

End-term Evaluation of the *Research Grants in ICT for Development Tenable in Universities in Eastern and Southern Africa* Project

Prepared by

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Executive Summary

This report presents the findings, conclusions and recommendations of an external evaluation of the *Research Grants in ICT for Development Tenable in Universities in Eastern and Southern Africa* Project funded by IDRC and hosted at the School of Computing & Informatics, University of Nairobi.

This Project was a three-year project (2009 – 2012) that enabled graduate students registered on a full-time basis in universities within the Eastern and Southern African countries to carry out research on different aspects of ICTs and development. The grant sponsored four Masters students on a full-time basis (24 months) and enabled eight registered Ph.D. students who did not have funding to undertake field work to carry out their field work for periods not exceeding 12 months. The Project provided technical support to the grantees by organizing a research methodology and scientific writing training workshop at the beginning of the awards offer to enhance the awardees' research and writing skills. The Project also facilitated supervision and mentorship of the grantees by linking them with academic supervisors and a network of eminent ICT4D researchers who served as mentors. The Project was granted a 6-month extension to enable most of the grantees to complete their studies.

This Project was initiated to address the inadequate capacity in ICT4D research within the region, in recognition of the importance of quality empirical research on the role of ICTs and their impacts on socio-economic development for evidence-based decision-making by governments, policy makers and practitioners. The Project also sought to strengthen intra-African linkages and collaborations so as to benefit from network externalities in further developing and sustaining the developed capacity.

a) Project Achievements

The Project has achieved its primary objective of developing regional research capacity in ICT4D in line with IDRC's Acacia programme themes by supporting the successful qualification of 6 PhD holders and 3 Masters graduates. It is expected that within the next twelve months, two more grantees will acquire their PhD qualifications and one more grantee will obtain their Masters qualification, bringing the total of directly developed human capacity to twelve. The newly qualified grantees are all working in Africa-based institutions and are actively engaged in ICT4D-related work thereby enhancing the ICT4D capacity of their respective institutions. The absorption of the grantees by local institutions contributes to continuity and sustainability of the developed capacity. Further, the Project has contributed high quality empirical research that is relevant to the socio-economic needs of the region as evidenced by the high number of refereed publications and dissemination activities undertaken by the grantees. The Project has thus contributed to creation of new, indigenous knowledge on the relationship between ICTs and development that is highly relevant to various stakeholders.

b) Areas for Strengthening ICT4D Research Capacity Building Interventions

- Prepare an induction document that details grantees obligations with respect to communication, progress and terms and conditions for continued support. This will help improve communication channels between the grantees and their supervisors, mentors and Project team so as to

monitor their progress more closely and take necessary interventions in good time. Communication with some of the grantees has been a challenge throughout the grant period and even during the evaluation exercise.

- Introduce scheduled, oral intra-Project research dissemination activities for each of the grantees so as to monitor progress and keep the grantees highly motivated. Such presentations could be presented orally via online conferencing technologies and would draw participation of all grantees, supervisors, mentors, donor representatives and the Project team.
- Expand the role of supervisors in the Project so that they can contribute their academic and professional expertise to a wider audience, and forge stronger relationships between participating universities.
- Require grantees to develop a research uptake and utilization plan at the beginning of their study, and perhaps require as output, either a policy brief or ICT4D prototype, so as to inculcate an ethos of practicality and utility of ICT4D research in the grantees.
- Organize Project symposia/colloquia and introduce a Technical Report series for themed dissemination of technical papers derived from the grantees' projects.

c) Lessons Learned

To be successful in their careers and offer leadership in the ICT4D domain, grantees require additional skills over and above technical research skills. These skills include grant writing and resource mobilization, project management, leadership and effective communication. Capacity building in these skills should therefore be done as part of the grantees training.

Grantees require sensitization and training on research uptake and utilization strategies and how to include these in their research plans, if their research outcomes are to be useful for policy or practice initiatives.

ICT4D research has great potential to transform the socio-economic landscape in the region if it is accessible to governments, policy makers and practitioners. There have to be deliberate, Project-level efforts to disseminate research results to these audiences by organizing targeted dissemination workshops on specific ICT4D themes. Without such efforts, most dissemination activities will remain biased towards academic audiences, and leave out critical stakeholders.

Research capacity is developed in at least three levels – individual, institutional and network. While it is easier to develop the individual capacity of the grantees, and their institutions by extension, it is a much harder task to develop a vibrant network of researchers. Developing a vibrant network of African researchers in the region requires a deliberate strategy to link individuals and their organizations and create opportunities for meaningful, mutually-beneficial engagements.

In recognition that on completion most of the grantees will continue their research activities within universities, it is important to undertake organisational capacity building within their universities on best practices of setting up effective research infrastructures, taking into consideration the support needs of junior researchers. This kind of sensitization would help improve the research structures and processes within the universities and create an environment that is enabling and supportive of the grantees' research activities.

Possible outputs of ICT4D research include policy briefs and ICT-based products and services. Funding to incubate at least one ICT-based product or service into a market-ready product or to publish a policy brief and push it to the right audience should be budgeted for.

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List of Acronyms

CBO	Community Based Organisation
EA	Eastern Africa
ICT	Information and Communication Technology
ICT4D	Information and Communication Technology for Development
IDRC	International Development Research Centre
MOU	Memorandum of Understanding
NGO	Non-Governmental Organisation
ODL	Open and Distance Learning
R&D	Research and Development
RCB	Research Capacity Building
SA	Southern Africa
SCI	School of Computing & Informatics
UoN	University of Nairobi

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1.0 Background

1.1 Description of the Project

Over the years, ICT4D has been touted as accelerating development and addressing poverty concerns in developing regions such as Africa. African governments are investing in ICTs with the hope that they will make a useful contribution to development efforts, e.g. poverty alleviation or enhancing the governance of governments. However, in Africa, there is limited empirical research on the role of ICTs and their impacts on socio-economic development at the individual, community and national level that governments and policy makers as well as practitioners can rely on for decision-making. It is also worthy to note that most of the research in this area has largely been carried out by researchers outside of Africa. This has been attributed to the inadequate human capacity in ICT4D research within the region, as well as weakly funded ICT4D Masters and Ph.D. programs in the local universities. The *Research Grants in ICT for Development Tenable in Universities in Eastern and Southern Africa* Project was initiated as a response to this dearth of human capacity and research resources in ICT4D.

Funded by IDRC and hosted at the University of Nairobi's School of Computing and Informatics, the Project administered a research grant to enable students registered in universities within the Eastern and Southern Africa countries to carry out research on different aspects of ICTs and development based on IDRC's Acacia programme priorities (see appendix B) or based on their specific countries' priorities. The eligible countries included Burundi, Comoros, Djibouti, Ethiopia, Eritrea, Kenya, Madagascar, Mauritius, Rwanda, Seychelles, Somalia, Tanzania and Uganda for the Eastern African region, and Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe, for the Southern African region.

The grant sponsored four Masters students on a full-time basis (24 months) and supported eight registered Ph.D. students to undertake their field work for periods not exceeding 12 months. Further, the Project provided technical support to the grantees by organizing a research methodology and scientific writing training workshop at the beginning of the awards offer with a view of enhancing the awardees' research and writing skills. The Project also provided supervision and mentorship by linking all the grantees with eminent researchers from local universities and funding the supervision process.

1.2 Project Objectives

The project committed to achieving the following objectives:

- (a) Build institutional research capacity on ICTs and development in the various universities in the region, with a view to creating knowledge on the relationships between ICTs and development and the associated impacts.
- (b) Build human capacity on ICTs and development in the region.
- (c) Provide support to weakly funded postgraduate programs on ICTs and development in the region.
- (d) Increase intra-Africa partnerships and collaborations.

1.3 Purpose of End-term Evaluation

The primary purpose of this evaluation is to critically and analytically examine the overall project to:

- 1) Assess project implementation and attainment of the objectives and results as outlined in section 1.2.
- 2) Assess the quality of the project outputs.
- 3) Profile the awardees with respect to their career accomplishments and future plans, paying particular attention to their involvement in the ICT4D domain.
- 4) Compile useful lessons learned, and draw attention to any other significant issues and concerns of relevance to the life cycle of the project.

2.0 Evaluation Approach and Methods

2.1 Conceptual Framework for evaluating RCB

This project was designed to develop individual as well as institutional research capacities in ICT4D, and enhance collaboration amongst researchers and/or their institutions within the region. Research capacity building and collaboration were therefore the primary concerns of this project.

One of the difficult challenges in measuring or evaluating capacity building interventions stems from first defining what capacity building is, and in the context of this project, agreeing on exactly what research capacity means. Various definitions for the term 'capacity' have been given, and they generally agree that capacity can be basically understood as the ability of people, organisations and society as a whole to manage their affairs successfully or to achieve effectively what they set out to do (OECD 2006). Extending this notion of capacity building specifically to the domain of research, research capacity can be thought of as the ability of individuals, organisations and systems to undertake and disseminate high quality research effectively and efficiently (DFID, 2008). In the context of this project, we therefore take research capacity building to mean the process of developing and strengthening the skills and abilities of the grantees to conduct high quality and useful research in ICT4D, and to enhance the research capacity of their respective institutions, and the focus region in general, in the ICT4D area.

The process of evaluation involves identifying an objective set of indicators or criteria against which an intervention is measured. To ensure objectiveness and comprehensiveness of the evaluation, these criteria should be based on guiding principles that underlie the intervention. For this evaluation, we identified the Research Capacity Building Framework (Cooke, 2005) that has been specifically designed to develop and assess research capacity building interventions. Though the RCB framework was developed in the context of building and evaluating research capacity in the health domain, it is generic enough to be adapted and re-used in diverse domains (Shams et. al, 2011).

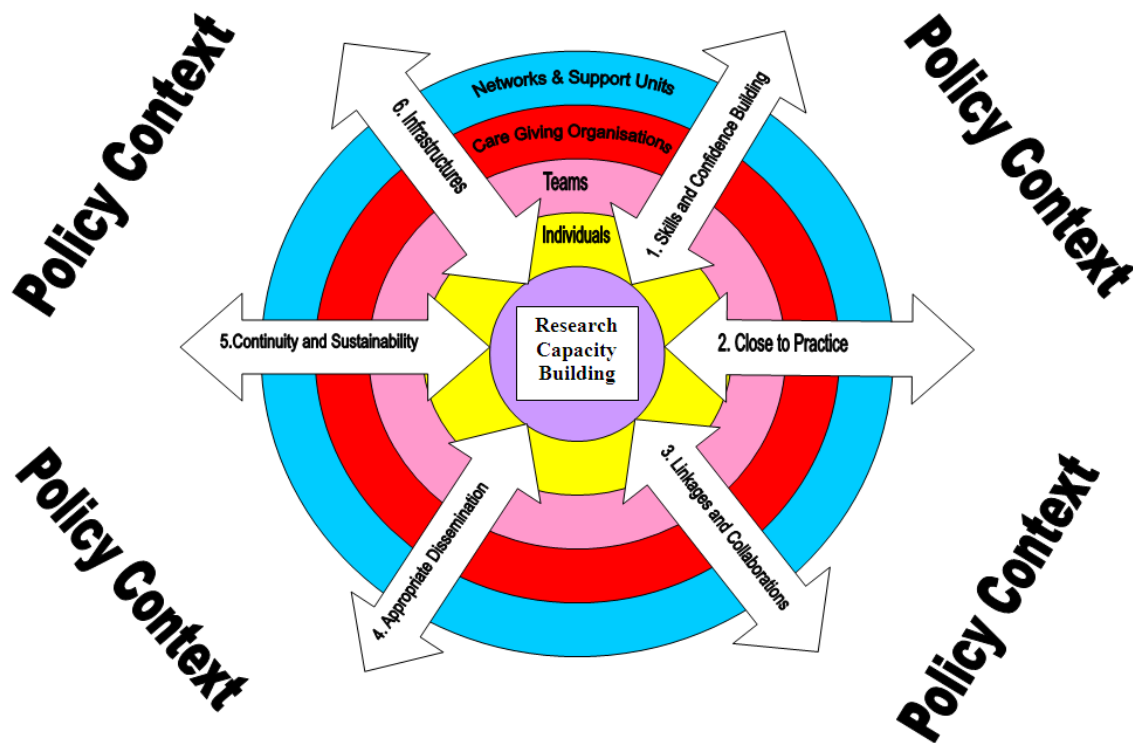


Figure 1: Cooke's Research Capacity Building Framework

As shown in Figure 1, the RCB framework identifies four structural levels of research capacity development activity and six principles of research capacity building. The four structural levels include: the individual, the team, the organization, and the network (supra- organizational) support level which are represented by concentric circles within the diagram. The six principles of capacity building that comprise this framework are:

- 1) **Skills and confidence building:** RCB involves the development of technical, managerial, and publishing skills, and these are developed through a multi-faceted process that includes training, supervision, mentorship and opportunities to practically apply research skills (Raina, 2007; Rhee and Riggins, 2007).
- 2) **Close to practice research:** This principle emphasizes the need for research to have a social impact through informing policy and practice, if it is to be useful and directly impact development.
- 3) **Development of linkages and collaborations:** This principle highlights the important role that organizations play in providing a knowledge base for research development and enhancement, knowledge creation and diffusion of research outcomes. Developing linkages, partnerships and collaborations with organizations is therefore a critical element in RCB.
- 4) **Appropriate dissemination:** RCB and dissemination of research findings should go hand in hand. This principle requires that dissemination of research be fit for purpose, with the traditional channels such as peer reviewed publications and conference presentations suitable for academic and practice communities, as well as other innovative publicity channels that target specific audiences with the sole aim of working towards research uptake and utilization.

- 5) **Building elements of sustainability and continuity:** RCB should contain elements of maintenance and sustainability of the acquired skills and structures, to ensure that individuals and organizations consolidate the built capacity through practice.
- 6) **Investments in research infrastructure:** This principle recognizes that research projects require not only tangible inputs but also sound academic and managerial leadership. Organizations should therefore strive to provide both of these inputs if research is to flourish, and for the latter, focus on establishing structures and processes that are supportive of research.

Given that the objectives of the project included not only building individual research capacity in ICT4D but also developing institutional capacity and collaboration networks as well, this framework provides an objective and systematic way to assess the performance of this project in line with its objectives. In using this framework, we take cognizance of the fact that the primary recipient of RCB in this Project was the individual, and therefore most emphasis will be paid to evaluating RCB at the individual level. The institutional and network levels will be evaluated in relation to the participation and contribution of the grantees in their associated institutions and/or networks, since as the model shows, RCB activities at any level can be affected by what happens in the other four levels. It is also important to note that the capacity of an individual, an organisation or a society is not static, but changes over time, and is subject to both internal and external influences. The RCB framework provides a context for evaluating these changes over time, as well as identifying and evaluating such catalysing influences.

2.2 Evaluation Criteria

To inform the identification and development of objective evaluation criteria, we reviewed relevant project documentation as well as literature detailing best practices in evaluating RCB. By considering the project objectives and expected outputs and outcomes, and using the RCB framework, we identified key evaluation criteria that would be used to formally assess the attainment of the projects' objectives and the quality of project outputs. We also incorporated the following evaluation questions which had been set out in the Terms of Reference.

- Did the project reach appropriate beneficiaries?
- Did all projects activities go according to plan? If not, why not?
- Were any changes made to the intended activities? If so, why?
- Are materials, information and presentations of good quality?
- Are the participants and other key people satisfied? Including involvement of supervisors and the extent to which it strengthened or not the south-south collaboration and built institutional research capacity, etc.

Table 1 summarizes the criteria on which the evaluation has been based.

Table 1: Evaluation Criteria

Component	Aspect	Criteria	Areas/Indicators
Research Capacity Building	Individual	Skills and confidence building	Professional qualifications; Promotion or change in duties; Acquired research Skills and competencies and how acquired; Evidence of progressive skill development; Evidence of confidence building through sharing new skills with others, applying existing skills in new situations, working with other professional groups in research; Participation in RCB activities; Quality and effectiveness of the Research methodology and scientific writing training workshop; Supervision and mentorship
		'Close to practice' research	Research uptake evidence (Practice-oriented outcomes, policy-oriented outcomes); Significance of research contribution; Community outreach activities; Dissemination in national workshops
		Development of linkages and collaborations	No. of collaborative projects or research partnerships; No. of co-authored publications; Participation in intra-African and International ICT4D research networks
		Appropriate dissemination	No. of refereed Publications and Conference presentations; No. of Seminar Presentations; No. of National Workshops; No. of non-traditional dissemination activities
		Sustainability and Continuity	Professional enthusiasm; Successful grant and fellowship applications; Research project management skills; Participation in RCB activities; New research/R&D undertakings; Type of employer and nature of work; Desired post-completion career-enhancing support

	Institution	Sustainability and Continuity	No. of successful Masters students; No. of successful PhD students; Number of grantees working in/affiliated to a local university; No. of grantees promoted within their institutions; Nature of RCB activities undertaken
		Investments in Research Infrastructure	Institutionalization of ICT4D Research
	Network	Development of linkages and collaborations	Promotion of intra-African networks, partnerships and collaborations; MoUs signed between UoN and collaborating universities
		Appropriate dissemination	Project Website
Project Management	Guiding Principles	Adherence to guiding principles of Transparency, Fairness and Promptness	Application process; Selection committee; Communication with grantees and other stakeholders
		Adherence to guiding principles of Regional and Gender balance of the grantees	% of female grantees; Regional distribution of grantees and Institutions
	Time Management	Adherence to timelines	Bi-annual progress reports; Project Reports; Planned vs. Actual timelines of project lifecycle; Project monitoring activities
	Financial Management	Adherence to budget	Project spending vis-à-vis Budget;
	Documentation	Quality	Project Reports

2.3 Methodology

As mentioned in 2.2 above, we reviewed relevant project documentation and undertook a comprehensive literature review on RCB evaluation, so as to come up with the evaluation criteria given in Table 1. Having developed the evaluation criteria, we structured the evaluation process as a series of the following activities, each of which is expounded in detail in the following sub-sections.

1. Identification of sources of evidence
2. Preparation of data collection tools
3. Sampling and Data Collection
4. Data analysis and project performance evaluation
5. Report writing

2.3.1 Identification of Sources of Evidence

To conduct the evaluation, we relied on multiple sources of evidence so as to obtain an in-depth understanding of the diverse relationships between all the stakeholders and environmental phenomena, in the context of the project's overall objectives. Multiple sources of evidence help shield the analysis and evaluation from any errors that may be implicit in the research methods chosen, and also support objective analysis, inferences and findings.

The key stakeholders in this project included the direct beneficiaries - the grantees themselves and indirect beneficiaries – their institutions and the region by extension. Other stakeholders include the implementation team led by the Project leader, the PhD and Masters Supervisors, as well as IDRC, the funding agency.

Given the project objectives and the evaluation context described in section 2.2 that largely focuses on the process and outcome of RCB, we relied largely on evidence provided by the grantees, supervisors and the Project leader, representing the implementation team. A list of respondents is given in Appendix B.

Review of Relevant Project Documentation

We relied on the following project documentation as another source of evidence, primarily for the project management component of the evaluation:

- 1) Project Proposal Document
- 2) Annual Technical Reports (July 2010, July 2011 and June 2012)
- 3) Annual Financial Reports (July 2010, June 2011 and June 2012)
- 4) Project portal (www.ict4dgrants.org)

We analysed the results achieved over the progress of the project against the targets and benchmarks set.

2.3.2 Data Collection Methods and Tools

To collect the required information, we developed data collection tools based on the evaluation criteria, targeted at the three different types of respondents – grantees, supervisors and project leader.

To address challenges of physical spread of the grantees, we combined two data collection techniques – a structured questionnaire and a follow-up interview. The structured questionnaire and interview guides are provided in Appendix C. The questionnaire captured all basic and preliminary information regarding the grantee, and this information was used to inform the follow-up interviews. The interviews focussed on questions that drilled down on various aspects covered in the questionnaire as well as collection of largely qualitative data that covered aspects on the grantees opinions, expectations, challenges and aspirations.

2.3.3 Sampling and Data Collection

The project awarded 4 masters scholarships and 8 PhD research grants, giving a total of twelve (12) grantees. Given that this number is manageable from a data collection point of view, we sought to interview all the grantees, so as to obtain as much information as possible to inform the evaluation. However, we were unable to reach one PhD grantee despite numerous attempts, and the actual number of interviewed grantees was eleven (11). Data collection proceeded in two stages for the grantees. In the first stage, the grantees were required to independently fill the structured questionnaire which was delivered online. Emails with a link to the online questionnaire were sent to the grantees, with instructions on how to fill it out. Once each grantee had completed the online questionnaire, a follow-up face to face or telephone interview was conducted, using the interview guide and drawing on the responses given in the online questionnaire. Each interview lasted approximately 30 – 45 minutes. The online questionnaires were filled out and follow-up interviews conducted between 16th and 26th February, 2013.

Given that the nature of supervision and mentorship is fairly similar and straightforward, we chose to interview 1 PhD supervisor and 1 Masters supervisor, and we assume that their feedback is representative of all other supervisors. We interviewed the Project leader as a representative of the project implementation team, who was in a position to provide information on all aspects of the project. Finally, we interviewed two representatives from IDRC with a view to get the donor's perspective on the project goals and desired accomplishments.

2.3.4 Data Analysis and Project Performance Evaluation

The data collected was derived based on the indicators and assessment areas given in Table 1. Data analysis and performance evaluation proceeded by grouping all indicators for a given assessment criteria and employing a mix of quantitative and qualitative analysis techniques to obtain objective measures, unearth relationships and come up with findings. Based on these analyses, we compared the findings vis-à-vis the objectives and their targets so as to come up with a sound evaluation on the degree of attainment of each target objective and associated outputs and outcomes. For each assessment criterion, we also analysed the data to identify reasons for less than expected attainment whenever this was encountered. By analysing the data and employing our expert judgement, we came up with sound and objective assessments as well as appropriate recommendations where necessary. The findings of the analysis are presented in the next section.

3.0 Results: Achievements and Challenges

In this section, we present our findings on how the project performed with respect to its laid down objectives. The findings are organized in line with the assessment criteria informed by Cooke's RCB framework and the project implementation criteria derived from the project documentation. It is through the lens of this framework that we make all evaluations of performance as well as give explanations for observed strengths and weaknesses, as well as lessons learned and pursuant recommendations.

3.1 Research Capacity Building

ICT4D Research capacity building is the core objective of the Project, and in this section, we evaluate how well the Project met this objective as given in section 1.2 and in line with the evaluation context detailed in section 1.3. We assess RCB at the individual¹, Institutional as well as network level.

3.1.1 Individual Level

Skills and Confidence Building

Effective RCB results in acquisition of research skills through training, mentorship and supervision, and researcher confidence, which is built gradually through practical utilisation of the acquired skills. A researcher whose skills and confidence have been developed and strengthened is in a position to in turn engage in capacity building by sharing the acquired skills with others, undertake continuous skills development, apply acquired skills in new research contexts, as well as work collaboratively with other professional groups.

To evaluate the extent to which the Project developed the skills and confidence of the grantees, we looked at the following indicators:

- i. **Acquired professional qualifications:** Three of the four masters grantees successfully completed their course and graduated with a Masters qualification. One of the grantees is scheduled to graduate in August, 2013². Five of the PhD grantees also successfully completed their research projects and successfully defended their theses. Of these five, four have since officially graduated, while one will officially graduate in April 2013. Of the remaining two doctoral grantees, one is expected to graduate in September 2013, while the other one targets to graduate in early 2014.
- ii. **Promotion at the workplace:** Three of the five PhD grantees who have completed their studies have since been promoted based on their new qualifications, an indication that they are able to handle more senior assignments at their workplace. This is both an indication of their developed skills and confidence as well as an opportunity to further strengthen their skills and confidence. The other two PhD grantees indicated that they have fulfilled the requirements for promotion though they have not yet been promoted. Two of the three master's grantees who are still at their original institutions have not been promoted since completion. However, it is important to note that one of them has been given more

¹ Most of the emphasis in the evaluation process is focussed on the individual as this was the focal stakeholder in the Project. Any evaluations of the institution or network are done in the context of looking at the participation or contribution of the grantee in associated institutions and networks.

² This grantee was scheduled to graduate in November 2012 but political events interfered with his university's academic calendar, delaying completion of some modules. The grantee is now on course and is expected to graduate in August 2013.

responsibilities at his work place. The other Masters grantee got a new job at the Ugandan Ministry of Finance on account of his new qualification. However, he has since left that organization and started an educational resource centre in the community where he is the head. Such changes in work and job descriptions are good pointers of increased skills and confidence.

- iii. **Effectiveness of the Research Methodology and Scientific Writing Training Workshop:** This workshop was conducted at the start of the grant period in Nairobi from 22nd to 27th March 2010. All the grantees attended this workshop with all but one grantee indicating that they found the training extremely useful in building their research capacity. The one PhD grantee who indicated that the workshop was somewhat useful said so as they felt they had already mastered all the skills that were taught in the workshop, and thus did not learn anything new. The PhD grantees further indicated that they would have wished for a more comprehensive coverage of qualitative research methods as well as exposure and training on how to use computer-based statistical analysis tools. The Masters grantees indicated that they would have wanted more training on scientific writing and publishing skills. All in all, the workshop was very highly rated by the participants as evidenced by this statement from one of the masters grantees:

“The research workshop helped me shape my ideas on what I want to do - I had always recognized the existence of problems but did not see the solution. Now I appreciate how the concepts and practice of ICT4D can offer a response to community challenges”.

- iv. **Supervision and Mentorship:** The grantees felt that the mentorship offered during the week-long workshop by the distinguished ICT4D scholars was invaluable in helping them appreciate the difficulties of the research process and how to manage the process without compromising other aspects of their life. This interaction was singled out as one of the highlights of the workshop. The Masters grantees were also very happy with the advice and mentorship they received from the PhD grantees. Supervision and mentorship received from the university advisors and the Project Lead during the research process was also rated as good and very supportive, as indicated by these responses from two of the PhD grantees:

“My supervisors were very effective and gave written feedback within three weeks. They also organized consultative meetings where they both attended and this made it easier for me since we were all in agreement with respect to the next steps in the research. I have learnt how to supervise students based on my experience with my supervisors”.

“...I am currently supervising research students and wish I can have more opportunity to impact masses of African students through my experiences and knowledge. I wish to be one of the ICT4D gurus in future, such as Prof Heeks, Prof Waema and others who play a significant role in uplifting the African higher education sector and also champions for ICT4D projects”.

- v. **Acquired research skills and competencies:** Over 90% of the grantees indicated that they had acquired new skills³ in statistical analysis, scientific writing and proposal writing during the course of their research. These skills were taught comprehensively during the workshop. At least 50% of the grantees indicated that they had acquired other skills that were not covered during the research workshop through their own efforts. These skills include fieldwork skills and techniques, resource mobilization and grant writing, research project management, research uptake and utilization, and research and product development skills. The acquired skills and competencies contribute to confidence building which enables the grantees to continue participating in RCB activities, as one grantee aptly put it:

“From my PhD work, I am able to appreciate the research process and do my work more efficiently and effectively. I also feel more capable and confident in handling complex projects”.

- vi. **Evidence of progressive skill development:** Given that over 50% of the grantees indicated that they had acquired new skills outside the training workshop, during their study as well as post-completion of their research study, this is evidence of progressive skills development based on individual initiative (see Table 3).
- vii. **Evidence of confidence building through participation in RCB activities:** Sharing acquired skills with others e.g. through training, supervision, mentorship, undertaking new research work etc. is proof of confidence built.

- a. **Training:** All the grantees who are working in universities are involved in building the capacity of others on the research skills they have since acquired. Two Masters grantees have been involved in teaching research methods courses to undergraduate students, while another indicated that training is not part of their current job description hence they have not had an opportunity to train. The PhD grantees have been involved in offering research methods courses to PhD students, in addition to teaching other domain-specific courses. One PhD grantee attributes their PhD qualification to their ability to train as quoted below:

“[Completing the] PhD gave me confidence to even teach new courses because I have the confidence to read and disseminate”.

