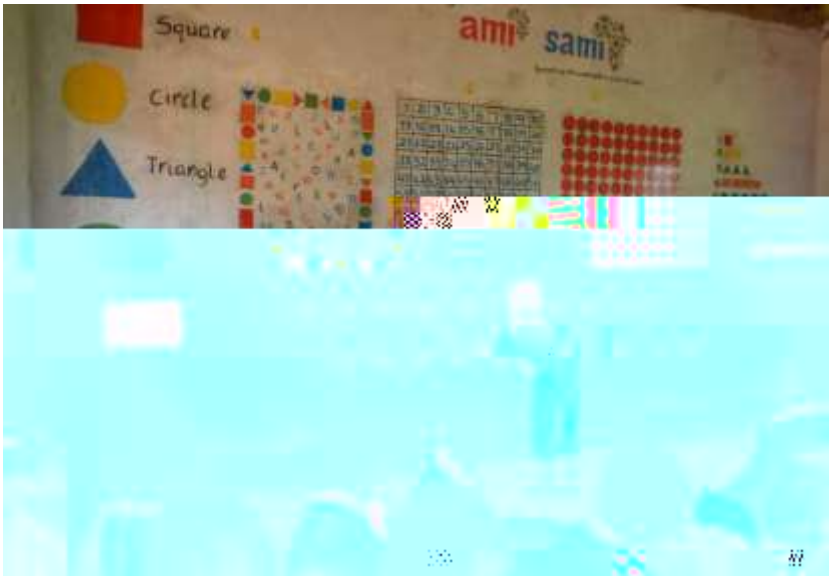
complete the assignments, citing pressure of other work, but neither had shown a deep capacity for transforming course experiences into sustainable local practice for their context. Others showed a variable grasp of related ideas, but sustaining those at a distance and without active local support is challenging, even in better-resourced and -aligned circumstances (e.g. Golding and Bretscher, 2017).

Five MTEs were, from data, able to profoundly re-envisage their contextualized teaching and teacher development to accommodate practices that deeply reflected course-valued approaches, course approaches transferred to planning for learning, and to active, meaning-making collaborative tasks. These participants were able to further develop such capacities between assignments 2 and 3. Where there is an impact on teachers at any stage of their career, there is the possibility for a related impact on primary learners, which is the ultimate goal. Teacher training systems in East Africa do not, though, currently support such approaches and longer-term impact is likely to be diluted unless ways can be found to sustain a supportive community of practice that values those – or a change in policy. East African policymakers, and especially those from Uganda, observed and claimed positive impact from the course, and ways are being sought of following those up: for example, the Ugandan Ministry of Education would like to see the course run for

teacher educators from all their primary training colleges, accompanied by local 'lead teachers' who would support embedding locally, since the serendipitous learning group of teachers mixed with

teacher educators was clearly highly productive. The limitations of course include the financial.



An impact on ten MTEs across East Africa is of course a drop in the ocean, yet assignments and other correspondence show strong evidence for wider impact on practicing and training teachers, as well as on large numbers of children in schools. Such activity of course embeds new practices in course participants, as well as spreading it more widely: the challenge, as above, is in sustaining that when it is often counter-cultural, and might not show short-term gain in valued measures. However, some participants, both school-based and college-based via their teacher trainees in school placements, are claiming fairly immediate impact on children's learning, and evidence this derives from both a move to valuing meaning-making, and

Acknowledgement:

References

Bethell, G. (2016). World Bank. Report No: