Educational Journal of Living Theories

Volume 2(3): 324-364
www.ejolts.net
ISSN 2009-1788

How can I encourage multi-stakeholder narrative and reflection on the use of ICT in Teacher Professional Development programmes in Rwanda?

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Abstract

This is an action research enquiry into how I can improve my practice to encourage multi-stakeholder narrative and reflection on the use of Information and Communication Technology (ICT) in Teacher Professional Development (TPD) programmes in Rwanda.

I examine the complexity of the ICT-TPD landscape in the Africa Region. I describe two action research cycles in which I attempt to encourage reflection on ICT in professional development in Rwanda. In each cycle I explore the potential of an Activity Theory lens for probing the issues and examining the perspectives of the stakeholder community of teachers, teacher educators, curriculum developers and researchers affiliated to national ICT in TPD programmes and initiatives. I integrate a "Most Significant Change" narrative technique to engage participants in telling stories of significant change in their practice with technology integration.

Through the rigour of the action research living theory approach I come to a number of conclusions about my own values and how I actually live my values in practice as I engage with partners in discourse and reflection for mutual learning on the issues of ICT integration in Teacher Professional Development.

Keywords: **Information and Communication Technology; Teacher Professional Development; Action Research; Living Theory; Activity Theory; Most Significant Change.**

My Research Context

The context of my study is Rwanda and specifically the Information and Communication Technology (ICT) landscape for Teacher Professional Development (TPD) in Rwanda. The Government of Rwanda has set a national goal that the country will achieve middle income status by 2020 based on an information-rich, knowledge-based society and economy, achieved by modernising its key sectors using ICT (Farrell & Isaacs, 2007). Rwanda *Vision 2020* identifies the strengthening of teacher development in an ICT-rich environment as one of the top government priorities for the achievement of its national socio-economic development goals (Ministry of Finance and Economic Planning, 2001). The target is that each primary and secondary school should have a computer-literacy teacher by 2010 (Mukama & Andersson, 2008). With respect to training structures to support the development of ICT in the educational system, higher educational institutions are required to make computer studies and basic computing an integral and a compulsory subject within their teacher education programmes (ibid.).

The drive to utilize ICT as an integral feature in all professional learning programmes has led to the emergence of a myriad of national and international initiatives and schemes for new technology integration over the last decade (Farrell & Isaacs, 2007). The current development of a Rwanda National ICT in Education policy represents a timely process to create a regulatory and governance framework to shape „the interventions and initiatives that are taking place and for those needed in this sector“ (Ministry of Education, 2008, p. 12).

I am an Education Specialist working for the Global e-Schools and Communities Initiative (GeSCI), an International Non-Government Organization (INGO). GeSCI was set up under the auspices of a United Nations (UN) Information and Communication Technology (ICT) Task Force in 2004 as a designated body to provide demand-driven assistance to developing countries seeking to harness the potential of ICT to improve access to, and the quality and effectiveness of their education systems.

I am also affiliated to the creative space of the Action Research Collaboratory set up by Dr. Margaret Farren at Dublin City University (DCU), Ireland, “to enable practitioner-researchers to provide evidence-based accounts of how they are improving work practices within their organisations and generating new knowledge through the use of ICT” (Farren, 2007). This research was carried out as part of an M.Sc. in Education and Training Management (eLearning strand) programme that I undertook as a part-time student in DCU from 2007 to 2009.

In my practice within the framework of GeSCI’s organizational mission, we seek to work with Ministries of Education in developing countries to address fundamental causes of poor quality and access to Education provision and to assess how ICT can be used to address these problems at different system levels. Currently over 75 million children worldwide are not in school (UNESCO, 2008a). Countless millions more are dropping out of school systems due to the seeming irrelevance of education to their lives (Ainscow & Miles, 2008). Yates (as cited in Teacher Education Policy Forum for Sub-Saharan Africa, 2007) sees the Education for

All (EFA) agenda as a Global Social Justice (GSJ) Project and asserts that the concept of quality is fundamental to its achievement.

A quality education is dependent on the development of high quality teachers (Haddad, as cited in The Teacher Education Policy Forum for Sub-Saharan Africa, 2007). The challenge is momentous in a global context of ever more complex demands on systems for educational provision coupled with acute shortages in the supply of suitably qualified and experienced teachers north and south (Davis, 2000; Leach, 2008). Eighteen million new primary teachers are needed to achieve Education for All (EFA) by 2015 (UNESCO, 2009). Meanwhile regional disparities in quality provision accelerate as richer countries lure qualified teachers from less favoured regions with incentive packages (Davis, 2000).

The challenge is in almost all respects greatest in sub-Saharan Africa where a third of existing teachers are untrained. Of the thousands recruited each year, they largely have inadequate subject knowledge and little if any pedagogic training (Evoh, 2007; Bennell, 2005, as cited in Leach, 2008). Many experts in the field of Teacher Professional Development and ICT believe that the evidence makes clear the incapacity of existing institutional structures to cope with the scale and urgency of the issues (Swarts, 2006; Evoh, 2007; Dhlala & Moon, 2002; Moon, 2007, as cited in Leach, 2008). In this context Leach (2008) believes that the thoughtful use of new forms of ICT can be exploited to strengthen and enhance TPD programmes and improve the quality of education in general.

One of GeSCI's partner countries of engagement in sub-Saharan Africa is Rwanda. At a meeting in October 2008 between GeSCI and members of the Teacher Education Services (TES) of the Ministry of Education (MinEduc) of Rwanda, discussion focused on a need for development of a framework for the use of ICT in TPD. The framework would provide a mechanism for coordinating programmes and improving school support towards a more productive integration of new technology. A prelude to developing an ICT for TPD framework would be an analysis of current programmes and initiatives in order to understand the challenges, opportunities and lessons that are being learned from the different levels, perspectives and contexts of programme implementation.

The process of enabling discourse among teachers, teacher educators, curriculum developers, partners and policy makers to trigger deep reflection on the various possibilities for ICT integration in professional learning in Rwanda constitutes the focus of my research.

Knowledge, Technology and Development in a Knowledge Society

The Global e-Schools and Communities Initiative (GeSCI) believes that ICT can be a powerful enabler of development goals and that the proper and effective use of ICT can improve the quality of teaching and learning at all levels of the education system. As an organization, we are committed to a vision of a *Knowledge Society for All* "where every person has equitable access to knowledge, and the ability and capacity to create and share knowledge for society's overall development" (GeSCI, 2008, p. 22).

At the heart of GeSCI's mission is the concept of Knowledge Building and Sharing: working together with our developing country partners to strengthen their knowledge systems and to develop their own visionary thinking, strategic capacity and sustainable solutions to effectively manage, deploy and integrate ICT in their education systems. GeSCI's

work can be described in terms of "Knowledge-based Aid", an emergent concept captured in a recent United Nations Conference on Trade and Development report (UNCTAD, 2007) as a new form of development assistance to support learning and innovation in Lesser Developed Countries (LDCs).

The foremost challenge to developing countries' successful utilization of ICT in their educational and developmental programmes is "ownership of the knowledge" and the "control of the technology" according to Addo (2001, p. 146). In this regard he considers that technologies are not "neutral instruments" as they "shape the social choice mechanisms of the communities that use them" (ibid.). It is Unwin's (2004a) view that while most global initiatives have tended to voice the positive benefits of ICT in development, "some have placed insufficient emphasis on the less desirable effects" (p. 154). In particular he laments the lack of a critical lens for analyzing the "implications of transfer of a "northern" or "western" technology to an entirely different cultural context" (ibid.). He believes that much policy discussion on ICT is top-down led by governments and the private sector. He notes that it is rare for the voices of the poor or marginalized to be listened to and as a result ICT-development issues tend to be "supply-led" rather than "demand driven" (ibid.).

Taylor & Clarke (2007), referring to Chambers' (1997) oft cited question "Whose knowledge counts?" (Chambers in Taylor & Clarke 2007, p. 11), consider that the concept of "Knowledge" in the "Knowledge Society" requires an expansion of our understanding of knowledge beyond the intellectual dimension - to include the personal and particular dimensions. Such authors are now stressing increasingly the importance of learning processes "that are based on co-construction and subjectifying of knowledge, through processes of critical reflection and experience" (ibid., p. 11).

My first concern in my research enquiry is that I engage with our partners in teacher professional development institutions and agencies in Rwanda on a basis of an equitable relationship that is developed upon processes of mutual learning. My second concern is to ensure that the research dialogue captures the voices of teachers, teacher educators, managers, lecturers, researchers and policy makers, in a way that reflects a real process of empowering discourse from "classroots" (O'Sullivan, 2004, p. 559) to policy level in the constituency of our partner engagement.

My research question is: "How am I improving my practice and contributing to knowledge as I encourage multi-stakeholder narrative and reflection on the use of ICT in Teacher Professional Development programmes in Rwanda?" I ask this question mindful that I am examining my own learning and that I am taking responsibility for the way I exercise my influence in the learning of partners.

Literature

In the literature review I examine the emergent field of ICT integration in education systems generally and in Teacher Professional Development (TPD) specifically. I draw on education mainstream and ICT literature to verify emergent conceptual frameworks for ICT in TPD. I look briefly at the use of Activity Theory as a lens to examine ICT use in TPD activity systems.

ICT and the Knowledge Society

There is a commonly-accepted rhetoric that education systems need to effect changes in the preparation of its citizens for lifelong learning in a 21st Century Knowledge-based or Information Society. The rhetoric can be characterized as follows:

- Systemic economic growth is the key to poverty reduction and increased prosperity;
- "New Growth" economic models emphasize the importance of new knowledge, innovation, and the development of human capacity as the sources of sustainable economic growth;
- ICTs are engines for new growth and tools for empowering societies to change into knowledge economies or information societies;
- Citizens in these information societies will need to be prepared in new technology literacy competencies inclusive of higher order thinking and sound reasoning skills - *the ability to learn how to learn* (i.e. to be a life-long learner), *the ability to reflect, to analyse synthesize, to find solutions and to adapt*;
- Education is a major pillar of a knowledge economy and a human right;
- Through access to an inclusive high-quality education by all – regardless of gender, ethnicity, religion, or language – benefits to individual, business, private and public enterprise are multiplied and will lead to growth and development that is more equitably distributed and enjoyed by all. (Burkhardt et al., 2003; Swarts 2008; UNESCO, 2008a; Global e-Schools and Communities Initiative, 2008)

The growing demands in knowledge specialization will require a change in the traditional view of the learning process. It will further require an understanding of how new technology can be used to facilitate learning environments in which students are engaged in the kind of team and project work that can enable them to take greater responsibility for their own learning and construction of knowledge (Pelgrum & Law, 2003). This is a view that has influenced a paradigm shift in teacher professional development programmes as the pivotal role of teachers, especially in the effective use of new technologies, is being recognized globally (Davis, 2000).

Global Trends in ICT and Teacher Professional Development

The extremely rapid growth and turn around in new technology and knowledge content mean that this emergent field is changing faster than education personnel can track (Coolahan, 2002). Thus the new models for TPD embrace a concept of "3 I's" – initial, induction and in-service teacher education. These new trends in professional learning represent a paradigm shift which replaces the prevailing assumption of one-time initial or specialized training with a lifelong learning approach for professional preparedness, development and research (Coolahan, 2002; Haddad, 2002; Dladla & Moon, 2002; Gaido & Carlson, 2003).

New models for technology integration in professional development should represent a "reconceptualization" of teacher professional learning for a digital age according to Butler (2001). The models should look beyond how teachers engage with technology, to

how teachers use technology as they work alongside their students to redefine learning itself and to become co-learners in the process. Hepp et al. (2004) observe that teacher beliefs and attitudes to ICT influence the rate of ICT adoption in TPD programmes and classroom practice. The authors identify three group adoption processes: (i) the "innovators" who will recognize the potential of ICT early in TPD programmes and will explore quickly tools in their practice; (ii) the "resistors" who tend to resist change in all its forms; (iii) the "mainstreamers" or late adopters of technology, arguably "the largest group in education systems and therefore the most important" (Hepp et al., 2004, pp. 18-19).

The assimilation of new technologies according to Drenoyanni (2006) cannot be understood in isolation from the broader context of the prevailing and more powerful social, economic and political contexts and dynamics. The incorporation and use of ICT in TPD will "mirror to a certain degree contemporary socio-economic problems and prevailing educational conditions" (Drenoyanni, 2006, p. 405).

ICT and Teacher Professional Development in Africa

Olakulehim (2007) reports that across Africa there is a deluge of challenges confronting the educative process in general and the application of ICT in TPD programmes in particular. While ICT has found its way into the formal curricula in most educational practices, the author considers their existence is still at an embryonic stage due to a lack of computers, connections and staff expertise.

Research conducted by SchoolNet Africa, the Commonwealth of Learning and the International Institute for Communication and Development (2004) identified an estimated sixty ICT-related TPD programmes underway in Africa. A large proportion of the programmes are small scale, dependent on donor funding and driven externally by donors as opposed to being Ministry-led programmes. They generally lack a whole school approach. Such initiatives fail to live up to the ambitious aspirations of their proponents because they speak to the supply-side, have not been demand-led historically as they give insufficient attention to the involvement of stakeholders in defining the needs and purpose of the development process (Unwin, 2004b; Isaacs, 2006; Ottevanger et al., 2007; Kontiainen, 2007, as cited in Hakkarainen et al., 2008).

In their survey of ICT in Education in Africa, Farrell and Isaacs (2007) suggest that the emergence of multi-country regional initiatives such as UNESCO's Teacher Training Initiative for Sub-Saharan Africa (TTISSA), the African Virtual University (AVU) Teacher Education Project, the New Partnership for Africa's Development (NEPAD) e-Schools Project, the Educator Development Network of SchoolNet South Africa, is indicative of a shift in the prevailing paradigm towards longer term, systemic professional development initiatives promoting quality innovation.

A Conceptual Framework for ICT Integration

There is a general absence of conceptual clarity on the objectives of ICT for TPD initiatives in the African region according to Isaacs (2006). Mandinach (2005) suggests that

the lack of clarity is pervasive in education systems globally, noting that while educational institutions seem to be aware they should be joining the ICT integration movement, they are not clear as to the purpose or the gains.

From the mainstream education literature Kennedy (2005) proposes that defining whether the fundamental purpose of a TPD intervention is to achieve transmission or to facilitate transformative practice can provide a powerful tool for conceptual analysis. Drawing from the literature, she developed a framework for categorizing nine different models of TPD provision along a continuum of delivery inherent in their purposes of provision - moving from *transmission* through *transitional* to *transformative* purposes which develop increasing capacity for teacher empowerment.

From the ICT domain Olakulehin (2008) identifies four broad approaches from the literature for the adoption of ICT in TPD programmes. The adoption model depicts a continuum of the four approaches correspondent to the Kennedy trajectory – moving from *emerging* to *applying* to *infusing* to *transforming* purposes which develop increasing teacher and support staff capability to use ICT as a "natural part of the everyday life of the system" (ibid., p. 140).

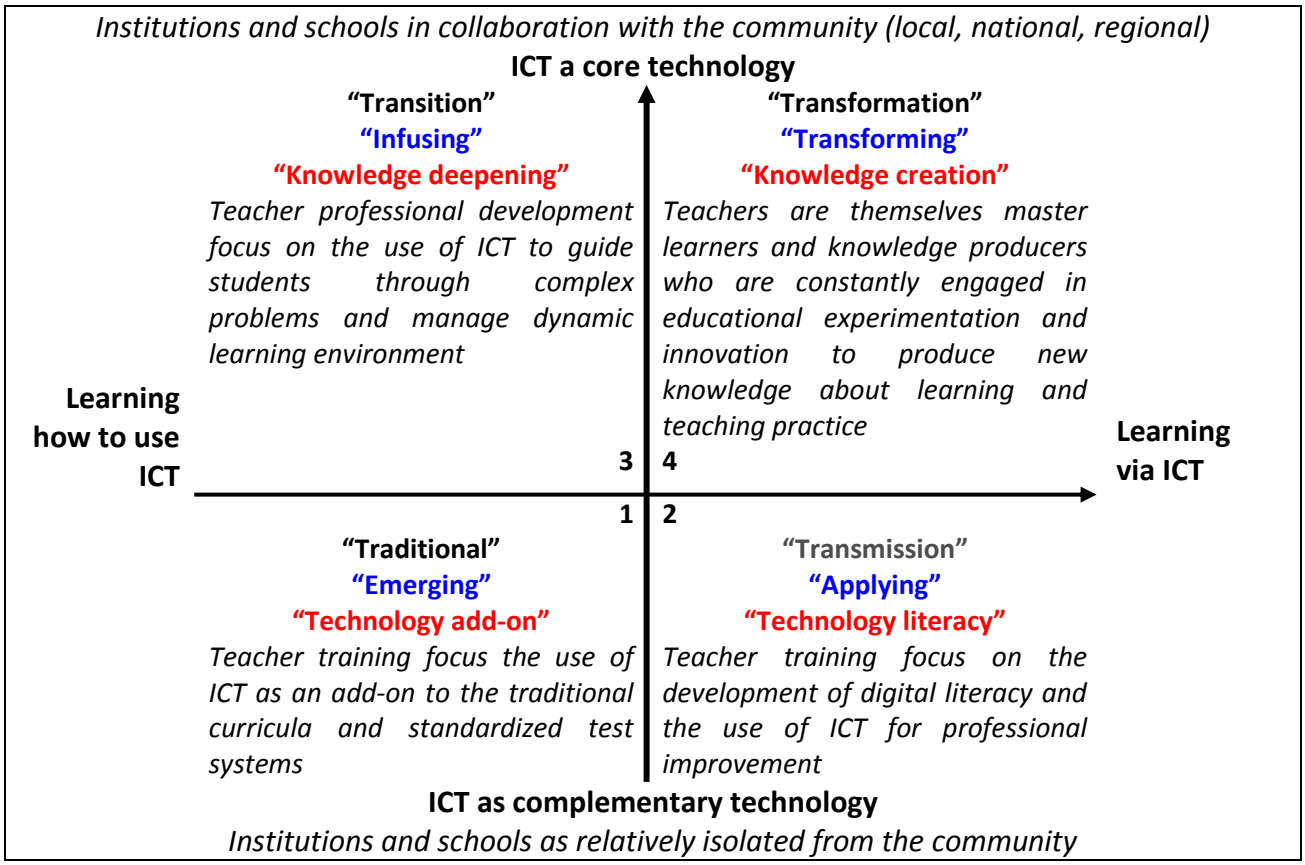


Figure 1: A consolidated continuum of approaches for ICT Integration in TPD (Vygotsky, 1978; Kennedy, 2005; Hakkarainen et al., 2008; Olakulehin, 2008; UNESCO, 2008a)

The UNESCO (2008a) Information and Communication Technology - Competency Standards for Teacher's (ICT-CST) project attempts to bridge both mainstream and ICT

specialist domains into a holistic framework for a modular continuum of ICT integration in all TPD programmes - moving from *technology literacy*, through to *knowledge deepening* to *knowledge creation* purposes which develop increasing capacity for teacher empowerment in the utilization of ICT as a tool to enhance the quality of learning (Figure 1).

The consolidated continuum of approaches represents a *conceptual framework* in which practitioners and institutions seek to move from isolated, passive consumers of externally defined programmes for ICT knowledge and skills acquisition towards more open communities of active learners and learning organizations that generate new knowledge on the use of ICT to enhance educational practice (Kennedy, 2005; Olakulehin, 2008; UNESCO, 2008a).

Looking at ICT Integration through an Activity Theory Lens

Activity Theory (AT) (Vygotsky, 1978; Engstrom, 2001) is currently widely applied to study technology-based learning and working situations (Issroff and Scanlon, 2001). Three basic principles of AT theory are helpful for understanding and analyzing the process of ICT integration in TPD systems:

- Teacher professional learning and development are social processes growing out of joint activity.
- People are active cognizing agents (Sen, 1999, as cited in Leach, 2008, p. 785) but they work in sites that are not necessarily of their choosing with tools that constrain and afford their actions.
- Teaching and learning systems are constantly subject to change and these changes are driven by contradictions and tensions which can lead to expansive learning (Cole & Russel 2002, as cited in Hardman, 2004).

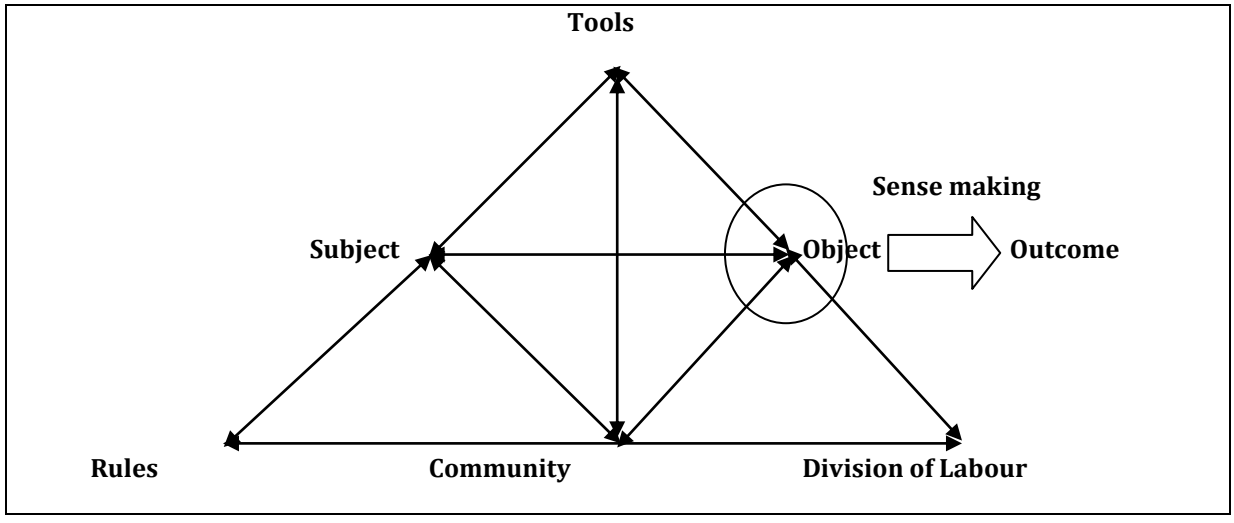


Figure 2. The six elements of an activity system (Engestrom, 2001; Hardman, 2005)

AT concepts can provide a framework to explore a socio-cultural perspective for analysing ICT practices, which supports the idea that ICT needs to be studied within the learning environment and also within the broader and more powerful social, economic and political contexts in which it is situated (Agalianos, 2001; Lim & Hang, 2003; Drenoyianni, 2006). A key feature of the theory is the extended model of Activity Systems developed by Engestrom (2001) that conceptualizes all human activity as the interaction of six inseparable and mutually constitutive elements: *subjects, tools, object and outcome, rules, community and division of labour* (Figure 2).

The common language defined by the six elements of the activity system structure can provide a useful mechanism to engage institutional reflection on ICT in TPD. If the assumption is that the *object* (purpose) is the use of the ICT *tool* to enhance institutional practice through a continuum of TPD programme development from *technology literacy* to *knowledge deepening* to *knowledge creation*, then the *outcome* progressively changes between past, present and future systems of provision.

Based on the elements of the activity system structure, tools can be developed to investigate and "mirror" historical and current models of institutional practice (Hakkarainen et al., 2008). The exploration of the complex pedagogical, organizational and technological issues inherent in ICT integration marks the start of a system's reflection process (Robertson, 2008).

The conceptual tools for analysing practice can be used to facilitate dialogue about the needs, possibilities and strategies for future models of ICT-TPD provision that are aligned to institutional and national policy and vision for a Knowledge Society (Figure 3).

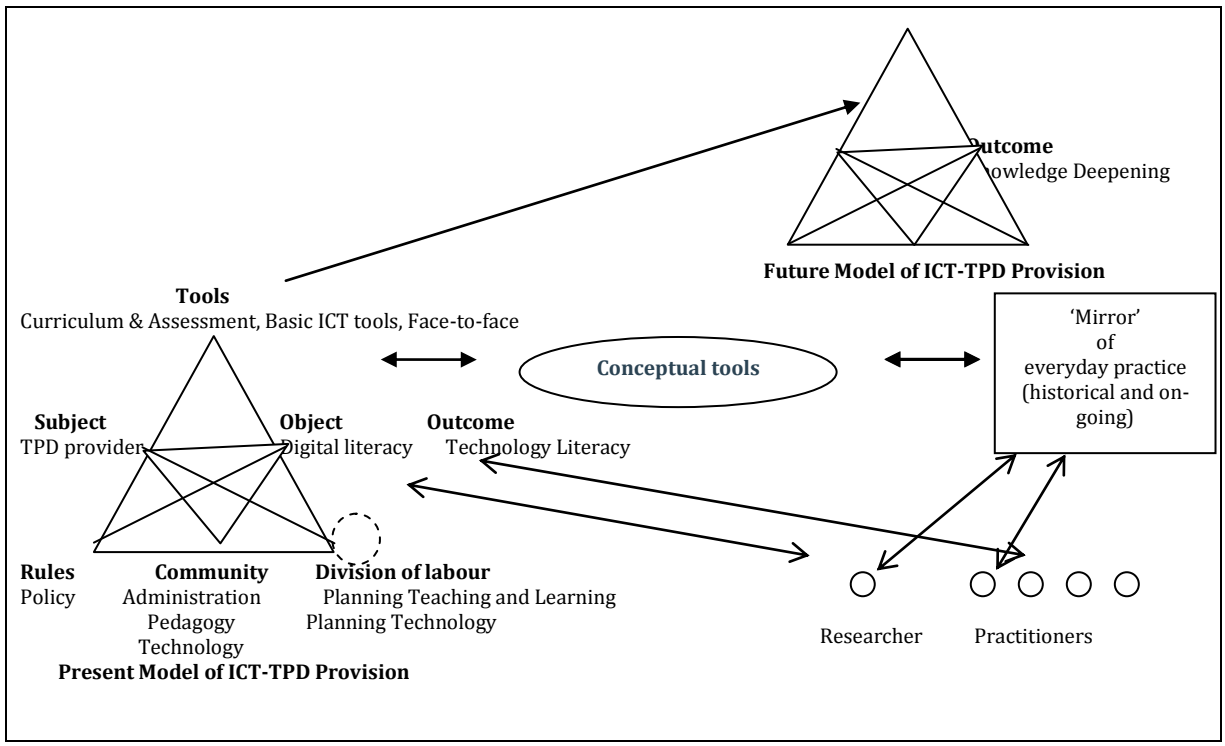


Figure 3: Expansive learning through reflection on past, present and future models (Adapted from Engestrom, 2003)

Activity Theory presents a flexible framework for facilitating a space for reflection, debate, discussion, critique, validation and ultimately expansionist learning – that is "learning beyond what would have been possible if actors from each perspective remained insulated" (ibid., p. 819). I sought to use the Activity Theory lens in my enquiry as I endeavoured to facilitate discourse and reflection with stakeholder institutions in Rwanda on their vision for ICT integration in Teacher Professional Development.

Methodology

Action Research Living Theory

Action research developed from the critical paradigm and takes its emancipatory agenda into a research realm that focuses and impacts on practice (McNiff & Whitehead, 2006; Cohen, Manion & Morrison, 2007). The cyclical, systematic, reflexive, iterative, participatory and democratic dynamic inherent in action research is the source of my affiliation to this research paradigm. While there are many forms and variants of action research, its fundamental purpose is to generate new knowledge (McNiff & Whitehead, 2006), that is useful to people in the everyday conduct of their lives (Reason & Bradbury, 2006) and that involves the participation and contribution of practitioner action-researchers (Whitehead & Mc Niff, 2006).

The practice of transformation of the social order, as in transforming the exclusionary dominance of knowledge elites to a more inclusionary order of knowledge plurality, begins with practitioners as they ask, "How do I improve what I am doing?" (Whitehead & McNiff, 2006, p. 147). The ontological "I" of the researcher-practitioner is what essentially distinguishes a living theory form of action research from other forms. The focus on "I" is connected to Sen's notion of the development of the capabilities of people (I, we) as a means of removing the "unfreedoms" that prevent them (me, us) from acting for good change (Sen, 2001, as cited in Taylor & Clarke, 2008, p. 10). Freedom then brings with it responsibility for each one of us to live our values, to make good decisions about our lives, to improve learning, to encourage others to do the same and to recognize ourselves as "living contradictions" when our values are being denied in practice (McNiff & Whitehead, 2006, p. 47).

As a researcher-practitioner, my real work according to McNiff & Whitehead is "to improve learning, both my own and others, in order to improve practice" (McNiff & Whitehead, 2006, p. 51). Improvement can be brought about through influence as "you do not set out to impose change on people and their ways" (ibid.). I am conscious of the inequities in relationships in partner engagements in the developing world that as an organization we have come to recognize. It is a "living contradiction" that is well documented in the literature with much evidence pointing to development thinking and practice that is still trapped in a paradigm of predictable, linear causality and top-down command and control (Hakkarainen et al., 2008; Ramalingam & James, 2008; Taylor & Clarke, 2008).

My ontological values are centred on the belief that there are different ways of coming to know and different forms of knowing. I value the capacity of other people, my

colleagues and my partners to come to know in their own way. I value the concept of a new scholarship of practice that is tentatively extending the epistemological boundaries to include and legitimate the voices and contributions of the practitioner communities to the knowledge base.

My *epistemological* stance flows from my ontological view. I do not consider that knowledge represents a packaged commodity that is transferable from one constituency to another. I value my own and other peoples' independent agency to communicate and act on the basis of our own sense-making. I value a new conception of knowledge that is no longer a factor of exclusion particular to the elitist model of knowledge societies in the past, but that promotes alternative views of knowledge that present new possibilities for inclusive knowledge societies in the future. I value equal partnership in the building and production of knowledge. I value the development of a participatory worldview involving an inclusive extended epistemology that incorporates diverse forms of knowing.

Action Plan

I believe that collaboration and joint knowledge-building are core activities in assisting our partners to strengthen their own capabilities for knowledge creation and innovation and to develop their strategic capacity to effectively manage, deploy and integrate ICT, in their education systems. My aim was to improve my practice as an education specialist, advisor and facilitator in assisting GeSCI's partners to develop an understanding of and develop their own solutions to address the major challenges of ICT integration in their education systems.

I would collect the data to demonstrate the story of learning as it unfolded; my learning and the influence of my learning on others. I would follow the story in a cyclical process incorporating a tentative trajectory path described by Whitehead as follows:

- I experience a concern when some of my educational values are denied in my practice.
- I imagine a solution to the concern.
- I act in the direction of the imagined solution.
- I evaluate the outcome of the solution.
- I modify my practice, plans and ideas in the light of the evaluation (Whitehead, 1989; 2003, as cited in McNiff & Whitehead, 2006, p. 91).

Data Collection Methods and Techniques

My action research design involved developing a hybrid approach in the first research cycle using dialogical and narrative tools for data collection and analysis. The process involved adapting "Activity Theory" (AT) and "Most Significant Change" (MSC) frameworks and tools into an interview protocol for data collection. The hybrid approach combines a dual strategy for sense making in anticipation of the complexity and volume of information that would be collected from many stakeholders across a range of educational settings from national institutions to school classrooms. In discussions with my supervisor, Dr. Margaret Farren, prior to the first cycle, she emphasized that traditional theory can be used as a method of analysis and integrated within the generation of a living theory.

The Activity Theory (AT) element of the interview protocol I modified from an eclectic range of tools and frameworks developed by the AT and ICT research communities (Lim & Hang, 2003; Mwanza & Engestrom, 2003, as cited in Robertson, 2008; Demiraslan & Usluel, 2008; UNESCO, 2008a; Yamagata-Lynch & Smaldino, 2007). I derived an Activity System (AS) Interview Protocol from the six elements of the AT model (*subject, tool, object, rules, community, division of labour)* (Engestrom, 2001). I used categories drawn from the six components of the model as a basis for thematic analysis of the data collection which ensured to some degree the reliability of the process (Figure 4).