- b. **Supervision and Mentorship:** All four PhD grantees who have since graduated are actively involved in supervision and mentorship activities. All are involved in masters supervision and mentorship, with approximately 20 masters graduates attributed to these grantees. For example, one PhD grantee has been active in supervision and mentorship, and has co-authored four refereed journal articles with his masters students. Two of the PhD grantees are currently supervising PhD students in the ICT4D area, while one⁴ serves as a PhD examiner and reviewer for local universities.
- c. **Undertaking new research activities:** Another example of participation in RCB activities is applying existing skills in new situations. This implies that the grantee

³ These skills were covered in detail during the training workshop conducted at the start of the grant period.

⁴ Note that this particular grantee is not based in a university but is actively involved in supporting local universities.

should be in a position to embark on new research activities that require similar or new skills to the ones they acquired during training. Here, we sought to find out what new research studies or projects they are involved in since completion of their study. Three (3) of the five PhD grantees who have completed their studies indicated that they have undertaken new research activities or projects that are directly related with the PhD study: one has implemented their research study findings in e-Learning into practical use within their university, another has spawned Masters-level projects which they are supervising and also embarked on new research projects that use concepts similar to those in his PhD study but applied in different domains (agriculture to health, transport, education), and the last one has contributed in national policy dialogues relating to national health insurance and a national e-Health strategy. One of the Masters grantees has embarked on capacity building projects in the area of e-Learning in local universities and surrounding secondary schools through the establishment of an educational resource centre that was established through a successful grant proposal⁵.

- d. **Collaboration with other researchers and professionals:** Another indicator of confidence building is manifested through working with other professionals on research projects. This includes co-publishing articles or collaborating in research projects with teams of professionals. All PhD grantees have co-authored at least one peer reviewed publication. One of the masters grantees co-authored a journal article with their supervisor, while another, though not in collaboration, has published 2 journal articles and written a book. Three of the five PhD grantees and two of the masters grantees are involved in collaborative projects as detailed under the 'Development of linkages and collaborations' criterion in a subsequent section.

Findings: From these examples, it is clear that the grantees have engaged in some type of RCB activities post-completion. From these indicators, it is clear that the skills and confidence of the grantees as ICT4D researchers and practitioners have been successfully developed, a significant outcome of the project.

'Close to Practice' Research

ICT4D Research that is close to practice should impact policy and/or practice. There should be a group of stakeholders who find the research useful and relevant for their needs. For this to happen, there has to be adequate public dissemination of the research findings, supported by deliberate efforts to spur research uptake and utilization. Given that all the grantees undertook projects that were within IDRC's Acacia ICT4D themes which are already designed to be relevant for the region and hence *close to practice* by default, we sought to evaluate the grantee's awareness on the need to cultivate uptake, deliberate efforts taken to encourage dissemination to key stakeholders as well as the extent to which they have translated their research outcomes into practice. To evaluate this factor, we considered the following indicators:

- i. **Significance of research contribution:** All the grantees indicated that they thought their research had a high significance to local needs.

⁵ The grantee wrote a grant proposal towards establishing the educational resource centre and received funding of 5,000 USD.

- ii. **Evidence of research uptake/utilization:** Despite giving a high significance rating to their research, only two PhD grantees had taken concrete steps to spur uptake of their research findings. One grantee actively participates in policy dialogues that inform his country's e-health strategy with emphasis on rural settings, while the other one is revising their institutional policy on ODL in line with their research findings. One other PhD grantee did a policy brief based on research findings but did not disseminate it. It is clear that grantees were not conscious of the need to work towards uptake and utilization of their research, and hence did not pursue any deliberate and targeted dissemination activities to relevant stakeholders. However, one Masters grantee developed a useful ICT4D product targeted at dairy societies but lacked funding to scale it up for deployment. In his efforts to work towards a viable product that would be in actual use in the community, he competed in a regional mobile start-ups funding challenge that drew the participation of venture capitalists and diverse donors but was not fortunate to secure funding, despite making it to the final round of the competition.
- iii. **Community outreach and awareness activities:** Despite undertaking research that is highly relevant to communities (e.g. farmers, learning institutions and economically marginalized communities) in the different research sites, few of the grantees engaged these communities or organisations with the view of sharing the new knowledge gained. However, there is one Masters grantee who is engaging local policy makers. He is working with the local city assembly and giving guidance on how the city can adopt his GIS-based work in mapping health facilities and influencing how health personnel are allocated to health facilities. Another Masters grantee founded an educational resource centre that avails books and other learning resources to local institutions with plans to develop and avail digital learning resources. He has partnered with two secondary schools and a tertiary institution in a rural setting to avail such resources.
- iv. **Dissemination in national workshops:** National workshops are attended by national players who more often than not influence policy, and as such, are good venues for dissemination of research that may inform policy. Almost all public dissemination activities were done outside the continent, and those that were done in the continent were fairly academic conferences that are unlikely to attract national-level decision-makers.

Findings: Though their topics were highly relevant and close to practice, in general, most of the grantees score poorly on the measure of conscious and deliberate efforts to engage relevant stakeholders through targeted dissemination and translating their research into practice as would be evidenced either by policy briefs or ICT products and services.

Development of Linkages and Collaborations

Building partnerships and collaborations is integral to capacity building as it enables the exchange, development and enhancement of research skills. Partnerships and collaborations established between practitioners and academia may contribute positively to research uptake and impact, as practice needs and priorities would influence the research questions to be addressed. Collaborations and partnerships may involve the grantee and other parties such as ICT4D practitioners and policy makers, experienced researchers e.g. supervisors and renowned scholars, and various professional groups and networks.

To evaluate the extent to which grantees developed linkages, partnerships and collaborations, we measured the following indicators:

- i. **Number of collaborative projects and research partnerships:** Three of the five PhD grantees who have completed their studies are involved in collaborative projects and partnerships. One grantee has done remarkably well as he is currently involved in 4 active research collaborations with partners ranging from international universities (University of Oslo and Columbia University), international research partners (ABT Associates, Nokia Research Centre) and the Ministry of Health. In one of these collaborations, the grantee is the principal investigator, and serves as a project manager in the other three. Another grantee in the same institution is serving as a researcher in one of these projects. The other grantee is currently a post-doctoral fellow at the Institute of Economic Research on Innovation at Tshwane University of Technology, where she is engaged in varied research activities. One of the Masters grantees has started an educational resources project that serves local educational institutions. Currently, he is collaborating with two secondary schools and one tertiary institution. Another Masters grantee is collaborating with a local city assembly in supporting them to adapt his research for their use.
- ii. **Number of co-authored publications:** All PhD grantees and one Masters grantee have co-authored at least one peer reviewed publication, either book chapters or journal articles. Most of these publications have been co-authored with their principal supervisor(s) which is an indication of RCB where novice researchers collaborate with more experienced researchers.
- iii. **Participation and contribution in intra-African and international ICT4D research networks:** Four of the seven PhD grantees are members of some research network, with each of them participating in at least one intra-African ICT4D network. One grantee is an active member and contributor in Research ICT Africa (RIA). Another is a founder member of the Kenya Health Informatics Association (KEHIA), and an invited member into the Human Computer Interface for Development (HCI4D) network (as a result of public dissemination of his research results at international fora). Another grantee is a member of two intra-African networks on localization, the African Network for Localization (ANLoc) and the African Language Technology Network (AFLAT), and one university-based research network, CLingDing (Computational Linguistics Research Group) at Indiana University, where one of his supervisors is based. One of the Masters grantees is a member of the Swedish ICT4D research group, a network through which he keeps abreast of current research and funding and collaboration opportunities.

Findings: Though some grantees score poorly on this front with no evidence of having developed any linkages, partnerships or participation in any research networks, 7 out of the 9 who have completed their studies have done fairly well on this score, with one in particular having done extremely well. Establishing such linkages depends on a host of factors including the grantees personalities, previous networks, institutional support and their current career focus, and as such, such variances are expected. We are also cognisant of the fact that establishing working partnerships does take time, and this evaluation is happening only within a year of most grantees completing their studies, which may not be adequate to make a lasting judgment on some of these indicators. In conclusion, we find that the project does score well on this aspect.

Appropriate Dissemination

Appropriate dissemination is a widely accepted measure of the impact of RCB efforts (Breen et. al., 2004). Given that ICT4D research should inform not just the academic community but the practice community as well (e.g. government, NGOs, CBOs, policy makers etc.), it is important that dissemination of research findings appropriately targeted to the different stakeholders and audiences be undertaken. Here, we evaluate how well the grantees disseminated their research findings to different audiences using the following indicators:

- i. Number of refereed publications and conference presentations - targeting the wider research community.
- ii. Number of seminar presentations – targeting institutional researchers.
- iii. Number of targeted workshops (these include national workshops, audience-specific workshops or presentations etc.) – targeting a less-academic audience that may include practitioners and policy-makers.
- iv. Number of non-traditional dissemination activities e.g. publicity instruments such as the media, internet etc. – targeting the general public.

Table 2 summarizes the findings for the first three indicators, which show that the grantees actively disseminated their research within the academic and practice communities, with a total of sixty (60) dissemination activities. However, most of these activities were heavily oriented to academic audiences. It is important to note that all grantees participated in at least one dissemination activity. All the PhD grantees wrote journal articles and participated in conference presentations. The support given by the project towards conference participation was invaluable in making this possible. Only two of the four masters grantees published their work, with one even publishing a book. The other two participated in workshops and seminar presentations. See appendices D and E for a detailed listing of all dissemination activities, and appendix G for a listing of research abstracts.

Table 2: Summary of Research Dissemination⁶

Dissemination Channel	PhD	Masters	Totals
Academic dissertation/theses	6	3	9
Books	0	1	1
Book Chapters	1	0	1
Journal Articles	16	3	19
Conference Proceedings	5	1	6
Conference Presentations	10	1	11
University Seminars	4	3	7
Workshops	5	1	6
Totals	47	13	60

With respect to non-traditional dissemination, only one Masters grantee presented his research at a funders meeting, as he sought financing for his ICT4D product. Further, the grantees did not leverage the potential of the internet e.g. through personal pages or blogs, for publicity and research dissemination, and the project website too, does not feature links to the grantees' publications. A quick Google search on the grantees however showed that some of them have created their

⁶ We only consider those dissemination activities undertaken during and after the grant period.

personal profiles on online professional sites such as *LinkedIn* and *ResearchGate*. Given the importance of the internet today for professional visibility leading to increased opportunities for networking, collaboration and research funding, the grantees should have done more to publicize themselves and their research via new media.

Findings: Dissemination of project results has been done very well, with at least one dissemination activity undertaken by all the grantees. Further some of the grantees used diverse dissemination methods to reach a wider audience. However, as mentioned in relation to *close to practice* research, there was no deliberate effort to disseminate findings to non-academic audiences, such as government, policy makers and the public, as confirmed by the low number of non-academic workshops, awareness seminars and non-traditional dissemination media.

*Sustainability and Continuity*⁷

As suggested by Crisp et al. (2000), capacity can be sustained by providing opportunities to apply and extend the acquired research skills. To measure sustainability and continuity, we look at evidence of continued skills application and career objectives, using the following indicators:

- i. **Successful grant or fellowship applications:** 3 of the 5 PhD grantees wrote grant or fellowship applications, and were all successful. One won a fellowship position, while the other two have had 7 research projects successfully funded between them. Of the two Masters grantees who put in funding proposals, one received funding to establish an educational resource centre, while the other was unsuccessful in securing funding to scale up and roll-out his ICT4D product.
- ii. **Extension and development of RCB skills:** All the grantees have acquired new skills and competencies since completion which should propel them further in the ICT4D domain. The grantees indicated that they have acquired these skills through various means e.g. by attending further training, self-study, mentorship, working in multidisciplinary teams, attending conferences and accessing IDRC resources. Examples of these skills are shown in Table 3.
- iii. **Professional enthusiasm:** On this indicator, we sought to establish the level of professional enthusiasm exhibited by the grantees, as this is an indicator to how active they will be in the field. We sought to establish what concrete plans they have with respect to building their ICT4D careers. One PhD grantee is already completing a post-doctoral fellowship, while the other four indicated their desire to enrol for one, subject to funding. The same is true for the Masters grantees who all indicated their desire to enrol for PhD programmes sometime in the near future, subject to availability of funding. All the grantees are very optimistic about the ICT4D domain as an attractive career, and they exuded a lot of confidence and enthusiasm for ICT4D research and practice. The following are selected quotations from the grantees with respect to their career plans:

"I feel well [good] about ICT4D. I am very hopeful for my future. I am planning to go for a PhD or enrolling for a Certified Information Systems Auditor (CISA) to improve on my technical skills. The completion of my studies has opened for me a sea of opportunities like lecturing the undergraduate students which is underway. I intend

⁷ We consider only those grantees who have graduated i.e. 5 PhDs and 3 Masters grantees.

to carry out more research in ICT4D and publish journal articles as well as authoring a book with my former supervisor”.

“[I plan to] increase my contribution to mentorship and modelling for upcoming researchers so as to improve the overall quality of research in Kenya and the East African Region. [I plan to] write successful research grants in technology-supported learning to impact positively on Kenyans and other people in the East African Region.”

“After completing my masters in August this year, my ambition (funds permitting) is to immediately enrol for a PhD program.....The masters course has therefore energised my career prospect of becoming a highly learned person in ICT so that I can be able, as a teacher, to share knowledge to Malawians a poor and developing country very far behind in ICT skills - my skills will help to develop University of Malawi in particular and Malawi nation in general. Apart from my PhD ambition, I also want to become a trainer of trainers in ICT4D and a recognised researcher. I am quite hopeful that my ambition will be achieved. I also have job security because of this Masters course”.

“ICT4D offers an opportunity to address real life issues in ways that affect the Bottom of the Pyramid members of the community. I feel that the research opened up possibilities of leveraging technology with socio-economic and technical issues among rural farming communities. My plan is to further research and development into ways in which agricultural practices can be improved through acceptance and eventual adoption of technology. Since graduation, my focus has shifted from abstract concept development to formulation of practical solutions to problems affecting people”.

