Supporting Elementary Mathematics Education in Rural Tanzanian Communities: Developing Relationships and International, Interdisciplinary, Cross-Sector Partnerships

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Introduction

Recognizing that “social innovation cannot be achieved by private action alone” (International Round Table on Social Innovation, 2010), the purpose of this paper is to describe the processes used to build relationships and develop an international, cross-sector, interdisciplinary partnership to address the need for primary mathematics teacher development in rural and remote communities in Tanzania (hereafter known as the project).

By the end of the 20th century the quality of education in Tanzania had reached a crisis (Wedgewood, 2007). The vast majority of children fail mathematics in the National Primary School Leaving Examination (Wangeleja, 2007), 25% of children do not attain a basic level of numeracy (Mrutu, Ponera and Nkumbi, 2005), and 1 in 10 children complete primary school with no basic mathematics skills (Rajani, 2010). Many reasons have been advanced to explain the performance of learners in mathematics. The focus of the project is on those factors related to the teacher: mathematics teacher shortages, poor qualifications among mathematics teachers (completion of Form 4 (grade 11) followed by two years teacher training college), low morale, and teaching methods which encourage pupils to learn by rote. These factors are intensified in rural and remote communities. Teachers who work in rural environments experience great disadvantage. They lack basic resources more common in urban areas (housing, electricity, water), have poor access to teaching resources and few opportunities for professional development. Not only is it difficult to place teachers in rural and remote areas, it is almost impossible to place well-qualified mathematics teachers. Given this serious problem of the lack of well-qualified mathematics teachers, we believe that a first step is to enhance the professional and mathematics knowledge of teachers who currently live and teach in rural community schools. The quality of children’s educational experience is critical for social and economic prosperity and UNESCO’s Millennium Goals for Primary Basic Education (2000) cannot be met without addressing the innovation needed to enhance the quality of mathematics teaching in rural and remote communities.

Social innovation requires “new forms of collaboration, including “co-creation” and “co-production” among citizens and institutional actors” (International Round Table on Social Innovation, 2010, p. 1). In our case, “action” is through research studies, policy analysis and development, and teacher development strategies and activities. The partnership we are developing uses a phased activity (Simmt, et. al., 2010) approach designed to facilitate learning
opportunities through dialogue in local contexts and creates opportunities for education, government and nongovernmental organization stakeholders to partner with communities at the national, regional, district and school level to learn with and co-create innovative, effective and sustainable strategies and models for in-service teacher development in rural communities.

The Phased Activity Approach

The phased activity approach (see Figure 1 for an illustration) involves international, cross-sector, and interdisciplinary partners and partner activities framed by two distinct but compatible perspectives. The first is an Indigenous approach to working with communities, where the development of relationships, emergent but shared concerns, and respect for both the indigenous knowledge of the local community and the academic knowledge of the university are valued (Glanfield, Donald, & Sterenberg, 2007; Poirier, 2007). From the work of Canadian Indigenous and non-Indigenous researchers (Glanfield, Donald, & Sterenberg, 2007; Poirier, 2007) we know about the significance of establishing relationships with communities based on communal concerns (in this case, for children and youth’s mathematics education) through authentic dialogue. The wisdom traditions of Indigenous peoples teach us that authentic dialogue is significant. Authentic dialogue is a traditional practice in Indigenous communities and the means by which decisions and ways of working together are negotiated. This authentic dialogue honors the contributions and roles all participants play in collaborative work.

![Figure 1: Phased Activity Approach](image-url)
The second frame for the approach is complexity theory (Davis & Sumara, 2008). From a complexity perspective we know that the emergence of a collective learning system that co-creates knowledge requires a number of conditions (Davis & Simmt, 2003). In particular we look to enhance the diversity of partners, ensure shared experiences among the partners, create spaces where ideas can bump into each other, take advantage of the various interests and abilities that partners bring to the group, and promote decentralized control in order work together on a common concern.

Of particular importance to the partnership is learning how to create and sustain primary teacher development in ways that honor both the community traditions, practices and knowledge and the human science research traditions, practices and knowledge. The phased activity approach offers new possibilities for innovating teacher development policy, strategies and models for rural communities.

The relationships formed and the approach developed co-emerged from conversations among people committed to enhancing the education of children in rural communities. In this case the partnership began when Glanfield learned about the Tanbur African Aid Society (TAAS) through a social activity where she and the president of TAAS began to talk about the professional development needs of teachers in rural Tanzania. From that point the visioning began and a network of relationships was actively sought among people interested in development work in mathematics education in rural communities and in Tanzania. Glanfield, Donald, & Sterenberg’s (2007) research points to the significance of relationship building through dialogue in rural settings. This authentic dialogue honors the contributions and roles all participants play in collaborative work. The collective and a joint focus co-emerged from dialogue.