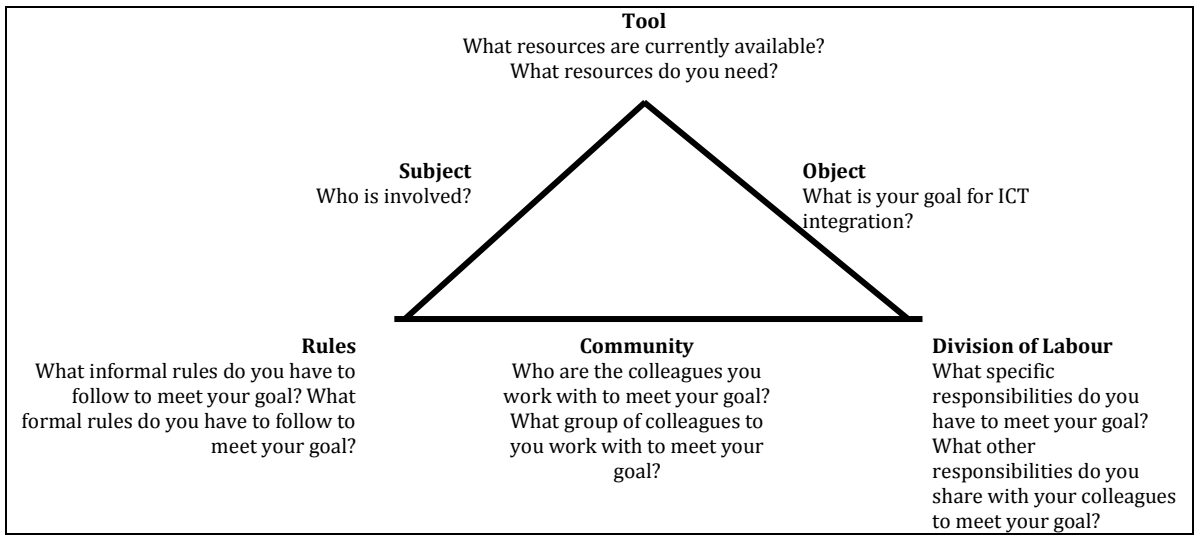


Figure 4. Activity System Interview Protocol (Mwanza & Engestrom, 2003, as cited in Robertson 2008; Yamagata-Lynch & Smaldino, 2007)

The Most Significant Change (MSC) protocol I modified from formats devised by Davis & Dart (2005) who developed the technique. I used the MSC protocol to collect stories of significant change from stakeholders on the use of technology in their practices. The most significant of stakeholder stories at one system level is reviewed by panels or groups of stakeholders at the next level using change domains and criteria defined by them to select stories most illustrative of change in each domain.

Implementation and evaluation

> It is not our role to speak to the people about our own view of the world, nor to attempt to impose that view on them, but rather to dialogue with the people about their view and ours. (Freire, 1970, p. 77)

Introduction

I engaged in this research because I value our organisational vision of a "Knowledge Society for All" (GeSCI, 2008) incorporating the dual notions of *universal access* and

participation of all in Knowledge Societies (UNESCO, 2005). In my work as an education specialist in the developing world, I am conscious of the inequities that are sometimes evident in partner relationships, a "living contradiction" (Whitehead, 1989, as cited in Whitehead & McNiff, 2006) of our espoused values for knowledge building and sharing on the basis of equal partnership. I wished to explore in the research cycles the potential of a hybrid of tools and frameworks to support authentic and participatory processes of knowledge-building and mutual learning within the context of an ICT in Teacher Professional Development discussion agenda.

Research cycle one - organizing tools and frameworks for knowledge building and sharing

The first cycle of my action research project centred on a survey of the ICT in Teacher Professional Development (TPD) landscape in Rwanda conducted during the week of March 2 to 6, 2009. I travelled to Rwanda to assist the ICT Unit in the Ministry of Education (MinEduc) to carry out the survey. The programme for the survey identified a purposive sample of pre- and in-service, distance, school-based and partnership programmes to be visited. A purposive sample is a feature of qualitative research where "researchers handpick the cases to be included in the sample on the basis of their judgement of their typicality or possession of the particular characteristic being sought" (Cohen et al., 2007, pp. 114 – 115).

The sample albeit restricted and biased in terms of selection nevertheless served the needs of the survey at two levels. On a consultation level the purpose of the survey was to access stakeholders (teacher educators, teacher trainers, school heads, teachers and students) affiliated to the various TPD initiatives and programmes with experiences on the use of ICT in their practices. The purpose of the survey on the level of my research was to examine the potential of a toolkit adapted from Activity Theory (AT) (Engestrom, 2001) to support a communicative space for authentic interaction, diverse reflection and thinking on the issues of ICT integration.

Exploring an "Activity Systems" (AS) Mirror

I used the Activity System protocol derived from the Activity Theory Framework to conduct four interviews with stakeholders in national institution providers/ affiliates of ICT in TPD programmes. All national institutions are identified in a generic way according to their function in deference to research agreement stipulations for confidentiality. Focus group interviews were conducted in:

1. The national institute for pre-service/ distance education - four participants representing Management, the Computer Science Division, The Academic Studies Division and the ICT Unit;
2. The national centre for curriculum and development - one participant representing the Technical and Vocational Unit;
3. The national centre for in-service - five participants representing the Management, the Quality Assurance and Research Division and Master Training teams.

4. A regional teacher education college consulate of the national institution for preservice/ distance education - three participants representing Management, the Academic Studies Division and the ICT Unit.

The interviews lasted between forty-five minutes and one and a half hours. As the participants indicated their discomfort with tape recording I conducted each interview with the support of the Country Programme Facilitator (CPF) and wrote comprehensive notes from which I prepared a summary report for institutional checking (MinEduc-GeSCI, 2009a).

I initiated each interview with a broad question asking participants to explain the goals of ICT integration in their TPD programmes. I anticipated from reading the literature (Hardman, 2004; Yamagata-Lynch & Smaldino, 2007) that enabling participants to clarify what they perceived to be individual and institutional goals and expectations of technology integration would lead to a deeper analysis of other characteristics of ICT impact in their activity systems. What emerged was a consensus across all institutional discussions that the goal of ICT integration in general was defined by the national socio-economic development vision and the goal of ICT in professional development programmes centred on acquisition of technology skills.

The following extract exemplifies a typical response that dominated the opening stages of all focus group discussions:

> **National Centre In-service discussion:** The overall goal is to help the government to educate the people in the region, to create employment, to achieve the government Vision 20/20 and in the process benchmarking Rwanda education with international standards, making Rwanda an international hub, increasing ICT literacy.
>
> The overall goal of the (in-service) programme is to enhance the quality of education through ICT and the specific objectives are to give teachers the knowledge to a) equip themselves with ICT tools, b) use the acquired skills for teaching and c) research and administer assessments.

There were however different perceptions as to the specifics on how ICT skills and knowledge might be integrated or used by teacher educators/ teachers and students/ learners in their teaching and learning programmes. The following extracts illustrate the institutions grappling with various interpretations and dilemmas regarding how ICT should be articulated in their programmes:

> **National Centre – Curriculum and Development discussion:** The objectives of the secondary school ordinary level programme are threefold and they are to a) familiarize students with and build their knowledge of computer architecture, b) familiarize learners with the use of X (IT Partner) ICT tools in daily office activities and 3) familiarize learners with the use the internet for communication and research.
>
> **National Institute Pre-service/Distance Education discussion:** There is a need for interaction between those who write curriculum modules, those who teach them and those who apply them
>
> **Regional Teacher Education College discussion:** Training for teachers to use the computer to deliver their courses is not deliberately articulated. It is not planned in the curriculum with regard to basic subjects – for example there is no help for a history teacher who wishes to deliver their subject with the assistance of ICT tools. The teaching of ICT is directed toward

literacy basics – how to use the computer, to access databases. We need to think more broadly about the use of ICT in teacher education programmes.

In these perspectives the emergent institutional reflection thread is on the complexity of ICT integration processes, as the Head of the Commuter Science Division in the National Institute for Pre-service/ Distance Education observed "ICT is a new field and the challenge is to make it a reality."

As I moved from one group interview to the next and became more confident and at ease with the AS protocol I observed the rich dynamic that the protocol stimulated in the discussions, as participants explicated the challenges and issues that technology integration produces within and beyond the boundaries of their institutional activity system frameworks. The following extracts present group reflections on the disruptive force of technology that affects cultural practices and creates tensions and contradictions in the underpinning elements of tools, community, rules, roles and responsibilities of their institutional activity systems:

Regional Teacher Education College discussion

Community-roles tension: The structure for ICT programmes is absent. There is no administrative structure and it is difficult to clarify who is involved in the delivery of programmes.

National Centre In-service discussion

Tools-rules contradiction: The timing of the training programmes to coincide with the 1:1 deployment during the period of national examinations was not helpful. Teachers were deterred from experimenting with projects in their practice during the critical post-training phase.

National Institute Pre-service/Distance Education discussion

Tools-community contradiction: The programme dynamic for ICT integration under development in the National Institute is not followed in schools. The programme is not the problem – rather it is the teachers who are adhering to educational objectives that have no clearly defined parameters and assessment standards for ICT integration.

National Centre – Curriculum and Development discussion

Rules-community tension: The standards for all curricula are set by the General Inspectorate. At the same time teachers do have a voice in determining policy and standards through their collaboration on curriculum panels.

The discussions illustrate palpable tensions between different system layers for policy formulation and practice implementation with correspondent contradictions in assumptions about teacher appropriation of change and the articulation of their voice in the change process. I felt however that the information that was emerging from the different sites was rich but fragmented. There was a lack of cross-institutional and multi-voiced reflection and interpretation on the issues from different system levels.

While the survey process was a factor in the limitations, I was also beginning to question my role of engagement with participants. Part of the problem certainly was the linear singularity in the analytical process. I interpreted the data sets from the interviews. I prepared the report summaries for distribution to each institution for checking. I recognized

that part of the problem was the AT theoretical framework I was using that was in essence exclusionary. The framework could not be easily understood by participants unless they had studied the literature.

A colleague in GeSCI had alerted me to this potential conflict in partnership engagement on researching the use of the tools. He wrote in an email dated 9th of January 2009:

> On the role of GeSCI – this might need some sharpening and discussion. Should we use these tools ourselves or should we build the capacity of the relevant stakeholders to use these tools or use a hybrid approach?...
>
> …It goes back to the question we have begun asking more regularly – what is the role of GeSCI and what is the role of the stakeholders. I think some clarity might be required. (A. Twinomuguisha, personal communication, January 9, 2009)

Exploring a "Most Significant Change" (MSC) Mirror

I was determined to rectify the imbalance in the partnership dialogue in the survey process by incorporating a more participatory approach. I was interested in the potential of the MSC technique both as a means of capturing stories of significant change at different levels and for involving stakeholder analysis in story selection about what constitutes the criteria of success or non-success – of significant or insignificant change.