- iv. **Employer and Job description:** Four of the PhD grantees are working in a university or a research institution where undertaking research is part of their job description. One PhD grantee works at a corporate company where collaboration with research institutes is encouraged. Two of the Masters grantees are working in universities but research is not part of their job description.
- v. **Participation in research activities:** All the PhD grantees, regardless of whether they are based in a research institution, have continued to apply the skills acquired during their study through participation in research related activities such as teaching, supervision, mentorship, undertaking new research projects and publishing. The Masters grantees have largely engaged in publishing-related activities post-completion.
- vi. **Desired post-completion support:** To further gauge the grantees commitment to developing and sustaining their ICT4D career, we sought to find out what support they currently require to ensure continuity of their research activities. This indirectly measures their awareness of, and commitment to addressing issues that could hamper research capacity sustainability and continuity. The responses given are summarized in Table 3, and large revolve around grant writing capability to fund new research activities, as well as mentorship. This clearly indicates that the grantees are enthusiastic about continuing their work as researchers, if they got the appropriate support.

Table 3: Sustainability and Continuity at the Individual level

Indicator	PhD grantees	Masters Grantees
New skills acquired/developed post-completion	Ethnography as a research method; User-centric design skills; Qualitative data analysis; Project management skills; Grant writing; Teaching; Student supervision; Computer-based data analysis skills	Product development, Entrepreneurship; R&D financial forecasting; Interpersonal skills; Management skills; Strategic planning
Desired post-completion support	Funding to support R&D; Mentorship on grant writing ⁸ ; Research project management skills; Development of a vibrant post-completion researcher support network ⁹	Proposal writing; Grant writing; Lobbying and Negotiation skills

Findings: 75% of the grantees who have since completed are based within universities or research institutions. This creates a very enabling environment within which to continue applying and developing their research skills. The grantees also demonstrate a high level of professional enthusiasm and this is an indication of their willingness to continue developing their skills and portfolio as they seek to remain competitive. This in turn creates opportunities to apply and develop the acquired skills, contributing to sustainability and continuity at the individual level. In conclusion, we find that the research capacity developed in the grantees achieves high levels of sustainability and continuity.

3.1.2 Institutional Level

As Cooke's framework shows, there is a lot of interaction between the four structural levels of capacity building, with one level possibly impacting on the others. The RCB efforts in this Project were largely geared to developing the capacities of individual researchers. However, a key outcome of individual RCB is that it impacts on the individuals' institutions as well. In this section, we evaluate the extent to which institutional RCB took place through the grantees. We consider two main criteria as described below:

Sustainability and Continuity

The impact of this Project on ICT4D research capacity in the grantees' institutions is directly influenced by the number of successful grantees and whether the institutions have absorbed these grantees, as well as by how these grantees continue to perform in ICT4D research. The latter criterion has been assessed in section 3.1.1, and in this section, we assess how many grantees

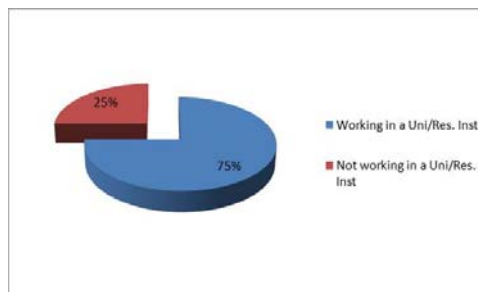
⁸ This involves writing grant proposals collaboratively with seasoned researchers who have written successful grants.

⁹ This is in reference to the Project's virtual communication network of grantees and mentors.

successfully completed their studies, where they are working post-completion, and the nature of their jobs, using the following indicators:

- i. **Number of successful Masters grantees:** Three of the four Masters grantees successfully completed their studies and have since graduated. The remaining grantee is scheduled to graduate in August 2013¹⁰.
- ii. **Number of successful PhD grantees:** Out of the eight PhD grantees, five successfully completed their studies. Four have already graduated while one is scheduled to officially graduate in April 2013. One of the PhD grantees who is yet to complete their studies is making good progress and is scheduled to complete by December 2013. It should be noted that this particular grantee was at the beginning of their study when they received the grant, unlike the others who were fairly advanced in their studies and were about to start data collection. The other grantee had to change his study focus after the key information system he was studying was withdrawn from use. He is scheduled to complete in early 2014. The other PhD grantee was scheduled to defend his thesis at an oral examination scheduled for July 2012 and then graduate in December 2012¹¹.
- iii. **Number of grantees working in a University or Research Institute:** Out of the five PhD grantees who have since completed, four are working in, or are affiliated to a university or a research institution. The same is true for two out of the three Masters grantees. This yields an absorption rate of 75% as shown in Figure 2. This is a good indicator that the research capacity in ICT4D in these institutions has been developed significantly by this Project, and will continue to be enhanced as the grantees continue undertaking RCB activities.

Figure 2: Grantee absorption rate in Universities/Research Institutes



- iv. **Number of grantees promoted within their institutions:** Three of the five PhDs (60%) have been promoted at their workplace, which increases not only their professional confidence, but their quality of life as a result of higher income levels. It can be argued that this bodes well for the institution in terms of retention of the grantees, further strengthening the continuity and sustainability of the developed ICT4D research capacity. None of the Masters grantees have been promoted. Table 4 shows the current job designations of the grantees.
- v. **Nature of RCB activities undertaken within the institutions:** As described in section 3.1.1, all the grantees are involved in RCB activities. Table 4 shows the kind of activities that the grantees are involved in, in line with their designations. The table summarizes the ICT4D and general research capacity that has been developed in these institutions.

¹⁰ Delays in this grantee's study plans were occasioned by a disruption of the university calendar due to political factors.

¹¹ The evaluator was not able to contact this particular grantee and is thus relying on the grantee's last known status as reported in the Project's 3rd progress report of June 2012.

Table 4: Designation and Job-related activities

Type of Organisation	Grantee type	Job Designation	Nature of activities
University/Research Institute	PhD	Lecturer, Senior Lecturer	PhD student supervision; Masters student supervision; Masters and PhD thesis examiner; Undergraduate and Masters teaching; Research; Consultancy; University ICT Projects Management
		Post-doctoral Fellow	Reviewing manuscripts for Institutional Journal; Organisation of PhD seminars; Research; Proposal writing
		Director, ODL centre	Providing leadership in the planning, development and delivery of Open and Distance Education programmes; Teaching Masters programmes; Providing research support to students
	Masters	Assistant Lecturer	Undergraduate teaching
		Chief ICT Officer in charge of Security	Responsible for Confidentiality, Integrity and Availability of university-wide ICT resources; Planning, design, implementation, monitoring and evaluation of security measures and controls in information systems and IP networks; Team member, ad-hoc ICT projects implementation teams
		(Acting) Director of Printing	Coordinating the production (printing) of teaching and learning materials including theses
		Editor	Editing all ODL learning materials in the university
Private enterprise	PhD	Manager, ICT Engineering	Team leader – ICT solutions development and quality assurance
	Masters	Centre Head	Grant Proposal writing; Budgeting and Accounting; Staff supervision; Action research planning & supervision; Publishing

Findings: 75% of the grantees who have since completed have been absorbed into universities or research institutions where they continue to develop their ICT4D research capacity. The grantees are

also involved in a wide range of RCB and managerial activities, further strengthening the research capacities at the institutional level. This translates into a sustainable model for developing and sustaining the institutional capacities of participating universities. In conclusion, we find that the Project has contributed positively to increased ICT4D research capacity at the institutional level, and laid good foundations for its continued sustainability.

Investments in Research Infrastructure

An effective research infrastructure comprises of organisational structures and processes that enable researchers to manage and carry out their projects effectively. In this project, we consider not only the institutions where the grantees are based, but also the institution hosting the Project, the School of Computing & Informatics, UoN, to evaluate the extent to which the Project has impacted on research capacity at the institutional level. We consider the following indicator:

- i. **Institutionalization of ICT4D Research:** Some of the universities hosting grantees have institutionalized ICT4D research to some extent, with others indicating that there is now an awareness of the need to do so. At the Kenya Methodist University, even if there is an existing directorate of research headed by a Dean, the PhD grantee at KEMU indicated that she has plans to form a research committee within the centre that she heads, that would manage proposal writing and coordinate research and publishing in the area of ODL. At the University of Malawi, there is an interest to establish ICT4D research, but nothing concrete as yet has been done. A Language Technology working group has been established at the University of Addis Ababa that brings together relevant stakeholders in a collaborative network. These stakeholders include the media, and they have managed to collect research resources, particularly natural language corpora which are a critical resource for the PhD grantee's research work. At SCI, the Project's host institution, there has been considerable progress in institutionalizing ICT4D research. With the support of the Project leader and two supervisors, SCI developed a research strategy that culminated in the establishment of the multidisciplinary Computing for Development Lab (C4DLab). ICT4D is one of the main areas of research and development in this lab, and the two PhD grantees are actively involved in shaping and carrying out research projects within the ICT4D thematic area. To further strengthen R&D capacity in line with the C4DLab research themes, the SCI has developed and recently introduced new masters programmes that are aligned to its research themes and that are responsive to national and regional needs. One of these programmes is the M.Sc. in Applied Computing¹² which seeks to develop capacity in the ICT4D domain¹³. The two PhD grantees are part of the human capacity that is key for the successful delivery of this Masters programme especially in the areas of ICTs in Education and ICTs in Agriculture, in line with their PhD studies. The C4DLab provides a well-thought out research structure that has a research co-ordinator and two graduate assistants who are available to support the researchers on varied research project management tasks. The SCI, and the wider UoN community have thus greatly benefitted from this grant both as a host as well as through the PhD grantees, as evidenced by the new ICT4D-oriented masters programme, increased

¹² 25 students have applied for admission into this programme which commences in May 2013.

¹³ R&D work spans application of ICTs in Health, Education, Agriculture and Environment, as well as Language Technology, Mobile Financial Services and Smarter Cities.

competitiveness and capacity to attract more grants and collaborative research projects¹⁴. However, in all universities, the grantees felt that the existing structures and processes are not streamlined, nor supportive of a researcher, especially a junior researcher or one with less experience in managing research projects. They cited lack of knowledge on research funding and collaboration opportunities, poor grant writing skills, poor or limited research project management experience and bureaucratic university procedures and processes for establishing and managing funded research projects, as key hindrances to continued research production.

Findings: A thriving and enabling research environment is driven by efficient research structures and processes that give researchers the freedom to focus most of their energies on their core research work, rather than on bureaucratic project management processes. Not much in the way of an enabling research infrastructure is evident in most of the universities, except for one where an entity dedicated to managing and growing ICT4D research has been established. There are evident challenges in streamlining the research processes at the participating universities, and this directly affects the research productivity of the grantees at these institutions.

3.1.3 Network Level

One of the objectives of this Project was to develop a strong intra-African research collaboration network and link researchers from the region with each other with the aim of building a critical mass of experts in this domain, sharing best practices and experiences, and collaborating in addressing common societal challenges. In this section, we evaluate the extent to which the Project achieved this objective by considering the following criteria:

Development of Linkages and Collaborations

We consider the following indicators to determine if the Project developed any linkages and collaborations, and how these, if any, are faring:

- i. **Promotion of intra-African networks, partnerships and collaborations:** The research workshop that brought together grantees, mentors and facilitators from different African countries, in addition to IDRC representatives was a first step in establishing an intra-African network in ICT4D. The grantees stated that they formed lasting professional contacts as well as personal friendships from this interaction. Further, one PhD grantee actively mentored and supported two masters grantees who were in a different country, and this professional engagement, though weak, remains. However, there is no evidence that any of the grantees have participated in writing joint proposals or collaborating in research projects despite knowing each other's research interests and strengths well. Given the focussed areas of specialization that were in line with the IDRC Acacia themes, it would be expected that the grantees would leverage on their skills and competencies to write joint proposals that address challenges that are common to the region. For example, three of the PhD grantees and one of the Masters grantee were working in the area of technology supported learning and teaching, and it would seem a natural progression that they would find common areas

¹⁴ ICT4D researchers at the C4D Lab have been actively engaged in not less than 8 funded research projects and collaborations over the past 12 months, including the recently IDRC-funded project on *Innovative Application of ICTs in Addressing Water-related Impacts of Climate Change* headed by Prof. Waema, the team leader in this Project.

of working together, and explore these within the Project network. However, this has not happened. The supervisors who participated in the Project were only involved in direct supervision of the grantee in their institution. They were not engaged in any other Project activity. Supervisors provide a powerful link to the institution and were an asset that was not utilized to foster linkages between different universities in the region.

- ii. **MoUs signed between UoN and collaborating universities:** No MoU was signed between UoN as the host institution and any of the grantees' universities. This failure was attributed to the lack of good contacts with the university management of the collaborating institutions since the Project leader only had access to the supervisors, who more often than not, saw their role as only that of supporting and supervising the grantee as an academic mentor.

Findings: Successful partnerships and linkages rely on both individual motivation and drive, as well as formalized institutional agreements. At the personal level, it remains a challenge to foster the desire for, and recognition of, the benefits of collaborative research, which can then be supported by formalized institutional agreements. At the institutional level, creating and executing MoUs is a complex process that requires top level management support and participation, which was lacking in this Project. We find that the Project did not do well in establishing intra-African partnerships, linkages and collaborations.

Appropriate Dissemination

The success of any network depends to a large extent on how vibrant the communication is, and how active the members are in sharing and disseminating appropriately-targeted communication through the network. Online communication e.g. through a website, provides a cost-effective way to manage communication through a network. To assess whether the Project had a good online communication strategy, we looked at the following indicator:

- i. **Project Website:** The Project developed a website that is hosted at www.ict4dgrants.org, and a mailing list through which important announcements were made to the grantees. This site featured information that was fairly static and primarily relevant to the prospective grantees, grantees and persons interested in the project from a project management perspective. Further, the website did not include links to the participating departments or schools and their universities, with the exception of SCI and UoN. The site features a discussion forum, but our analysis reveals that it was not frequently used¹⁵ and when used, only four of the grantees and the project management team participated. This may be attributed to the fact that there was no strategy to identify and moderate interesting research-related topics e.g. based on specific ICT4D themes, and as such, the discussion revolved around project management issues, which are not enough to sustain a vibrant discussion. The site did not feature dynamic content that relates to the research outputs or dissemination activities undertaken by the grantees. Dynamic content keeps a website up-to-date and relevant in keeping with a changing research environment, generating interest and attracting participation from the network members.

Findings: Though the Project developed and hosted a website, it seems that there was no proper online communication strategy that would have leveraged the online presence to establish a vibrant inter-Project network, through which an intra-African network of collaborators would have

¹⁵ The last posting in this forum was in 2011

developed. The Project therefore does not score well on appropriate dissemination for establishing a vibrant partnership and collaborative network.