Working from the sensibility that authentic dialogue is essential for community-based work four Canadian researchers along with the president of TAAS and three colleagues from a Tanzanian university visited rural regions and communities in Tanzania in August 2010 to continue our conversations and to stimulate relationships with the local peoples, leaders, and teachers. The eight individuals used that time together to share and learn about each others’ interests and concerns related to primary education in rural and remote communities and to meet with Tanzanian education stakeholders at the national level. In a three-week frame the group of eight also met with people in regional and district offices of education, rural primary
schools, teacher colleges, and universities. Those meetings were very successful in a number of ways. The group observed complexities and uncertainties in a national education system and governance structure that makes teacher education a problem in the country; learned of the multilingual classroom and the problems teachers encounter in that context; and identified three local initiatives that were making a positive difference for teachers and learners in rural schools: (1) a university with programming for rural teacher development; (2) a district education office leadership focused on teacher development; and (3) the teachers in a rural school focused on their students’ learning of mathematics.

We believe the partnership, which now includes a second university in Tanzania, a Tanzanian national education organization, and two nongovernmental organizations, has the potential to be a collective learning system. The partnership demonstrates diversity/specialization, shared experiences, decentralized control, and the possibility for neighboring interactions. To illustrate: partners bring diverse interests and skills such as mathematics teacher education, literacy, research, governance, and rural development. With their diverse interests comes the ability for partners to specialize and work on specific aspects of the project. In order for the co-creation of knowledge to emerge there is a need for common interests, concerns, and experiences. Preliminary work in Tanzania brought people together and provided the partners with not only common experiences but the assurance that we share enough in common for the partnership and the phased activity approach to work. Also needed for the partnership to become a collective learning system is the need for decentralized control. The phased activity approach decentralizes control by taking advantage of the diversity of specialization and different experience level of the individual partners. We have built in yearly meetings where the partners come together to share their findings and work on the next stage of the project. Those meetings also include people other than partners who add diversity to the partnership. In the yearly meetings the opportunity for interactions between partners and other individuals will be emphasized since it is from those neighboring interactions that the co-creation and emergence of new knowledge will happen.

The phased activity approach of the partnership facilitates learning opportunities through authentic dialogue in local contexts and creates opportunities for education, government and nongovernmental organization stakeholders to partner with communities at the national, regional, district and school level to learn with and co-create innovative, effective and sustainable
strategies and models for in-service primary mathematics teacher development in rural and remote communities in Tanzania.

The partners in the partnership bring diverse interests and skills, such as mathematics teacher education, literacy, governance, research, and rural development. Partners from government agencies, higher education, and aid organizations (nongovernment organizations) pursue relationships with regional and district school administration, as well as teacher colleges, schools and communities to work together to co-create policy, strategies and models for in-service teacher development.

The partnership builds leadership capacity by decentralizing control and taking advantage of the diversity partners bring to the work of the partnership. We make the assumption that leadership exists in the community and that innovation will emerge from understanding successful leaders and successful practices that exist in the communities. Truly innovative practices will only be of value to a community if they are sustainable and effective, hence they must engage local knowledge and expertise.

Some Final Thoughts

Years of foreign aid and the UNESCO Millennium development goals could be seen to be partly responsible for most children participating in primary education in Tanzania. In recent years international aid organizations have been partnering to pool their funding to make a bigger impact in Tanzania. This has been an important step towards social innovation. However, there is still much more to be done.

Poor performance in mathematics in primary schools in Tanzania has existed for many decades (Eskola, 2009) despite various efforts made to address it. Cognizant of the existence and extent of this problem, Tanzania has made various efforts to improve the performance of students in the subject. Efforts to promote mathematics performance in Tanzania have included: liberalization in publishing books, including those for mathematics; undertaking in-serving teacher training (though very poorly implemented); increasing salaries for secondary mathematics and science teachers, which is a very recent strategy; and conducting seminars for mathematics teachers. However, despite these efforts, performance in mathematics in primary schools continues to be poor.

The lessons learned from this partnership and the phased activity approach will contribute to the international conversation on how partnerships with communities are key to
addressing complex social issues such as the performance of primary school children in mathematics. The work will also inform the role educational researchers can play in cross-sector and interdisciplinary partnerships to serve the public good and enhance education in rural and remote communities. Finally, this work will inform policy makers on ways in which aid can be leveraged with human and institutional resources through cross-sector, interdisciplinary partnerships.

References


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Presenters:

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- Florence – how we started
- Joyce – context of the work
- Elaine – description of the model
Partnership Development to Research Possibilities for Primary Mathematics Teacher Development in Rural and Remote Communities

**Phase One**
- Governance study
- Study of University ME and Certificates
- Study of District Education Officer Innovations
- Study of Successful School
- Study of Multilingual Issues in Teacher College Classroom

**Phase Two**
- Research symposium and in-service education prototype workshop (all participants)
  - Tanzania Ministry of Vocational Training and Education
    - Tanzania Institute of Education
    - National Examination Council
    - Teacher Education College Universities
    - Non-governmental agencies
  - Develop PD model(s) for rural primary in-service teachers
  - Test PD models for professional development for rural primary in-service teachers

**Phase Three**
- Evaluation and knowledge mobilization
  - Part 1: Symposium and evaluation workshop in Tanzania
  - Part 2: Research Symposium in Canada
Thank You!