With the support of staff from the ICT Unit I collected 44 stories from rural and urban zones, capturing data of significant change from the perspectives of primary teachers (nine urban and five rural), secondary teachers (two urban), teacher educators (three rural), primary school principal (one urban), primary school ICT coordinator (one urban), primary school director of studies (one urban), secondary school students (seven urban), tertiary computer science students (twelve urban), college students with visual impairments (three urban).

Each interview lasted between forty-five minutes and one and a half hours depending on the size of the focus groups. All interviews were recorded with the permission of participants. Like the AS protocol and as suggested in the MSC literature (Davies and Dart 2005) I initiated each interview with a broad opening question as a starting point of the type: "Since the computers came into your classroom (or since you started using technology in your classroom), what has been the most significant change in your practice?"

My preference was to use the MSC protocol in focus group interviews to explore the group interaction that sharing stories might trigger. The following extract is from the very first focus group discussion I conducted with a group of seven urban primary teachers who were introducing 1:1 laptops in their classrooms (Appendix A). All research participants are identified by pseudonyms in deference to research agreement stipulations for confidentiality. In the extract the story of Teacher Anastase has triggered a group reflection as to whether his learners' tendency to play with the computer software during class should be considered a positive or negative change story. An audio of the extract can be accessed at http://gesci.org/old/files/docman/Audio1TLICT.wma.

Teacher Anastase said

The children they like all those things which, only girls in the laptops, they like music, I don't know if you have mentioned "snappy", other things I think can cause... cannot be easy for the teacher to teach another thing as you said…

Teacher Jacqueline said

Another thing he says, (Teacher Anastase) says that the student he likes to play music and he says that he says that it is a negative point and his neighbour says that it is not negative because actually the student, they want to discover so many things on their laptops…

...it is not negative because it is the beginning, when it is the beginning the laptops, the children need to discover, they need to play, they need to do so many things on the laptops…

The struggle to categorize Teacher Anastase's story is prompting the group to reflect on learning and what the group understands by learning. This reflection constitutes perhaps a tentative "reconceptualization" of their understandings about learning (Butler, 2001). I transcribed all the interviews into a summary document for participant checking (MinEduc-GeSCI, 2009a). An artefact entitled "Perspectives from Rwanda" developed by my organization on the basis of the stories can be accessed on GeSCI's website.

Video 1. Perspectives from Rwanda (GeSCI, 2009a)

Reflection on Cycle One

As an advisor I have always been aware of the dilemmas in our engagement fields and of the failure to translate into practice the values, principles and concepts we espouse in our strategies. I felt a sense of frustration in the first cycle that I had not managed to encourage a more participatory discourse and analysis throughout the survey process.

Having trialled the dialogical tools and frameworks I was satisfied that the use of the tools enabled a rich dynamic of interaction in the focus group discussions and established a vibrant communication space for reflection on the issues. I was dissatisfied however that the knowledge sharing established in each communication space was fragmented - dissipated as I progressed from one focus group to the next.

I recognized that the survey had limitations in that the institutional homogeneity of the focus groups diminished the potential for participants to think differently on the issues, as Butler (2001) says, to reconceptualize ideas about professional learning for a digital age.

I became more acutely aware that the partnership in the dialogue was not an equal one and that I was responsible to a degree for the inequity. The theoretical framework that I was utilizing through the interview protocol was not understood by participants. I was reinforcing the status quo of the external expert in my use of this framework. I was essentially inhibiting a more authentic level of participation and empowerment in the discussion analysis. I was experiencing myself as a "living contradiction" (Whitehead, 1989, as cited in Whitehead & McNiff, 2006) denying my values for equal partnership and mutual learning in practice.

In my preparation for the second cycle I would need to modify my approach and utilize the tools to encourage a more participatory analysis of the tensions of ICT, their systemic impact and strategies to overcome them.

Cycle Two – Creating a communicative space for collective reflection

The focus of my research project in Cycle Two is the partnership discussion analysis which took place during a three day workshop retreat held in Kigali Rwanda from 27 to 29 April 2009 on the theme of *Teacher Professional Development Tomorrow, Today*. The workshop drew together a multi-stakeholder participation of twenty representatives from national institutions for Teacher Professional Development, Curriculum Development, Research and Development Partners. The workshop was jointly coordinated and facilitated by the Ministry of Education (MinEduc) and the Global eSchools and Communities Initiative (GeSCI)**.** Documentation related to global, regional and national trends for ICT integration in Teacher Professional Development (Butler, 2001; Olakulehin, 2008; Swarts, 2008; UNESCO, 2008a,b,c; Gasane, 2009; Kumar, 2009; Nduwingoma, 2009; Vuningungo, 2009) was disseminated prior to and throughout the workshop to all participants.

The workshop programme outlines the strategic objective of the workshop "to examine the parameters for ICT integration in Teacher Professional Development (TPD) in Rwanda through the identification of current challenges and possible futures for provision and ways to prepare for future scenarios now".

A Programme Framework for Reflection

The workshop challenge would be to organize a reflection across a distributed community of stakeholders and institutions. Working with colleagues in the facilitation team (MinEduc and GeSCI), I assisted in the design of the workshop sessions to incorporate an exploration of issues and future scenarios for ICT in TPD models through a three stage reflection process of (i) *diagnosis,* (ii) *scenario building,* and (iii) *synthesis*. We determined that the *diagnosis* session should use data from the baseline survey of prevailing practices, to trigger collective reflection and analysis of tensions in the system as a prelude to the *scenario building,* and *synthesis* sessions.

In the *diagnosis* session of the workshop I gave an overview of the Most Significant Change (MSC) technique and the Activity Systems (AS) model as a basis for introducing the hybrid approach to the workshop discussion. I proposed that we use the approach to analyze episodes of practice from the baseline survey data. I suggested that the use of the hybrid approach would provide us with two "mirrors" for looking into the ICT use in educational environments:

> **Mirror 1**- "Most Significant Change" story: Which story from the base line survey represents the most significant change?
>
> **Mirror 2** – "Activity Systems" model: What tensions do the stories reveal about educational practice?

The "Most Significant Change" Mirror

I prepared a purposive sample from the survey data of four practitioner stories of significant change to "mirror" change practices in programmes affiliated with national pre-service/in-service/school-based ICT in TPD initiatives. I presented the four stories in a group task for selecting the most significant change story from the set (Appendix B):

> i) Teacher Anastase's story – a primary teacher in a TPD in-service programme for 1:1 laptop saturation (access to audio at: http://gesci.org/old/files/docman/Audio2MSC.wma);
>
> ii) Teacher Alinne's story - a secondary teacher liaison in a TPD partner whole-school programme for IT literacy (access to audio at: http://gesci.org/old/files/docman/Audio-3MSC.wma);
>
> iii) Teacher Jacque's story - a secondary teacher newly graduated from a tertiary pre-service programme in Computer Science (access to audio at: http://gesci.org/old/files/docman/Audio4MSC.wma); and
>
> iv) Student Ronah's story - a secondary student attending an innovative ICT school of excellence (access to audio at: http://gesci.org/old/files/docman/Audio5MSC.wma).

Significantly all groups selected the stories of Teacher Anastase and Student Ronah as the most significant. The change domains they identified in these stories focus on shifts in the power relations between the teacher and learner with indicators of the "teacher emerging as co-learner" and the student "more confident in using technology than the teacher." Revealingly the stories of Teachers Alinne and Jacque were not selected by any group.

In the plenary session I questioned participants on whether there was anything to learn from the stories of Teachers Alinne and Jacque. It was at this point that participants suggested the story of Teacher Alinne in particular represented a narrative of "most *insignificant* change". I wondered why her story was deemed insignificant by all us. I wondered whether Teacher Alinne presented the profile of a "mainstreamer" or "late adopter" of technology – a profile representing "arguably the largest group in education systems and therefore the most important" (Hepp et al., 2004, p. 19). We suggested as a facilitation team that unpacking Teacher Alinne's story, looking more closely at her school setting using our "activity systems" mirror may reveal something "significant" about late adopters and their environments.

The "Activity Systems" Mirror

As a follow up to her story on Most Significant Change, Teacher Alinne was interviewed using the Activity System protocol (access to audio at: http://gesci.org/old/files/docman/Audio6Interview.wma) (Appendix C). During the interview she was asked about her role and responsibilities as the school liaison for the IT partner programme. She responded: "My role in this programme I think is to... to help students and teachers to be in contact with X (IT Partner) – they have to learn something" (Teacher Alinne, personal communication).

I wondered why Teacher Alinne was so hesitant. What are the opportunities and constraints that affect her work? More specifically what is it in her environment that is affecting her capability or her "cognizant agency" (Sen, 1999, as cited in Leach, 2008, p. 785) to carry out her work? The following extract from the interview suggests a communication tension between staff, school management and the IT partner which prevents Teacher Alinne from introducing the programme in the school:

> **Interviewer:** Do you intend to go on using ICT?
>
> **Teacher Alinne:** Yes...ah, yes, I can use it if I have an opportunity, ah...
>
> **Interviewer:** Why do you say if you have an opportunity?
>
> **Teacher Alinne:** Because as I started to say, this is a Centre of X (IT Partner), maybe if they gave us the opportunity to, to teach the programme here, we can go through ICT and use some computers and that...

We invited participants to participate in a group discussion analysis of Teacher Alinne's school setting using the Activity Systems mirror. To accommodate the discussions I prepared a group task orientation to provide participants with a general overview of Teacher Alinne's school activity system that was based on the interview data. Prior to the group discussions I worked through a sample analysis of the communication tension that was emerging in the school community with the introduction of technology (Figure 5).