3.2 Project Management

The terms of reference for this evaluation included the requirement to critically examine the project life cycle and assess performance and conformance to the proposed project plan. The review of the project management aspect is guided by the evaluation questions given in section 2.2. We examine the project's adherence to the guiding principles as set out in the proposal, how well the project conformed to the plan with respect to time and financial management, and also evaluate the nature and quality of project documentation.

3.2.1 Guiding Principles

Adherence to the guiding principles of transparency, fairness and promptness

The project committed to upholding transparency and fairness in its activities, and especially with respect to the process of selecting grantees. Promptness in communication was also to be a key principle in Project execution. We evaluated the extent to which the Project adhered to these guidelines by looking at the following indicators:

- i. **Application Process:** An announcement of the grants call was prepared and availed in both English and French so as to reach both Anglophone and Francophone applicants in the region. The announcement contained all relevant information i.e. the objectives of the project, eligible fields of study, eligibility criteria and all that was required of applicants. An application form accompanied the announcement making it easy for applicants to submit their applications. The announcement was circulated to 35 universities in the 23 countries in the region that offer ICT4D or ICT related training at the Masters and/or PhD level. The announcement was also publicized through various online academic forums and professional mailing lists for wide dissemination. Throughout the application period, the Project team were in constant communication with the applicants, clarifying information and assisting them in the process. This meant that no applicant was disadvantaged due to lack of information or misunderstanding of the process. Objective selection criteria (see Appendix H) were developed and used to rank the applicants based on merit, providing for transparency and fairness in selection of grantees. This is aptly captured by the following quotation from one of the grantees:

"I liked the selection criteria – [based] on merit, no biasness. Even someone from far and remote like me was chosen."

- ii. **Selection Committee:** The selection committee comprised of leading African scholars in the ICT4D domain and key IDRC representatives. This meant that the panel had the requisite technical expertise as well as knowledge of the ICT4D challenges in the region, to select grantees based on merit as well as relevance of their research with respect to the regional needs and IDRC's Acacia themes.
- iii. **Communication with grantees and relevant Stakeholders:** Timely and relevant communication is key for successful project implementation, and the Project committed itself to promptness with respect to communication and responding to grantee needs.

Communication from the Project to stakeholders (grantees, IDRC) was rated as very good and prompt. The website blog features a number of discussion threads between the grantees and Project leader and project assistant, and from these chats, it is evident that responses to grantees' queries were attended to and addressed promptly. Most of the grantees highlighted prompt and constant communication as being one of the things they liked best with respect to the day to day management of the project, and which contributed to their continued progress, as stated in these quotations:

"I liked the prompt dissemination of information."

"[I liked] the continuous support I got to complete my doctoral thesis after the funding."

".....Moreover, the financial assistance and the follow up and encouragement by the project coordinators and leader was helpful to keep on progressing."

"The project management was good and supportive and the advisers gave in really their time."

Findings: From the above indicators, we find that the project adhered to its set principles of transparency and fairness in grantee selection, and promptness in communication and executing project activities.

Adherence to the guiding principles of regional and gender balance of the grantees

The project committed to ensuring gender and regional balance of the selected grantees. We evaluated the extent to which the Project adhered to these guidelines by looking at the following indicators:

- i. **Percentage of female grantees:** To improve the selection chances for female applicants, the selection criteria awarded an extra point for female applicants. Out of the sixty-one Masters applicants, only 48 were eligible for consideration. The distribution of Masters applicants and grantees by gender is shown in Figures 3 and 4. It is important to note that one female grantee had been selected but her scholarship was revoked as she already had another scholarship, leaving no female Masters grantee.

Figure 3: Masters applicants by gender

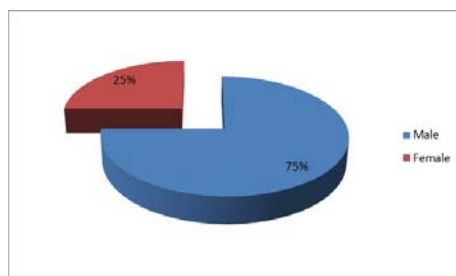
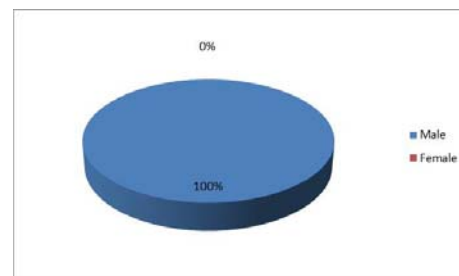


Figure 4: Masters grantees by gender



The distribution of eligible doctoral applicants and grantees by gender is shown in Figures 5 and 6. It should be noted that all female applicants were awarded the doctoral grant, however one opted to drop out, leaving two female doctoral grantees.

Figure 5: PhD applicants by gender

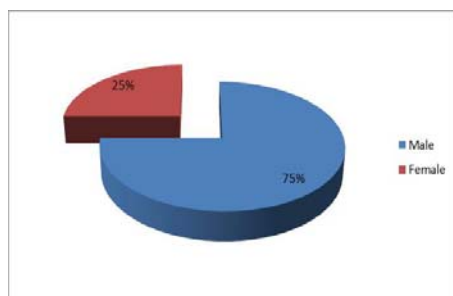
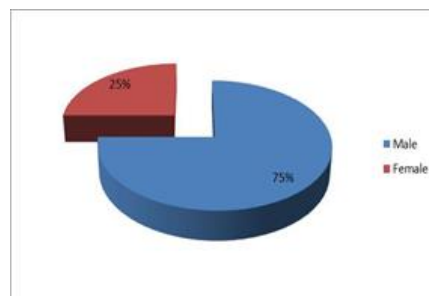


Figure 6: PhD grantees by gender



- ii. **Regional distribution of grantees:** There were 24 eligible countries from the East and Southern African region, with 14 EA countries and 10 SA countries. Masters applicants came from 14 out of the 24 countries and were studying in 12 of the 24 countries. The distribution of applicants versus grantees with respect to citizenship and country of study is shown in Figures 7 – 10.

Figure 7: Masters applicants by citizenship

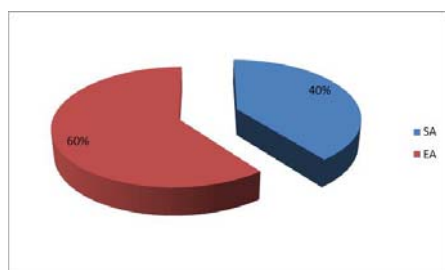


Figure 8: Masters grantees by citizenship

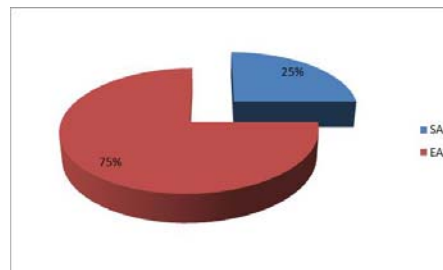


Figure 9: Masters applicants by country of study

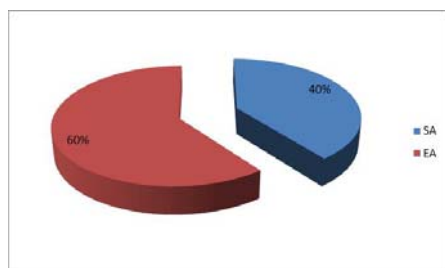
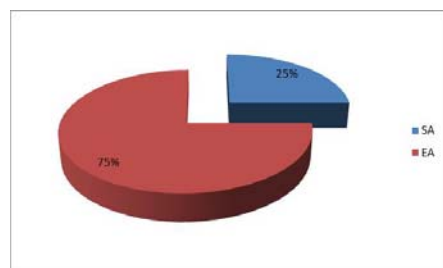


Figure 10: Masters grantees by country of study



Eligible PhD applicants came from only 4 out of the 24 countries, with 58% of them being Kenyan citizens. The applicants were enrolled in universities from only 5 countries, which may be attributed to the low number of universities in the region that offer a PhD programme in ICT4D. The distribution of eligible applicants versus grantees with respect to citizenship and country of study is shown in Figures 11 – 14.

Figure 11: PhD applicants by citizenship

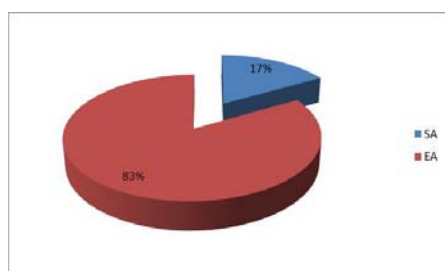


Figure 12: PhD grantees by citizenship

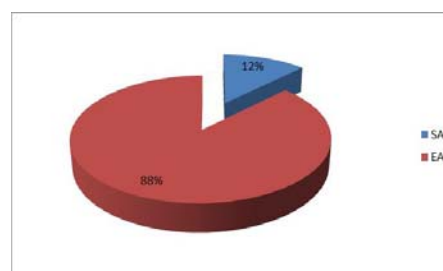


Figure 13: PhD applicants by country of study

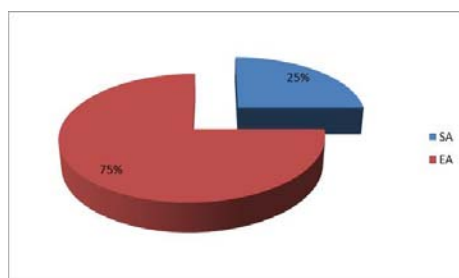
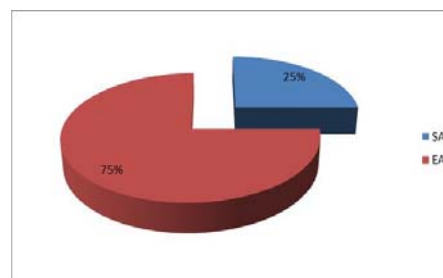


Figure 14: PhD grantees by country of study



Findings: The extent to which the Project adhered to its set principles of gender and regional balancing was dependent on the applicants who applied for consideration. With respect to gender, eligible female applicants accounted for 25% for both awards. After selection, despite the additional point in favour of females, the female grantees accounted for 0% and 25% of the Masters and PhD grantees respectively. Clearly, gender balance was not achieved with respect to the Masters scholarships, while it was achieved for the PhD awardees looking at the ratio of percentage of applicants versus percentage of grantees which would be expected to have a fairly similar distribution. With respect to gender balancing, there were more applicants from EA than from SA, and this distribution is reflected in the regional distribution of the awardees. The distribution of PhD applicants versus awardees by region is fairly consistent, implying attainment of the regional balancing principle. The distribution for the Masters scholarships is not as consistent, with the EA region receiving more grantees and more grantee institutions. However, considering that there were 48 applicants competing for only 4 merit-based Masters scholarships, the Project did strive to achieve regional balancing. The target region covered 24 countries, and the announcement was sent to 35 institutions from 18 countries. PhD applicants came from only 5 countries while Masters applicants were drawn from 12 countries. This disparity may be attributed to the low number of universities offering ICT4D programmes at either the Masters or PhD level. Though it might be very hard to establish if there were other underlying reasons for this disparity, it does suggest that the information channels employed in the Project may not have been as effective in reaching many potential beneficiaries in all the 24 countries.

3.2.2 Time Management

The Project proposal had a detailed implementation plan with key milestones clearly spelled out. In this section, we evaluate how the Project performed with respect to its set milestones and establish what deviations, if any, occurred and the justifications for these. Table 5 shows the key milestones, proposed completion date and an indication on whether these timelines were met.

Table 5: Timeline of Key Project Milestones

Activity	Output	Timeframe	Completed on Schedule?
Contract preparation and pre-grantee selection activities	Contract MoU between University of Nairobi and IDRC Project Assistant Publicity materials Applications Selection Committee	May – Sep 2009	Yes
Selection of grantees and Awards official announcement	Selected Masters scholarship awardees Selected Doctoral research grant awardees Awards	Oct – Nov 2009	No Completed in January 2010
Relationships with host universities		Nov-Dec 2009	Not done
Start of research activities	Registered Masters students Start of research by Doctoral grant awardees	Jan 2010	Yes
Research methodology and scientific writing training	List of participants of the training workshop	Feb/March 2010	Yes Held on 22-27 March 2010
Monitoring and external evaluation	External evaluation report	Jan-Feb 2012	No Completed in April 2013
Progress report writing	12-monthly reports	June 2010 June 2011 June 2012	Yes
Final Report writing	Report	Oct 2012	On-going
Publication and dissemination	Papers and report	Throughout	Yes

From this table, most activities happened as planned, and the expected outputs being produced in line with the project plan. The few exceptions are explained below:

1. **Selection of grantees:** This was scheduled to have been completed by November 2009. However, the final list of grantees was completed in early January 2010. The delay was occasioned by having to identify new grantees where previously selected grantees had to be dropped. In one instance, some grantees had been dishonest with respect to their status and the award had to be revoked. One of the PhD grantees turned down the grant on account that she did not think she would complete her study within the stipulated time. Having to select new grantees thus took time, and the process was completed two months later than earlier planned. However, this delay did not affect the subsequent activities as these progressed on schedule as planned.

2. **Relationships with host universities:** This was not done due to lack of strong contacts in the participating universities.
3. **Monitoring and evaluation:** This activity was delayed after a 6-month extension to the project was requested and granted, and therefore end-term evaluation could not take place at the proposed time. This extension was requested to allow for all the grantees who had not been examined to be examined, as well as to allow the PhD grantees who were lagging behind to complete. Further, the extension would allow all grantees to undertake some type of research dissemination, either publish journal articles or present at conferences. Given that only two grantees had completed by the earlier target date of Jan-Feb 2012, extending the grant period bore fruit as seven grantees completed during 2012. The increased grantee completion rate makes it possible to conduct an informed and accurate evaluation of the Project.
4. **Final Project Reporting:** This is the final activity to be conducted at the end of the Project. It is currently on-going with the final report scheduled to be submitted before the Project's closure on 30th April, 2013.

Findings: The Project generally adhered to its project plan, and where there were deviations, these were explained and justified, and did not negatively impact on the Project outcomes.

3.2.3 Financial Management

To evaluate financial management, we sought to establish if the Project has operated within its proposed budget as given in the Project proposal. We referred to the three financial reports of July 2010, June 2011 and June 2012. From these three reports, we find that the Project's spend is within its total budget for the period June 2009 to June 2012. It is however important to note that since the Project received a 6-month extension, not all Project activities are completed, and that the financial reporting for the period July 2012 to project closure is yet to be concluded. Given that the current spend is still below the total Project's budget, we conclude that there has been prudent financial management in line with the proposed budget.

3.2.4 Documentation

Project documentation provides a lasting description and record of any project, and should necessarily be of good quality. We assessed the materials generated within the project for quality and clarity. We evaluated the following materials:

- i. Selection Criteria Template
- ii. Final ICT4D Selection Report
- iii. Technical Reports (July 2010, July 2011 and June 2012)
- iv. Financial Reports (July 2010, June 2011 and June 2012)

Findings: The documents generated within the project are well-written and very informative, and provide a very clear description and record of the project throughout its life cycle. We find that project documentation is of a very high quality.

4.0 Summary of Results, Lessons Learned and Recommendations

4.1 Summary of Evaluation Findings

As described in the foregoing section, we have evaluated the Project's performance in line with its laid down objectives. Specifically, we have evaluated the extent to which the Project attained its overall goal of RCB, by looking at the individual, institutional and network levels of RCB. From the evaluation, we found that the project has attained its primary objective of individual and institutional capacity building as evidenced by the number of successful grantees, their acquired skills and competencies, the quantity and quality of their research outputs as well as their current professional engagements in the ICT4D domain. Appendix F gives a detailed profile for each of the grantees. However, we conclude that the project did not perform as expected with respect to increasing inter-African linkages and collaborations.

We also evaluated the project management aspect of the project and find that the project adhered to its guiding principles of transparency, fairness, promptness as well as gender and regional balancing of the grantees. Further, the financial management was prudent and consistent with the proposed budget. Even though the project has exceeded its proposed time-frame, the reasons for this delay are well articulated and acceptable, given the unpredictable nature of research activities as undertaken by the grantees which occasioned delays in completing the final project activities.

Our evaluation concludes that the Project has achieved its primary objectives, and has contributed to capacity building in ICT4D in the Eastern and Southern African region in line with IDRC's Acacia programme themes.

4.2 Lessons Learned and Recommendations

In this section, we highlight lessons learned and issues that have had a significant bearing on Project performance. We also give recommendations for consideration in ensuring that a RCB project such as this one attains even higher levels of success.

- i. It would have been more effective to organize different training workshops for the PhD and Masters grantees since they have different competencies and needs. For example, the scientific writing and publishing skills training requested by the Masters students may not have been covered in as much detail as the Masters grantees would have wanted, since the majority of the trainees who were PhD grantees already possess these skills and competencies, thereby disadvantaging the Masters grantees. The low dissemination output by the Masters grantees (only 2 of the 4 produced some publication) corroborates their request for more training in scientific writing and publishing. Also, the PhD grantees wished for more detailed and in-depth coverage of some of the statistical analysis techniques, which would have been hard-going for the Masters grantees. This points to the need to have some sessions offered separately for both groups so that the right depth and topics of interest be covered adequately for the different groups.
- ii. Both groups of grantees indicated that there are skills that they are lacking as they seek to build their ICT4D careers. These include resource mobilization and grant writing skills, training and supervision skills, research uptake and utilization skills and R&D skills. Training on how to write successful grant applications and to mobilize resources is a critical skill if

sustainability and continuity of the RCB efforts are to be maintained. Further, passing on one's skills is important for sustainability as well, and additional training in effective teaching/training, supervision and mentorship would go a long way in preparing the young ICT4D researchers in growing the resource base and RCB competencies in their respective institutions.

- iii. Objectively determining that an individual's capacity in a given area has been developed is a challenging undertaking, especially when the baseline prior to the capacity building intervention was not established. This evaluation has relied on a qualitative analysis of the grantees responses as well as tangible evidence in the form of publications and activities undertaken by the grantees to evaluate the extent to which the Project contributed to developing the research capacity of the grantees. To support an objective, quantitative evaluation, it would be worthwhile to establish an explicit set of key research skills, competencies and professional attitudes and values that a research capacity building initiative seeks to develop in the grantees. A pre-test conducted at the beginning of the grant period on these competencies and values would provide a baseline for subsequent assessment. At the end of the grant or study period, a post-test on the same competencies would be conducted, the results of which would provide for objective evaluation of capacity development on key competencies. A mix of both qualitative and quantitative evaluation methods would yield a more comprehensive view of capacity building achievement.
- iv. Given that ICT4D should have an impact on socio-economic development, research in this area is therefore much more useful if it translates to policy interventions or practice e.g. in the form of ICT products and services. This requires proper engagement of stakeholders throughout the research cycle. Sensitization and skilling on research uptake and utilization therefore needs to be emphasized right from the research conceptualization and research design stages, so that researchers prepare a concrete plan for engaging key stakeholders throughout their research. This helps to keep stakeholders in the loop and easier to engage when the study is done, to explore uptake and utilization potential. It is therefore important that such skills be developed during the grantee's study period. The training should include appropriate dissemination and effective communication strategies for diverse, non-academic stakeholders e.g. how to use mainstream and new media, as well as how to effectively lobby key decision and policy-makers.
- v. ICT4D research has the potential to generate ICT-based products and services which would have a tremendous impact on society. However, most of these products and services usually need further development work as well as business viability modelling if they are to scale and succeed as viable products. This requires additional funding as well as business incubation support. Drawing from the experience of the Masters grantee who developed a prototype that made it to the finals in a regional competition but failed to secure business funding, shows clearly that there is need to consider a budget-line to support one or two prototypes into full development. Such products would be a long-lasting and directly visible output from such a RCB initiative. Many of the grantees indicated that lack of funding is the biggest impediment they face in as far as translating their research into practice is concerned. There is need therefore to establish a funding mechanism to support R&D activities for highly-relevant ICT4D products and services that would be scaled up and rolled out for public use. This support could be channelled through a well-established ICT hub or R&D Lab that would offer the grantee much needed support in product testing, legal and

marketing support, as well as business modelling and product roll-out. One grantee suggested inclusion of an 'ICT4D challenge cup' component in such a project, that would require grantees to write funding proposals for an ICT4D product or service idea deriving from their research, and whichever would be most compelling as judged by a project/donor panel would receive additional funds to support full development and deployment of the product. This is a suggestion worth considering for ICT4D RCB projects such as this one.

- vi. National workshops provide a good environment where researchers and policy-makers at the national level meet and learn from each other. The project was characterized by low dissemination activity in such fora. This could be simply because there were no such workshops organized by any of the institutions due to low capacity in ICT4D. A recommendation here would be to host a targeted research dissemination workshop organized by the project where all the grantees would present their findings and policy and practice recommendations to an audience drawn from relevant stakeholders (in line with grantees research areas) from the region. This would not only provide a focussed ICT4D workshop, but provide grantees with much needed publicity as well as networking opportunities as they seek to build their careers.
- vii. Setting up an efficient end-to-end research infrastructure within universities is of paramount importance if partner institutions are to entrench research and make it easier for researchers to carry out their research activities smoothly. An end-to-end infrastructure would support researchers in the entire research project life-cycle that starts from idea inception, grant writing, collaboration formalization (e.g. through MoUs), grant administration and financial reporting, to research dissemination and uptake. Where such an end-to-end research infrastructure is lacking, as in most of the grantee institutions (and possibly in many African universities), researchers, who may lack some of the requisite project management skills are usually overwhelmed as they struggle to get their research ideas off the ground into properly funded and managed projects. There is a definite need to undertake organizational capacity building at the university level on how to structure research as an end-to-end process and sensitize university administration on the need to streamline all these activities for the benefit of the researcher. Without institutional changes with respect to research management and supportive policies, it will remain an uphill task for the capacity developed within these institutions to realize its full potential. A RCB project should therefore incorporate an aspect of organizational capacity development in line with establishing an efficient institutional research infrastructure.
- viii. Establishing a vibrant inter-African network of researchers requires a well-thought out communication strategy, coupled with a good cost-effective implementation plan. The Project's website served the needs of the Project from a project management perspective, but did not target a project-external audience. Inclusion of dynamic content would have gone a long way in increasing the site's effectiveness as a networking tool. Grantees should have been encouraged to contribute actively to this content by linking to their own personal pages and blogs where they would feature for example reflective opinion pieces emanating from their research work. Further, inclusion of scheduled dissemination activities e.g. a quarterly Project newsletter with contributions from grantees or a regularly-scheduled topical discussion around an ICT4D research problem moderated either by one of the grantees, supervisors or mentors would have created interesting discussion topics and perhaps even spawned collaborative research proposal ideas. Further, leveraging internet

and other communication technologies e.g. webcast seminars and lectures delivered via teleconferencing or *Skype* etc. could provide for a cost-effective way of keeping the network active and participatory. Embedding Twitter and Facebook within the site would have made it possible to reach a wider audience and increase visibility of the grantees and their research work. For such a project, it would have been a good idea to include an online communication strategist and technologist with ICT4D knowledge in the project team, to help with audience and platform targeted ICT4D-specific dissemination to a global audience. Such an online strategy would also assist in enhancing African researcher and research visibility on a global platform, and help overcome the online scarcity of home-grown African research. This could be achieved by including a training component on how to leverage new media to create an effective online personal brand, delivered to the grantees during their study period.

- ix. Establishing long-lasting inter-Africa and inter-Institutional research partnerships and collaborations requires creation and execution of formal agreements and commitments to collaboration which detail the roles and responsibilities of all member institutions. From this Project, it is clear that the Project should have first sought collaboration agreements with individual universities before admitting grantees and supervisors so that they operate within a given framework, and create a foundation upon which further research activities can be conducted. This opens up opportunities for visiting professorships, co-training in summer school settings in specific ICT4D topics, exchange students etc., all of which would positively enhance intra-African collaboration. However, such activities would have to be adequately funded if they are to be successful.
- x. Fostering an active network of African researchers requires the creation of networking opportunities where the researchers meet in both face-to-face or online meetings. This enables the researchers to get to know each other and also become aware of on-going research and potential collaboration partners, dismantling 'research silos'. Supervisors and mentors could have been engaged in more collaborative activities such as cross-supervision of students working in the same area, delivering web-cast seminars or mentorship talks to all grantees and participation in dissemination activities undertaken by their supervisee. Organizing an annual colloquium or symposium that brings together the grantees, their supervisors, mentors and other ICT4D researchers in the region is one way through which more linkages could have been developed. Grantees would present in such a forum and get comprehensive feedback from all participants, and such in-depth critiquing of the grantees topics could generate new lines of inquiry that could potentially interest participants into forming joint projects. Further, introducing a Technical Report series for the Project where grantees and their supervisors are required to write joint chapters would provide high quality documentation of the technical outputs of ICT4D research in the project. These ideas if implemented, would serve to further strengthen inter-Africa linkages.

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Appendices

Appendix A: Acacia programme themes and sub-themes

I. People Empowerment

This theme covers areas of research that particularly focus on the individual and ICTs, covering topics ranging from income generation opportunities; gender to intellectual property to privacy issues; censorship; local language access; and more.

- a) **Gender research.** The theme concerns research to gain a more sophisticated understanding of women's access and usage of ICTs in Africa, as well as the magnitude and evolution of the observed gender gap and changing gender relations in areas such as access and patterns of use; ICT literacy, education, and skills; and ICT employment.
- b) **Digital commons.** This theme will support research on innovative models for the creation and use of content, as well as the production of knowledge-based products such as software. It will also support the development of researchers in this trans-disciplinary area and especially the interests of lawyers, authors, librarians, academics, and artists, as well as entrepreneurs in stimulating the growth of alternative approaches to digital copyright.
- c) **Localization.** Research under this theme will support work to make a difference by offering real solutions to specific problems in accessing ICTs and information and to develop evidence on what localization possibilities are feasible and on the benefits of ICT support of African languages.

II. Social service delivery

This theme focuses on the question of whether ICTs have the potential in Africa to improve the way social services are delivered, reduce costs, increase transparency, and, facilitate devolution of government services.

- a) **Tertiary education and research.** This theme will fund research work on research and education Internet infrastructure for tertiary institutions in Africa. It will focus particularly on expanding research and education networking in Africa, improving the effectiveness of policy interventions, lowering costs and improving access for African universities, appropriate technologies and the relationship between access to the internet and research capacity.
- b) **Local governance.** Little work has been done to adapt emerging e-local governance conceptual and theoretical frameworks as well as methodological approaches to Less Developed Countries and African contexts. This theme will thus aim to build African research capacity and strengthen the quality and significance of applied research on ICT-enabled local governance in Africa.
- c) **Health.** ICTs are a tremendous enabler of healthcare and can have a transformative effect on the health sector. This theme will fund research into the innovative use of ICTs (relevant

software, content, and communication with small devices, e.g. mobile phones and PDAs) to improve healthcare in Africa.

- d) ***New learning environments and practices.*** This theme will fund research that contributes to better a understanding of the educational uses of ICTs in the socio-cultural context of Africa; that produces evidence that can inform the main stakeholders (policy-makers, practitioners, researchers, parents, students, etc.); and that promotes the formulation and implementation of policies and reforms supporting the introduction of ICTs in the educational systems.

III. Economic Development and Opportunity

Evidence of ICTs' potential to combat poverty and promote socio-economic growth in developing countries is largely anecdotal. This theme will support research that leads to a better understanding of the linkages between ICTs and socio-economic growth.

- a) ***Telecommunication and network infrastructure and policy indicators.*** This theme will fund research into strategic ICT infrastructure development for universal human development. In particular, research to be funded must focus, among other things, on universal access to ICTs and the related policy, legal and regulatory frameworks; on access and affordability of ICTs by poor communities; on across-the-board participation in the ICT sector; on mechanisms to influence ICT policy and regulatory processes; and on indicators for access, use and impacts of ICTs.
- b) ***Small-scale agriculture.*** Agriculture and the harvesting of natural resources provides livelihoods for over 70% of the African population; access to appropriate information is known to be amongst the single largest determinants of agricultural productivity. This theme will fund research focused on informational resources and innovative ICT applications that can enhance small-scale agriculture.