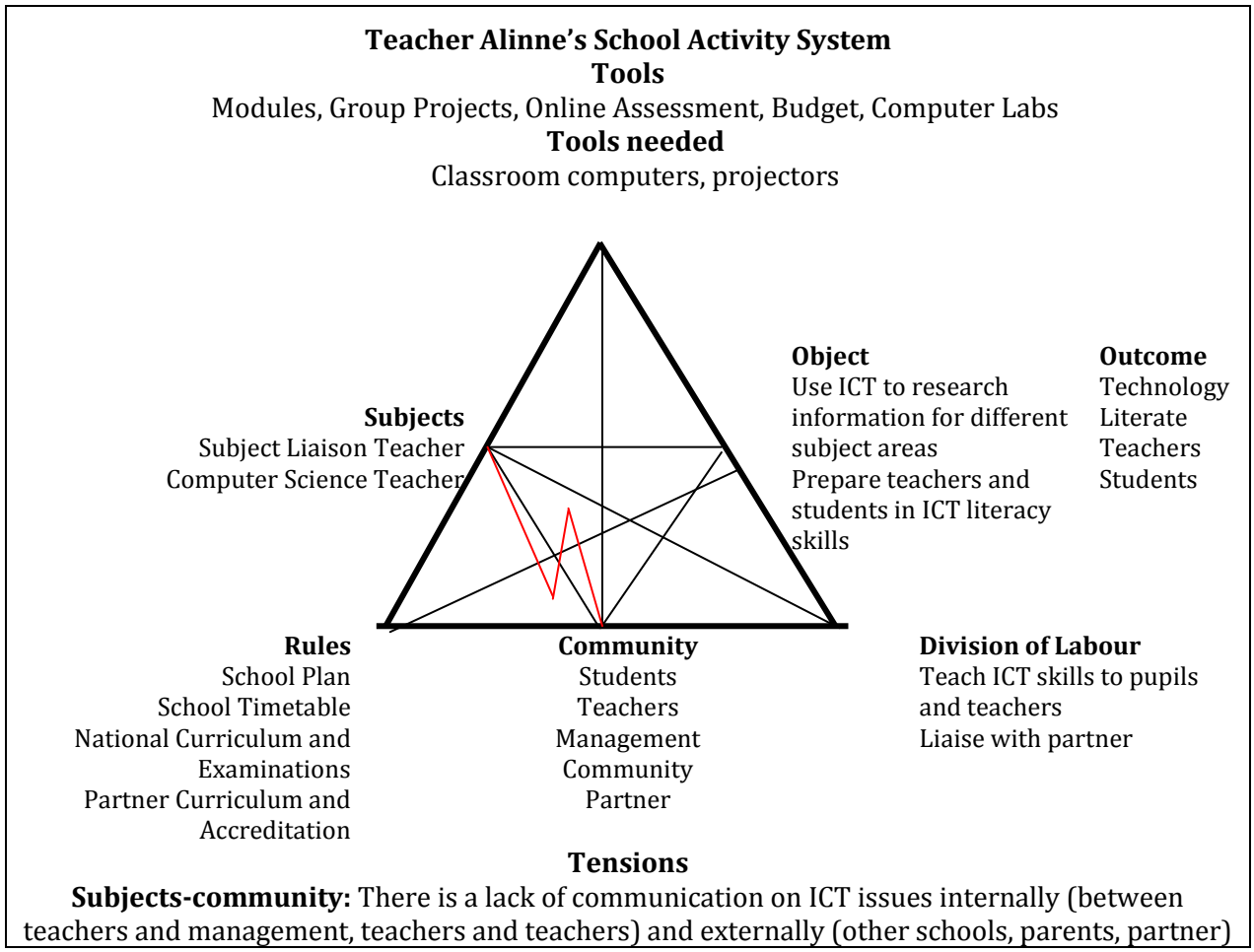
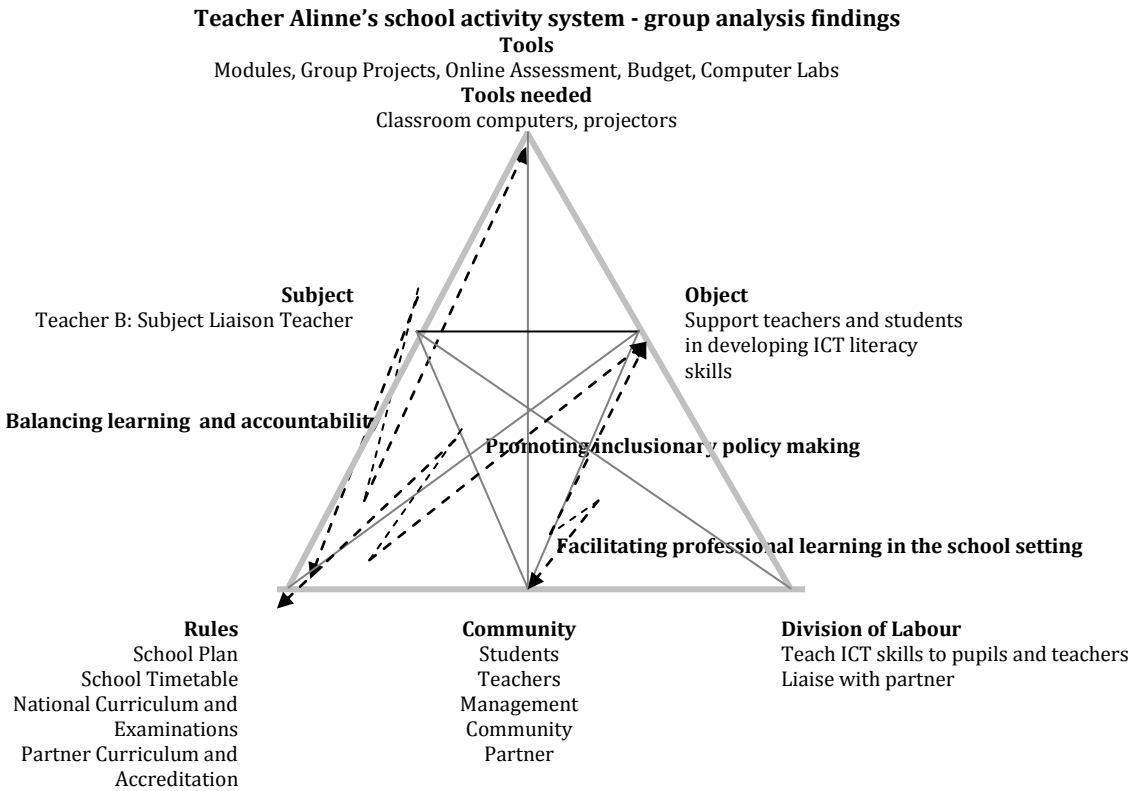


Figure 5. Activity system tensions in Teacher Alinne's School

During the group discussion analysis, participants worked with activity system models of Teacher Alinne's school setting on flip charts. Observing the discussions I was impressed by the manner in which the participants explored tensions across all elements of the activity system expanding the issues in Teacher Alinne's story into a forensic analysis of the education system. The activity system analysis that the participants presented in plenary represented a rich reflection on the issues from the local to the broader educational perspectives. From the group discussion analysis I was able to prepare a composite activity system representing the common themes and tensions which emerged. The significant tensions that the groups identified from Teacher Alinne's school environment included:

- facilitating professional learning in the school setting
- balancing professional learning with accountability
- promoting inclusionary policy formulation

The significant tensions in Teacher Alinne's school activity system are explored more fully in Figure 6. The tensions and contradictions illustrate the complexity of the change process in educational settings. They further demonstrate the "insignificance" of introducing technology if there is insufficient capacity and knowledge within the system "to develop new processes, to alter institutional settings and to effectively utilize the given technology" (Pulkkinen, 2009).



Facilitating professional learning in the school setting

There is a lack of clarity as to the role of the liaison teacher between the school community and the technology partner to promote school based ICT-TPD programmes. The teachers are not involved in defining the objectives for their training needs. The lack of communication between the liaison teacher and other teachers in the school community inhibits collective participation and inter-disciplinary collaboration within the school and between schools. These tensions were brought about by a lack of established procedures to support partnership activities for facilitating school based capacity building.

Balancing learning and accountability

The teacher is anxious over her inability to achieve the ICT literacy objective for all staff within the constraints of the school regulatory environment. Tight time-tables and bureaucratic planning inhibit opportunities for the teachers to research, to direct self-learning to communicate with other teachers on ICT use. The overemphasis on examinations in the school system results in teacher unwillingness to use ICT. The requirement of accountability in the top-down school system creates tension and contradictions that are counterproductive to the development of staff capability. There is little scope for promoting practitioner experimentation to explore the affordances of ICT tools to improve practice and develop more learner centred approaches. Regulations to integrate ICT into the curriculum in the field of assessment would be required to create a more conducive environment for technology oriented change across all curriculum areas.

Promoting inclusionary policy formulation

The emerging community of ICT teacher practitioners are not involved in planning policy or contributing to curriculum for ICT use. Teachers tend to be excluded from planning on ICT use in the school environment. The lack of adequate communication between teachers and parents in the community brings about tensions in understanding as to the purpose of ICT integration and teachers encounter a lack of support from the community for experimentation. The extended school community is not consulted or involved in the formulation of objectives.

Figure 6. Activity System representation of results

Reflection on cycle two

Cycle two was significant because I focused on encouraging arrangements for a communicative space in which to engage partners in a more collaborative approach for joint knowledge building. In adapting the narrative and dialogical tools into a hybrid approach my aim was to encourage a more equitable communication process for dialogue, knowledge building and mutual learning. I could see in the diagnostic stage of the workshop process that participants who had limited knowledge of the theories behind the hybrid approach were able (i) to appreciate its structure and (ii) to access and use tools for discussion analysis on complex issues of technology integration in systems.

Throughout the workshop I took photographs and video-taped snatches of group discussions and plenary sessions. My tutor Yvonne Crotty had worked with us in Dublin City University on using photography, audio taping and video-taping tools to document, to capture and to store conversations and recordings of reality of our practice for retrieval and evaluation later.

The workshop photo gallery and video artefact document the quality of participant engagement in the workshop process. The photographs seem to show participants' ease in using the "Most Significant Change" and "Activity System" theoretical tools and frameworks to reflect deeply and interactively on the issues and to envision scenarios and development paths for ICT in TPD.

Figure 7. Using the Activity System tool to present the issues (MinEduc & GeSCI, 2009b)

The video montage is somewhat jerky. It is a product of my circulation from group to group with my mini camcorder attempting to "capture" the group discussion dynamic as the deeper reflection on the issues took hold. This was perhaps a contradictory endeavour as the roving eye of the camcorder may have been perceived by some as somewhat intrusive.

Video 2. Using the Activity System tool to analyse the issues (GeSCI, 2009b)

There is one episode in the video however that in my view presents a "most significant moment" or a "critical episode" that shows a nuanced improvement in our work of engagement with partners. It is the moment where my colleague and co-facilitator Dr. Patti Swarts spontaneously asks participants for their opinion on the manner of our facilitation of the workshop. She then explains:

> **Dr. Patti Swarts**: I'm sure you've also noticed that we (GeSCI facilitators) didn't really participate in the group work and that was intentional... The issue was ... we didn't want to interfere in that dynamic because both Mary and I... we are... you know we provide certain perspectives but we don't want to influence the discussion in the group, we wanted you to discuss with each other and not try and explain things to Mary and myself... but to discuss with each other...

It is precisely in this moment that my colleague describes my values, our team values, our organizational values to the group. She articulates our commitment to a dialogue with our partners that is "about their view and ours" (Freire, 1970, p. 77) – where each can make their own unique contribution to the dialogue and where each can come to know in their own way. These are the ontological values and standards that we have embodied in our tacit being and understanding and that we have turned into our epistemological values and standards for our work, standards by which we assess our practice and with which we invite others to assess our work.

Reflection on my research

I began this research because of my commitment to the social purpose inherent in my organization's strategic vision for building a *Knowledge Society for All* (GeSCI, 2008). I value the capacity of other people, my colleagues and my partners to come to know in their own way. This is evident in the way I became aware in the first cycle of this research that I can negate my values in practice and bring inequities into the partner dialogue in the fragile

environments of our engagements. In order to address this contradiction I have been continuously engaging with the literature, participating in DCU Collaboratory forums, researching theoretical frameworks, reflecting on my own learning in order to improve my practice in assisting knowledge-building and sharing partnerships in our engagements.

I now believe that it is possible to create a communication space to encourage inclusionary multi-layered and multi-voiced dialogue in our partner engagements. I have experienced the rich potential of the communication dynamic in that space to push the boundaries of our thinking jointly and I am both excited by its possibilities and wary of its tentative nature. I have come to understand that I must continue to reflect on my practice, to value mutual learning, to sense the contradiction in the actions of my engagement with partners, in order to live my values.

I believe that I have influenced the learning of colleagues and partners. The workshop process using the hybrid model provided opportunities for participants to really understand the issues, their significance or insignificance and their impact on educational activity systems. In this approach, partners were able to clarify and take ownership of the issues from individual, institutional and systemic perspectives and to design their own development paths for the way forward.

The validity of my research enquiry

During the process of undertaking this research, I formally presented my work on two occasions on the 4th and 25th May within a peer validation group setting - on the former occasion in the presence of Dr. Jack Whitehead. The peer validation meeting is a requirement of the Masters in Education and Training Management programme (eLearning strand). The purpose of a validation meeting is to provide practitioner-researchers with the opportunity to present their research to others.

Validation also enables participants to gain new insights into the research process (Farren, 2008). Following the validation session on the 4th May, Dr. Jack Whitehead shared the following reflection in an email on my use of Activity Theory in the generation of my own living educational theory:

> I've been thinking about your engagement with cultural-historical activity theory in relation to the creation of your own living educational theory... There is a way of thinking about your living educational theory as a "potentially shared object" of "activity theory"... I make my living theory available through the web as a "potentially shared object" for understanding dialogue, multiple perspectives and voices, and networks of interacting activity systems. I also make it available with the intention of helping others in responding to their questions "How do I improve what I am doing?" in their community and workplace contexts and in making their own unique contributions to public knowledge (J. Whitehead, personal communication, May 12, 2009).

In this way I engaged in critical reflection throughout the research enquiry with colleagues and peers in general and with my supervisor, Dr. Margaret Farren in particular. In our meetings before and after my visits to Rwanda we discussed issues such as using Activity Theory as a method of analysis and integrating this into Living Theory. We had several

discussions on my use of the Activity System and Most Significant Change tools and frameworks in the first cycle and the need to adapt these tools in the second cycle to encourage a more equitable communication space for dialogue and knowledge-building.

From these processes of feedback, critical reflection and learning I believe that I have adhered to Habermas' (1998, as cited in McNiff & Whitehead, 2006) criteria of social validity, in presenting an account of my work that is comprehensible, truthful, sincere and appropriate to the context of my engagement with partners.

I believe my research account is comprehensible in that the process of inquiry documents an emerging conciousization (Freire, 1970) on how I actually lived my values in practice. As I worked through each cycle of engagement I came to a realization through self and peer reflection of the contradictions and inequities that I was promoting in partner dialogue. These inequities were occurring as I denied my values and the values of our organization by using tools in a manner that was exclusionary.

I believe my explanation is truthful, sincere and appropriate in the way it illustrates the emergence of my embodied consciousness of my values as I came to recognize the contradictions in my practice and focused on adapting the tools and frameworks to promote a more inclusionary process for authentic dialogue and mutual learning.

My explanation documents the potential in the "shared object" of Living Educational Theory and Activity Theory to effect a deeper understanding of the multiple perspectives and voices that emerged through the cycles of the research process – voices that engaged in debate, discussion, analysis, validation and ultimately in expansive learning.

Future Action

A Hybrid Approach for Knowledge-building and Sharing

I have shown that improvement in practice was achieved through action research cycles exploring the use of a hybrid "Most Significant Change" and "Activity Theory" approach for fostering authentic cross-institutional dialogue on ICT in Teacher Professional Development (TPD).

The first cycle of the research revealed the disconnects and tensions that exist within and across institutional activity systems on policy, planning and practice in ICT-TPD programmes and initiatives. The use of the hybrid approach in the second cycle of the research enabled key stakeholders from professional development, curriculum development and research institutions to jointly engage in constructive discussion on the issues emerging from the "thick description" (Geertz, 1973, as cited in Davis & Dart, 2005) of the *practitioner narrative* and from the tensions and contradictions of the *activity system analysis* components of the approach.

The research was limited however to investigating the dynamic interactions that emerged during one multi-stakeholder workshop process. As the research findings lack an in-depth historical perspective, I recommend that we engage our partners in multiple action research iterations of narrative and activity system analysis of the ICT-TPD landscape in

national and regional programmes. A comparative study of national and regional experiences and solutions over time could help us build a better picture on sources of tension in technology integration in the broader professional development landscape and promote mutual learning on strategies to overcome these.

I conclude that I have gone some way towards creating a communication space that is not simply confined to the building and sharing of knowledge but that is inclusionary and promotes each stakeholder's *active participation* in the knowledge creation process.

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Appendix A

Stories of 'Positive' and 'Negative' Change

All research participants are identified by pseudonyms in deference to research agreement stipulations for confidentiality. Stories were presented for the most part in English – a second or third language for most participants. In Rwanda the official languages are Kinyarwanda, English and French.

The following is an extract from a focus group discussion I conducted with a group of seven urban primary teachers who were introducing 1:1 laptops in their classrooms. In the extract they ponder on what constitutes "positive" or "negative" change (http://gesci.org/old/files/docman/Audio1TLICT.wma).

Anastase: Another point we have forgotten and which is important to remember, ah the children, the discipline of the children, have you seen the discipline how the children are disciplined if you tell them I will not give you the computer, they will keep quiet in the classroom, anything you ask them, you make the condition of not giving them the laptops, the work is done very well, the condition of not giving them the computer, the work is done very well. That is another thing I mentioned. But a negative thing I have mentioned, the children they like all those things which, only girls in the laptops, they like music, I don't know if you have mentioned "snappy", other things which I think can cause cannot be easy for the teacher to teach another thing as you said.

James (Librarian/ ICT Technician): There is also another positive effect he mentioned earlier, saying that there is no more to come late at school, because for him in his class, the students in his class, whoever comes late he never gives them a laptop, for now all the students arrive at school on time, they are punctual now because of that.

Jacqueline: Another thing that he says, he says that the student he likes to play music and he says that he says that it is a negative point and his neighbour says that it is not negative because actually the student, they want to discover so many things on their laptops, because there is another programme that the X (IT Partner) will import in our laptops, which will give, which will permit us to connect my activity to my children's, it means that the menu is called sharing, sharing activities, but that kind of programme is not available now, because that programme is not available, when you teach the laptops, the children do everything they want on the laptops (yes... ok...) because we don't have some work on our laptops (yes...) that is not negative because it is the beginning, when it is the beginning... the laptops... the children need to discover, they need to play, they need to do so many things on the laptops, I think that they if they play music, it is not negative, because they don't have something to do.

Anastase: I can support that because I think that if we accept that the children to have computers, these laptops during the holidays, so that they be familiar to the computer, so that when we start the New Year, ah the children will have already become familiar to the computer. The reason why it is disturbing now is because the time goes the children will think about other things...

Appendix B

Four Stories of Significant Change

All research participants are identified by pseudonyms in deference to research agreement stipulations for confidentiality.

Stories were presented for the most part in English – a second or third language for most participants. In Rwanda the official languages are Kinyarwanda, English and French.

Teacher Anastase: Primary teacher attending school based in-service programme for use of 1:1 laptop technology

Interviewer (addressing a focus group of primary teachers): Since the laptops came into your school and into your classroom, what has been the most significant change for you in your practice?

Teacher Anastase's Story (http://gesci.org/old/files/docman/Audio2MSC.wma)

Ok in my classroom I think I am now holding a very heavy task to avail the children to use the laptops – they like laptops very much - they want to survey what is being done in computers - the laptops – they discover so many things which I myself did not know them for – they also to teach me – I gain from them – although it is my secret that I did not know before – but sometimes I meet something they have written somewhere which I did not know – something like that (inaudible)... yeah, they want to use laptops, to be with laptops fluently for hours...that it was not easy to prepare them for the terminal examination this year ...yeah we were very strict too – but they were annoyed always – they wanted to remain with laptops in their hands.. and they want to be with them even at home, sometimes, eh, first there is very great pressure eh… with the children – but I can say on my behalf I wanted to learn about the computer before this time, but ah, as soon as the programme has come on at my school, I gained a lot from the laptop, I can now write and punctuate my data, and keep into in the computer...(inaudible)... I can keep my reports, I have already reached the internet and I can communicate with the world outside the country, I'm very happy with it...

Teacher Alinne: Secondary teacher liaison attending joint university/technology partner in-service ICT literacy programme for whole school integration of ICT

Interviewer: From your point of view, can you tell a story ah…which describes the most significant change in your practice as a teacher that ICT has brought, or that computers have brought in your practice as a teacher?

Teacher Alinne's Story (http://gesci.org/old/files/docman/Audio-3MSC.wma)

Emmm...Ah, ok... I don't know what to do, ah, to say, but, for me, emm... it was a good occasion to learn about computers because, I did at University only language, so it was my first time to... to be in contact with computers, ah... to open it, you know, practice and we learn about all programmes, excel, word, windows, and whatever, as you see, I don't know...em...

Interviewer: The question is, has these… this access to computer skills brought about a significant change in your practice as a teacher?

Teacher Alinne: As a teacher now I can use computer ah... maybe in making into certificates, I can do it myself, yeah... that's all... emmm...

Interviewer: No other significant change… where you use computers…

Teacher Alinne: I don't think so.

Interviewer: Do you have access to a computer yourself?

Teacher Alinne: Yes, I have my own laptop at home.

Interviewer: Do you use the laptop for any aspect of your professional practice, your work as a teacher of English?

Teacher Alinne: Yeah, I can use it ah… when I want to mark ah… notes, marks for students...em... the certificate, when they want to leave the school and I can go Internet, because I have a modem, MTN modem... yes... that's it..

Interviewer: Why is it important to…, ah…you mentioned quite a bit the certificates and the students' marks, why is this significant, why is this important?

Teacher Alinne: Maybe for the internet, you can say that when you have it, you have your own work in your hand, you can get news...ah... and many things... and be informed with many things with the internet...

Interviewer: And, but you also mentioned the student marking and the certificates – why is that important… the use of the computer important for that in your practice? Why does that make a difference?

Teacher Alinne: The difference is that maybe when we are working with your pen and paper, it can be... it can take more time, but with the computer it's ok... and even the paper it's very clear, instead of writing by the pen...