Appendix B: List of Respondents

No.	Name	Role in Project
1	Abraham Kule	Masters Scholarship Grantee
2	Gideon Wananda	Masters Scholarship Grantee
3	Joram Kinuthia	Masters Scholarship Grantee
4	Eddons Munthali	Masters Scholarship Grantee
5	Margaret Nyambura Ndung'u	PhD Grantee
6	Judith Kamau	PhD Grantee
7	Robert Obwocha Oboko	PhD Grantee
8	Daniel Orwa Ochieng	PhD Grantee
9	Nkqubela Ruxwana	PhD Grantee
10	Wondwossen Mulugeta Gewe	PhD Grantee
11	Klodwig Mgay	PhD Grantee
12	Prof. Peter Wagacha	Masters Supervisor
13	Prof. Elijah Omwenga	PhD Supervisor
14	Prof. Timothy Waema	Project Leader
15	Rita Bowry	IDRC Representative
16	Edith Adera	IDRC Representative

In what area of IDRC's Acacia program priorities did your research fall? *

Research Methods Workshop

Did you attend the Research methodology and scientific writing training workshop? *

This training workshop was conducted in Nairobi, Kenya at the beginning of the funding period

- ☐ Yes
- ☐ No

Was the Research Methods workshop useful in building your research capacity? *

1 2 3 4 5

Not at all ☐ ☐ ☐ ☐ ☐ Extremely useful

ICT4D Research Competencies

What research and ICT4D-related skills did you gain during your research? *

- ☐ Statistical Analysis
- ☐ Fieldwork skills and techniques
- ☐ Scientific Writing
- ☐ Resource Mobilization and Grant writing
- ☐ Proposal Writing
- ☐ Research Project Management
- ☐ Research uptake and utilization skills
- ☐ Research and Product Development
- ☐ Other:

Have you been involved in capacity building and training of these skills to others? *

- ☐ Yes
- ☐ No

List any research and ICT4D-related skills you wish you had acquired during your research

In your current area of practice, what skills and competencies do you feel you have not yet acquired or fully developed?

Development of ICT4D Career

How would you rate your research's contribution in ICT4D? *

How significant is this contribution in affecting policy and/or practice in your country and/or the region

1 2 3 4 5

Not significant ☐ ☐ ☐ ☐ ☐ Very significant

Was receiving the grant critical for developing your ICT4D career? *

How instrumental has the grant been in developing your career in ICT4D? Would you still have developed as you have, without the grant?

1 2 3 4 5

Not critical ☐ ☐ ☐ ☐ ☐ Very critical

As an ICT4D researcher and/or practitioner, describe your career plans *

How do you feel about your career in ICT4D? are you hopeful? What are your career plans? How has completing your study affected your career?

What challenges, if any, are you currently facing that may hinder growth of your career in ICT4D? *

Publications

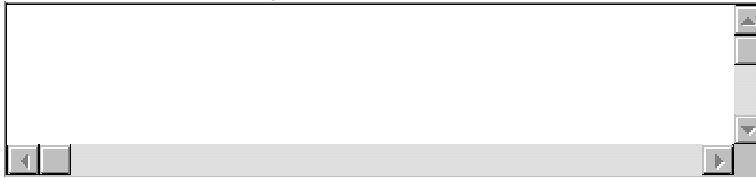
Have you authored or co-authored any publications? *

This includes journal articles, books, book chapters, media briefs, policy briefs etc

- ☐ Yes
- ☐ No

List the publications you have authored or co-authored *

Include all relevant citation information



Research Activities/Projects

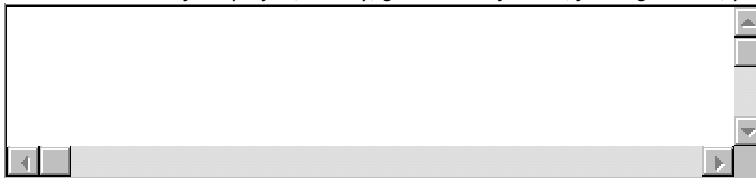
Has your research work translated into new research projects or product development activities *

What other research projects/activities have spawned from your funded research?

- ☐ Yes
- ☐ No

List any such activities that have come about as a result of your research work *

Indicate the name of the project/activity, goals and objectives, funding sources, your role, collaborators etc

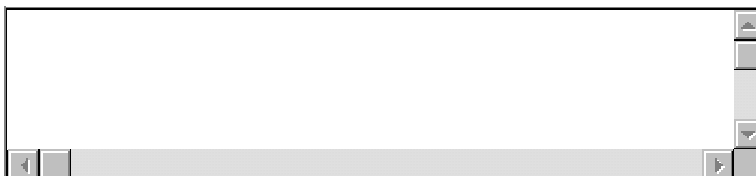


Partnerships and Collaborations

Are you involved in any inter-African or international partnerships and collaborations? *

- ☐ Yes
- ☐ No

List the partnerships and collaborations you are involved in, and describe your role in the collaboration *



Dissemination Activities

Have you participated in public dissemination of your research work either during or after your study period? *

This includes conferences, workshops, institutional seminars etc

- ☐ Yes
- ☐ No

List the public fora where you have disseminated research results *

Indicate the type of forum (conference, seminar, workshop etc), date, location and title of presentation



Grantee Experience

What were the highlights of your experience as a grantee *

What did you like most about the ICT4D Research grants project as a beneficiary?

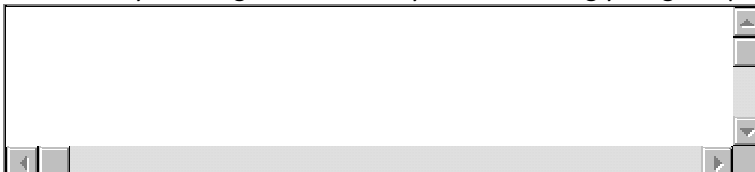


Challenges

Did you experience any challenges or setbacks during your grant period? *

- ☐ Yes
- ☐ No

Describe any challenges or setbacks you faced during your grant period



Did you receive any assistance/advice from the project management on how to address these challenges? *

- ☐ Yes
- ☐ No

Did you successfully overcome these challenges and/or problems ? *

- ☐ Yes
- ☐ No
- ☐ Other:

Grantee

1. What was the title and gist of your research?
2. Was the supervision and mentorship you received during your study adequate? If not, what was missing?
3. In your institution, were there other avenues of funding to support your post-graduate funding? Did you receive funding from other sources or did you rely entirely on the ICT4D grant?
4. Is research part of your job description in your current organisation? Is it used as a measure to appraise performance?
5. Has ICT4D research being institutionalized in your institution? How has this been done? What successes/challenges are you facing? What strategies would you recommend to address these issues?
6. Describe the sort of work you are doing now? Does it contribute to creation of knowledge in ICT4D? In what ways? Conferences and workshops and seminars attended and presented in? Publications (journals, books, media profiles etc.)? Have you presented your research findings in an institutional seminar?
7. What research and ICT4D-related skills can you say you have gained during your research? What of after your research? Have you been involved in training and capacity building of these skills to others? What of community outreach? If yes, who, where and when? If no, why not?
8. Are you involved in managerial support/involvement on research projects in your institution? What role(s) have you played since you completed your study? E.g. supervision of MSc and/or PhD students? Mentoring junior researchers? Are you involved in coordinating inter-organisational research efforts in ICT4D? give examples.
9. How have you translated your research into practice? Are you undertaking any projects that impact ICT4D as a follow-up to your research or that have spawned from your research? Is there any evidence that your research has had an influence on local strategy and planning?
10. What other on-going research activities and/or projects are you engaged in in your institution? Who are the collaborating partners?
11. What other research projects/activities/collaborations have spawned from your funded research? With which bodies are you working?
12. In what acacia priority area did your work fall/contribute in? What was the exact contribution? How would you rate your research's contribution in ICT4D? How significant is this contribution, in your country and/or for the region?
13. Would you say that your research or current engagements have had an influence on policy making in your country or region? e.g. policy briefs? Examples of uptake? Which decision-makers in this field have you interacted with and what was the outcome of such interaction?
14. How do you feel about your career in ICT4D? Are you hopeful? What are your career plans? How has completing your study affected your career? Do you think you would be there or have such plans if you had not completed your studies with the help of the grant? What other factors have contributed to your capacity development in this area, despite the grant?

15. Have you considered post-doctoral research? Any challenges?
16. Is there any form of support that you would have wanted to receive after the completion of your research as you seek to build your career in this area? What challenges are you currently facing post-completion that may hinder growth of your career in this field?
17. How many books did you purchase or subscribe to journals? Are you able to continue accessing these journals?
18. Have you co-authored any papers? With whom? Industry practitioners? Policy makers?
19. Are you involved in any intra-African partnerships and collaborations? How do you contribute as well as benefit from such partnerships/collaborations? What of other international collaborations?
20. Have you applied for funding (grants, fellowships) to support ICT4D research or related projects? Have you been successful? If yes, how is this contributing to your development as an ICT4D researcher?
21. Do you feel you have adequate skills in research project management? Since completion, have you managed any research project? What challenges, if any have you faced? Do you think this is a vital skill in building your career?
22. What was your experience with the application process? Was it transparent? Did you receive clear instructions and guidelines of what was expected for grant consideration? What of the terms of reference on your continued support? Did you encounter any challenges?
23. Did you experience any challenges or setbacks as you undertook your study? What of challenges related to receiving your funds? What support did you receive from the project to help overcome or address these challenges? What support would you have wished to receive? The field work was to last 12 months and this is what was funded – was this sufficient? Any challenges related to this timeframe?
24. What were the highlights of being a grantee with respect to undertaking your study?

Supervisor

1. How would you rate the grantee's contribution in ICT4D? How significant is this contribution, in your country and/or for the region?
2. What avenues do you see being available for the grantee in this area?
3. During their study period, are there specific areas (research methods, domain-specific competencies) you noticed that needed strengthening or that affected research performance?
4. What challenges, if any, did you face as you supervised the student?
5. What are your thoughts on human capacity in ICT4D in your country, in the region? (numbers, quality, relevance etc.). What challenges do you face e.g. as an institution to build human capacity and to address any related challenges? What strategies have been adopted by your institution (or others) in trying to address these challenges?
6. Do you participate in intra-African collaborative networks in ICT4D? Which ones? Have you introduced your grantee to any of your networks?
7. Have you continued to interact with and mentor the grantee post-completion?

8. Has ICT4D research being institutionalized in your institution? How has this been done? What successes/challenges are you facing? What strategies would you recommend to address these issues?

Project Leader

1. What were the main challenges faced if any, in managing the grants project?
2. Did you establish any MoUs between UoN and the participating institutions? If yes, what is the nature of the relationship and what sort of activities are envisaged?
3. In what mailing lists was the project site circulated?
4. What are your thoughts in terms of sustainability of the developed capacity? E.g. what would you have liked to see in terms of continued support to the grantees as they continue into practice?
5. Do you have an active mailing list where ICT4D calls, fellowship opportunities, conferences etc. are continuously share amongst grantees, their supervisors and collaborators to boost networks and collaborations? If not, are there plans to do this? If not, what are the obstacles/challenges?
6. If you were to redo the project, what would you do differently, and why?

IDRC Representative

1. What was your role in the project?
2. What was the overriding motivation or interest for IDRC to fund such a project? What ICT4D research gaps exist in the region that you would have wanted addressed by the project?
3. Did you interact with the grantees at all during their grant period? If yes, what struck you most about them as a funder?
4. How do you interpret RCB and how do you measure it, especially in reference to the Acacia ICT4D themes?
5. What are your thoughts on sustainability of RCB activities especially in resource-scarce environments e.g. African universities?
6. What are your thoughts on building functional and sustainable research networks and partnerships?
7. What was your experience in dealing the project's management in terms of communication, reporting, documentation etc.?
8. Are there specific aspects of the Project you would want emphasized in the evaluation?

Appendix D: List of Publications

Academic Dissertations/Theses

Kamau, J.W. (2013). Distance learners' perceptions of the effectiveness of learner support services in a primary education diploma in Botswana: A Case Study. PhD Thesis. University of Pretoria, South Africa.

Kinuthia, J.N. (2012). A Produce-based credit service model: Case for Limuru Farmers Dairy Cooperative. Masters Thesis. University of Nairobi, Kenya.

Kule, A. (2012). Strategic Information Systems Planning and the management of Uganda Martyrs University. Masters Thesis. Kampala International University, Uganda.

Murage, M.N. (2012). Assessment Of E-Learning As Course Delivery Method In Public Universities In Kenya. PhD Thesis. Kenyatta University, Kenya.

Oboko, R.O. (2012). Adaptive Learning and Metacognitive Regulation Support for Ill-structured Problem Solving Processes in Web-Based Learning. PhD Thesis. University of Nairobi, Kenya.

Ochieng', D. O. (2012). User-Centric ICT Adoption Model for Rural Agricultural Communities in Kenya. PhD Thesis. University of Nairobi, Kenya.

Wananda, G.W. (2012). The Data Infrastructure Mainstreaming Model: Government Enabled Creative Commons. Masters Thesis. Nkumba University, Uganda.

Ndung'u, M.N. (2011). Development outcomes of the new technologies to the quality of life of low income households in Kenya: A case study of Nairobi. PhD Thesis. University of Nairobi, Kenya.

Ruxwana, N.L. (2011). The Adoption of Quality Assurance in e-Health Acquisition for Rural Hospitals in the Eastern Cape Province. PhD Thesis. Nelson Mandela Metropolitan University, South Africa.

Books

Wananda, G. (2013). *Computer Studies: An Introductory Course*. CreateSpace Independent Publishing Platform. ISBN-10: 1481977806. ISBN-13: 978-1481977807.

Journal Articles

Adede, C.O., **Oboko, R.O.** (2013). Model for Predicting the Probability of Event Occurrence Using Logistic Regression: The Case of Credit Scoring for a Kenyan Commercial Bank. *International Journal of Societal Applications of Computer Science*. Vol. 2, No.3. pp 216-223.