Teacher Jacque: Secondary teacher newly qualified graduate in Computer Science

Interviewer: You are the computer science teacher in the school, what significant change do you think computers are bringing to teaching and learning in this secondary school?

Teacher Jacque's Story (http://gesci.org/old/files/docman/Audio4MSC.wma)

Ah.. well.. the use of computer is of great importance, because if students are taught nicely how to use them, the computer can help them in their activities. For example, when I can say, according to what I'm teaching, to what I'm telling the students right now, because now if I'm introducing, they are studying the introduction to computers, the introduction VITE, where they come from and what is the history of it, and how can they use the computer, how can they use ICT to develop their country, to develop the individual, all they know, and if everybody, if a student knows how to manipulate, how to use computer, writing a text, writing a document and so on, or how a student can be, can know how to search, he or she goes to the computer, goes to a certain website, she can put a word like maybe biology, and she'll be able to get more detail about something, so the student get that information on how computers are used and how they can use that information, playing games, chatting, and if they can know beyond that, beyond playing games, beyond chatting and so on, but if they can know computer, how they can do some research concerning the other subjects, for example, if it is mathematics, physics, we know there are some sites, that they have detail, that they have information that are detailed, also some books here, because we tell them to go to the library to read, but also another way round if the computer or internet is used, they will do his own, his work, that's one, if they understand how they can used, oh, something else, they can communicate with one another, writing messages, they can communicate, so if a student or student here understand that, how a computer is used, I think it will make a great significant eh... today...

Student Ronah (G12) - Girls' Secondary School

Interviewer (addressing a focus group of secondary students): …Now you use computers, so what difference has it made to your studies? Can you tell a story which describes the most significant change, the most important difference? Anyone?

Student Ronah's Story (http://gesci.org/old/files/docman/Audio5MSC.wma)

Ok, thank you. As my friends also say that it was a change to us, and once we started doing our researches on the computer, it was like we used to think that maybe you are the only person taking that course, maybe this chemistry is kind of like too tough or something, but when you go there you get the opportunity to do your research, make research and you meet other students, other children from all over the world, who tell you that you know, they're doing the same thing, and you interchange ideas, you get their programme, you get... that's how you get the more explanations.. I think that, that's what kind of, that's the most thing that's the most thing that's emphasizing, that's impressed me in the computer thing, cos you meet new people and you know that if other people are doing it why can't I, I can also do this computers has made has brought this (inaudible) between us.

Interviewer: Why is it different? Why is it significant to you to actually meet other students who are studying in these areas? Why is that important?

The important thing is that, when you're studying a course and, as mostly people say, two heads are better than one, when you get someone you know that there is a student somewhere in Miami, there is a student in London who is taking the same course, we are doing the same things, so, it's like, you develop that spirit of togetherness, now we are doing the things together and of course when you go for research, she is helping you, he is helping you, you are also doing the same, and...

Group Criteria for Story Selection

Teacher Anastase's Story

Shift in teacher role

- teacher is no longer the gatekeeper of knowledge
- teacher is emerging as co-learner - learning with and from students about the technology

Shift in pedagogy

- student-centred approach
- discovering learning through exploring

ICT as catalyst for change:

- ICTs can change pedagogy
- student can become "addicted" and distracted from learning
- "war" inside teacher leading to anxiety

Student Ronah's Story

Shift in learner role

- from passive to active engagement
- student more confident in using technology than teacher

Shift in pedagogy

- Learning becomes real - changes world view
- Student can learn from research, team work, communication (self-learning)

ICT as catalyst for change

- ICT breaking down geographic barriers - world accessible through the internet
- 3d multi-media dynamic learning instead of 2d static learning
- interactivity for student
- Education For All Relationship

ICT tool focus

- Focus of student – use of ICT as a tool for learning /
- Focus of teacher – use ICT to teach technology literacy

Appendix C
Activity System Interview Transcript

All research participants are identified by pseudonyms in deference to research agreement stipulations for confidentiality.

Interviews were conducted in English – a second or third language for most participants. In Rwanda the official languages are Kinyarwanda, English and French.

Interview Transcript - Teachers Alinne & Jacque
(http://gesci.org/old/files/docman/Audio6Interview.wma)

Programme Goals:

Interviewer: What are the most important factors that encourage you to use ICT in your personal or your professional practice?

Teacher Alinne: I say that ICT make life easy, emm... it's easy and simple with ICT.

Interviewer: And when you say make life easy, ah, what, how, what is it in your professional life that you want made easy?

Teacher Alinne: Ok, I mean when you want to look for information, instead of coming here through books and library, you can go through Google and you can find something and write it down, you can find something to say, to teach your students.

Interviewer: Do you plan to go on using ICT?

Teacher Alinne: Yes...ah, yes, I can use it if I have an opportunity, ah...

Interviewer: And why do you say if you have an opportunity?

Teacher Alinne: Because as I started to say, this is a Centre of X (IT Partner), maybe if they gave us the opportunity to, to teach the programme here, we can go through ICT and use some computers and that...

Interviewer: Why do you think there hasn't been that opportunity?

Teacher Alinne: Because we have to have an extra time. Yeah. The fact it may be during the weekend and it's not easy.

Interviewer: Who would you be working with during the weekend?

Teacher Alinne: Maybe some teachers and students, if possible. Because they are here, they live here, for students no problem, maybe teachers I don't know...ah...

Tools:

Interviewer: What are the ICT tools that you would be using in this programme?

Teacher Alinne: We need computer, em...projector, I think...

Interviewer: Do you have any manuals?

Teacher Alinne: Yeah, we have her school properties. Yeah we have to use school properties, and they have it here. We have to... to use what we have here at school.

Interviewer: What methods, what approaches would you be using in this course?

Teacher Alinne: Normally they gave us notes, we have to read notes and we have some projects and then we can ah… do tests...that's what we have in the programme... and everything is online.

Interviewer: The course is online? So the projects that you do… are they for individuals or for groups?

Teacher Alinne: For groups

Interviewer: Can you describe the projects?

Teacher Alinne: How?

Interviewer: What is that you do in groups?

Teacher Alinne: The projects are for groups – in groups you normally give notes, after reading notes we can do quiz, after doing the quiz, now you can do a test, the quiz is in notes, but the test, you have to do it online and there are specific hours that you have to, only one hour.. and they can, they can give you maybe 40 questions, and you have to do them in only one hour.

Interviewer: What is the actual goal in this programme, what is the objective?

Teacher Alinne: The objective is emm... ah....

Interviewer: What do you… When you carry out the programme with other teachers and students, what is the purpose, what will they have by the end of the programme?

Teacher Alinne: I think that all (inaudible) is about ICT, about computer and programme, different programmes.

Interviewer: So the evaluation online is carried out externally...

Teacher Alinne: Emm...

<u>Roles and Responsibilities</u>

Interviewer: So what is your role in this programme?

Teacher Alinne: My role in this programme I think is to... to help students or teachers to be in contact with X (IT Partner) – they have to learn something.

Interviewer: So it's to facilitate contact…

Teacher Alinne: Yes…

Interviewer: Do you have any responsibilities?

Teacher Alinne: For now, no. I didn't start yet.

Interviewer: Do you have any information on the responsibilities you will have?

Teacher Alinne: Yes, we have everything – after we completed, they gave us everything, about X (IT Partner), about what you can do at school.

Interviewer: Do you find that the school administration is supportive for this programme?

Teacher Alinne: Yes. The problem is time, the problem is time, but they know.

Interviewer: Time in the school calendar…

Teacher Alinne: The availability of teachers, I don't know...They have to think about it.

Community

Interviewer: Is there collaboration among teachers in the school on ICT? Do you collaborate with each other on ICT in your programmes, inside the school?

Teacher Alinne: Inside, inside?

Interviewer: Yes here in the school… about the use of ICT in teaching and learning, do you collaborate, do you meet, do you discuss how it can be used in teaching and learning?

Teacher Jacque: Well for now, for now no, because well, this is the beginning of the year whereby the teacher has a lot of, many periods, 27, 28, like that, so you find that eh, eh, we are not yet permitted to get time to discuss about it, how they can use ICT in general, in their respective subjects, for now not yet, but maybe we can put in the plan for few months to come, maybe, and maybe we can see if it is possible to administration, and maybe other teachers we can talk, and we can discuss during our holidays we can see if there is time, during our holidays, because some of them they don't know ICT, they find if now they are poor, some of them actually they don't know, but if we can discuss with the teachers, during our time, our free time, and we can say, we can help each other...

Interviewer: Em... you have pointed out also school planning... emm... bringing it into ah... the school plan. Is there any other reason why teachers would not collaborate on ICT?

Teacher Jacque: Well the first point was that about time, if I am not mistaken, there is a low priority behind, they value time, but also priority, low priority should be there. Eh, two, maybe we could talk about them, maybe other responsibilities that they have, maybe to, because if time collapses, that is four thirty, everyone has to go to family, to see how we can plan to show him, and he has family, so maybe you find that they have a lot of responsibility to learn… I don't know if I am clear...

Interviewer: You're very clear... Is there any other reason you think that teachers don't collaborate on ICT... one is obviously time… if ICT is a low priority what are the high priorities?

Teacher Alinne: The high priorities eh… for teachers to prepare notes for what they have to teach their students in their subjects... and marking… that is what I think...

Rules and Regulations

Interviewer: And... what about for example… other rules and regulations that might influence teachers... for example assessment and examinations... you talked about marking quite a bit... Is this a high priority for teachers?

Teacher Alinne: Yes.

Interviewer: Why?

Teacher Alinne: Because you have to evaluate students in your subjects… em…

Interviewer: And why is this important?

Teacher Alinne: Maybe, they, what they, in marking they have to use the computer, then maybe you can have time to explain something, when they are marking, the use of excel, you can get time to, the opportunity...

Interviewer: If the computer is used for marking and for examinations, this will be useful to teachers, but otherwise it is not useful.

Teacher Alinne: Emm... yes...

Interviewer: Why not?

Teacher Alinne: I don't know… Emm...

Interviewer: Why is it a low priority?

Teacher Alinne: Emm...

Teacher Jacque: Emmm... maybe you can say that it's a new, a new innovation, it's still new, so if a teacher has been spending twenty years teaching mathematics and physics for example, ten with experiences, telling him to go to a computer to use what and what, that's why I say it's a low priority...

Interviewer: Thank you very much. We talked about teachers in the school looking at ICT. Do you ever communicate with other teachers in other schools about ICT?

Teacher Jacque: But maybe… Actually that's what I am, I want to, for the few months to come, maybe to start. But, for now, I have been meeting other teachers at different schools, how they are going on, like that, but not so much actually, not so much, because for the last two months, we are starting...

Interviewer: And I would like to thank you very much.

Teachers Alinne and Jacque: You're welcome.