- Ayoma, M., **Oboko, R.O.** (2013). M-Learning Support Services for Corporate Learning. *International Journal of Societal Applications of Computer Science*. Vol.2, No.3. pp 210-215.
- Kule, A.**, Jehopio, P. (2013). Strategic Information Systems Planning framework for a developing university. *International Journal of Engineering Sciences & Emerging Technologies*. ISSN: 2231 – 6604 available at ectc.iafor.org/Submissions.html (under review)
- Mogire, A. M., **Oboko, R.O.** (2013). Context Aware Framework to Support Formal Ubiquitous Learning. *International Journal of Societal Applications of Computer Science*. Vol. 2, No. 3. pp 248-254.
- Oluoch, F. O., **Oboko, R.O.** (2013). Designing an M-learning system for Community Education and Information on HIV and AIDS in Kenya. *International Journal of Societal Applications of Computer Science*. Vol. 2, No. 3. pp 238-247.
- Wananda, G. W.** (2013). Strategies for Wider Use and Access of Digital Libraries in Secondary Schools in Developing Countries: A Case Study of Uganda. *The International Journal of Computing and ICT Research*. (under review).
- Awuor, Y., **Oboko, R.O.** (2012). Automatic Assessment of Online Discussions Using Text Mining. *International Journal of Machine Learning & Applications*. Vol. 1, No. 1. pp 2-11.
- Ayalew, Y., Renken, J., **Mgaya, K.** Nkgau, T. (2012). Developing a Contextualized Information Systems Curriculum for an Emerging Economy. *The Electronic Journal of Information Systems in Developing Countries*. Vol. 54, No. 2. pp. 1-19.
- Kule, A.** et al. (2012). Overcoming Poverty: Accounting for Stagnation and Upward Mobility in Central Uganda. *East African Researcher*. pp 1-17. ISSN: 1816-6822.
- Musumba, G.W., **Oboko, R.O.**, Opiyo E.T.O. (2012). Agent Based Adaptive Learning Model for Intermittent Internet Connection Conditions. *Journal of Continuing, Open and Distance Education*.
- Ndung'u, M.N.** (2012). Development outcomes of the new technologies to the quality of life of low-income households in Kenya: a case study of Nairobi. *Innovation and Development*. Vol.2, No.1. Special Issue: Sustainability-oriented innovation systems in China and India.
- Ndung'u, M.N.**, Waema, T.M., Mitullah, V.W. (2012). Factors influencing usage of new technologies in low-income households in Kenya: The case of Nairobi. *Info*. Vol.14, No.4.
- Oboko, R.O.**, Wagacha, P.W. (2012). Using Adaptive Link Hiding to Provide Learners with Additional Learning Materials in a Web-Based System for Teaching Object Oriented Programming. *Journal of the Research Center for Educational Technology*. Vol. 8, No. 1. pp 11-25.
- Ochieng, D.O.**, Waema, T.M., Onsomu, J.O. (2012). Mobile Interfaced Crops Diagnosis Expert System (MICDES): a case for rural Kenyan farmers. *International Journal of Services, Economics and Management*. Vol. 4, No. 1. pp 4-26. DOI: 10.1504/IJSEM.2012.043943.
- Ndung'u M.N.**, Waema, T.M. (2011). Development outcomes of internet and mobile phones use in Kenya: the households' perspectives. *Info*. Vol. 13, No.3, pp 110 – 124.

Oboko, R.O., Njenga, S.T. (2011). Use of Concept Map Scaffolds to Promote Adaptive E-Learning in Web-Based Systems. *International Journal of computing and ICT Research*. Vol. 5, No. 2. pp 59-66.

Kamau, J.W. (2010) Factors that affect the progress and retention of distance learners in the Diploma in Primary Education Programme in Botswana. *Progressio: South African Journal for Open and Distance Learning*. Vol. 32, No. 2. pp 164-180.

Ruxwana, N.L., Herselman, M.E., Pottas, D., Ouma, S. (2010). Advocating a quality assurance model for the implementation of e-health solutions in rural South Africa. *Health Information Management Journal*. Vol. 39, No. 1.

Ruxwana, N.L., Herselman, M.E., and Conradie, D.P. (2010). ICT applications as e-health solutions in rural healthcare in the Eastern Cape Province of South Africa. *Health Information Management Journal*. Vol. 39, No. 1.

Book Chapters

Mgaya, K. V., Uzoka, F. M., Kitindi, E. G., Akinnuwesi, A., Shemi, A. P. (2012). An Empirical Study of Career Orientations and Turnover Intentions of Information Systems Personnel in Botswana. In A. Usoro, G. Majewski, P. Ifinedo, & I. Arikpo (Eds.). *Leveraging Developing Economies with the Use of Information Technology: Trends and Tools*. pp. 120-154. Hershey, PA: Information Science Reference. doi:10.4018/978-1-4666-1637-0.ch008

Conference Proceedings

Wananda, G. W. (2013). Towards Effective Government ICT for Development Policy: The Data Infrastructure Mainstreaming Model. *Proceedings of the Rural ICT Development (RICTD) International Conference 2013*. pp. 25–27. Malacca, Malaysia. <http://ercmbale.org/publications/The DIM Model.pdf>

Mulugeta, W., Gasser M., Baye Y. (2012). Incremental Learning of Affix Segmentation. *Proceedings of COLING 2012: Technical Papers*. pp 1901–1914. Mumbai, India.

Ayalew, Y., Renken, J., Grand, B., **Mgaya, K. V.**, Nkgau, T. Z. (2011). The perception of the role of IS in an emerging country: The case of Botswana. *Proceedings of IST –Africa 2011 Conference*. Gaborone, Botswana. ISBN: 978-1-905824-26-7.

Ruxwana, N.L., Herselman, M.E., Pottas, D. (2011). The Generic Quality Assurance Model (GQAM) for successful e-health acquisition in rural hospitals. *Proceedings of IADIS International Conference e-Health 2011*. Rome, Italy. ISBN: 978-972-8939-49-6.

Uzoka, F.M., **Mgaya, K. V.**, Shemi, A. P, Kitindi, G. P., Akinnuwesi, B. (2011). Stay on or Quit: IT personnel Turnover in Botswana. *Proceedings of ACM SGMIS CPR Conference on Mind the gap:*

preparing, Recruiting, and retaining IT Professionals in Today's Evolving Environment. San Antonio, Texas, USA. ISBN: 978-1-4503-0666-9.

Kamau, J.W. (2010). Leadership Vacuum in the Application of ICTs in Lifelong Learning in Africa. *Proceedings of the Fifth International Conference of MIT Learning International Networks Consortium (LINC)*. MIT, Boston, Massachusetts. USA.

Appendix E: List of Dissemination Activities

Conference Presentations

Kamau, S., **Ochieng, D.O.** (2013). Contextual Weather and Climate Broadcast System: Case for Nganyi Community Farmers in Kisumu. HCI International Conference. 21 - 26 July 2013, Mirage Hotel, Las Vegas, Nevada, USA.

Kule, A., Jehopio, P. (2013). Strategic Information Systems Planning and e-learning innovations of private universities in Uganda: a case of Uganda Martyrs University. **To be presented at the European Conference on Education 2013 & The European Conference on Technology in the Classroom 2013.** Brighton, UK. Available at <http://ectc.iafor.org/Submissions.html>

Mulugeta, W. (2012). Learning Morphological Rules for Amharic Verbs Using Inductive Logic Programming. *Eighth International Conference on Language Resources and Evaluation (LREC 2012).* Istanbul, Turkey.

Mulugeta, W., Gasser M., Baye Y. (2012). Incremental Learning of Affix Segmentation. *COLING 2012.* Mumbai, India.

Ndung'u, M.N. (2012). Nothing is as practical as a good theory!? Considering the added value of the Capabilities Approach for ICT4D research and practice. *Fifth International Conference on Information and Communication Technologies and Development (ICTD2012).* Atlanta, Georgia, USA.

Oboko, R.O. (2012). Challenges of implementing eLearning Systems in HEIs in Kenya. *eLearning Africa 2012.* Cotonou, Benin.

Ndung'u, M.N. (2011). Are Mobile phones expanding household's capabilities in Kenya? A case of low income households in Nairobi. *2011 Human Development and Capability Association (HDCA) International Conference.* Hague, The Netherlands.

Ruxwana, N.L., Niehaus, E., Herselman, M., Grössler, M., D'Souza, P., Ackermann, G. (2010). Resource Management System for Informed Healthcare Decision and Disaster Management. *IASTED Health Informatics - AfricaHI 2010 Conference.* Gaborone, Botswana.

Ruxwana, N.L., Niehaus, E., Herselman, M., Grössler, M., D'Souza, P., Ackermann, G. (2010). Rural Healthcare Resource Optimization through adoption of Spatial Decision Support System alongside with Quality Assurance. *MedInfo conference.* Cape Town, South Africa.

Ruxwana, N.L., Herselman, M.E., Pottas, D. (2010). Community awareness and involvement: An overlooked security threat driver. *4th International Symposium on Human Aspects of Information Security & Assurance (HAISA 2010).* Port Elizabeth, South Africa.

Workshops

Kinuthia, J.K. (2012). Dairy Sacco App. *Pivot East Mobile Startups Regional Competition*. Nairobi, Kenya. <http://pivoteast.com/competition/finalists/business-resource-mgt-dairy-sacco-app.html>

Murage, M.N. (2012). Course delivery via e-Learning: The Practice of Moodle Learning Management System. *E-Learning and Moodle Learning Management System workshop*. IT Training Centre for Teachers in Africa, Kampala, Uganda.

Ndung'u, M.N. (2011). ICTs and governance in Africa: What is changing and how can we study the changes?. *Dissemination Workshop for Researchers from Kenya and the UK*. Nairobi, Kenya. http://www.polis.cam.ac.uk/cghr/sms_events.html

Ndung'u, M.N. (2011). Factors Influencing Usage of the New Technologies in Low-Income Households in Kenya. *4th Euro-Africa Cooperation Forum for ICT Research*. Cape Town, South Africa.

Ndung'u, M.N. (2011). Factors Influencing Usage of the New Technologies in Low-Income Households in Kenya. *Research ICT Africa (RIA!) Regional Training Workshop and conference*. Nairobi, Kenya.

Ndung'u, M.N. (2010). Development outcomes of internet and mobile phones use in Kenya: the households' perspectives. *Research ICT Africa (RIA!) Regional Training Workshop and conference*. Cape town, South Africa.

University Seminars

Munthali, E. (2013). Application of Geographic Information Systems in Health Human Resource deployment into health facilities: A case of Blantyre district health office. *Academic Research Seminar, Moneymen Training Centre*. Malawi.

Mulugeta, W., Gasser, M. (2012). Learning morphological rules for Amharic verbs using inductive logic programming. *SALTMIL-AfLaT Workshop on Language Technology for Normalisation of Less-Resourced Languages, LREC 2012*. Istanbul, Turkey.

Munthali, E. (2012). Application of Geographic Information Systems in Health Human Resource deployment into health facilities: A case of Blantyre district health office. *Academic Research Seminar, Moneymen Training Centre*. Malawi.

Ndung'u, M.N. (2012). Development outcomes of the new technologies to the quality of life of low income households in Kenya: A case study of Nairobi. *PhD seminar series, School of Computing & Informatics*. University of Nairobi, Kenya.

Ochieng', D. O. (2012). User-Centric ICT Adoption Model for Rural Agricultural Communities in Kenya. *PhD seminar series, School of Computing & Informatics*. University of Nairobi, Kenya.

Mulugeta, W. (2011). Amharic Morphological Analyzer: Machine Learning Approach. *CLingDing - Computational Linguistics Research Group at Indiana University*. Bloomington, USA.

Kule, A. (2012). Strategic Information Systems Planning and the management of Uganda Martyrs University: Key findings and policy issues. *Uganda Martyrs University Wednesday seminar series*.

Appendix F: Grantee Profiles

PhD Research Grant Recipients

Ruxwana Nkqubela graduated in April 2011 from the Nelson Mandela Metropolitan University in South Africa. His PhD topic was *“The Adoption of Quality Assurance in e-Health Acquisition for Rural Hospitals in the Eastern Cape”*. He is an ICT Engineering manager at Vodacom South Africa, where he leads teams that are responsible for the development and quality assurance of converged enterprise ICT solutions. In addition to his work at Vodacom, he supervises Masters students at Tshwane University of Technology, and four students have so far successfully completed their studies. He also serves as an external examiner for Masters and PhD theses in the local universities. As part of spurring uptake of his research findings, he contributed in policy dialogues on National Health Insurance and e-health strategy, and also contributed in RegLaN, the Research Group Learning and Neurosciences project. In 2009, he published a book entitled *Technology Assessment of Rural Hospitals in the Eastern Cape Province*. He has co-authored two Journal articles and one conference proceedings, and presented in one continental conference and in three international conferences, during and after the grant period. Ruxwana is very confident about his career, being one of the youngest achievers in the domain of Health Informatics in the region. Even though he is working in a highly competitive and busy firm in the private sector, he is committed to contributing to the development of research capacity in his country by making time to offer lectures, supervise students and examine theses in the local universities. He states: *“I wish to be one of the ICT4D gurus in future, such as Prof Heeks, Prof Waema and others who play a significant role in uplifting the African higher education sector and also champions for ICT4D projects”*.

Margaret Nyambura Ndung’u graduated in December 2011 from the University of Nairobi, Kenya. Her PhD topic was *“Development outcomes of the new technologies to the quality of life of low income households in Kenya: A case study of Nairobi”*. She competitively won a one year postdoctoral research fellowship at the Institute of Economic Research on Innovation based in Tshwane University of Technology in Pretoria, South Africa, for the period March 2012 to March 2013. She has published three Journal articles and presented at six public fora spanning international conferences, regional training workshops and research dissemination workshops, during and after the grant period. In March 2012 at the Fifth International Conference on Information and Communication Technologies and Development (ICTD2012), she co-organised an open session on ICT4D and the Capability approach titled *“Nothing is as practical as a good theory!?”* which considered the added value of the capabilities approach for ICT4D research and practice. On completion of her postdoctoral fellowship in South Africa, Nyambura plans to relocate back to Kenya and is hoping to get a full-time position at a University. Even whilst at a university, Nyambura plans to continue engaging closely with industry as she advances her career. She also plans to continue undertaking research work through her current networks such as Research ICT Africa (RIA!). She is very enthusiastic and hopeful about her career prospects in the ICT4D domain, and credits her PhD qualification for the positive prospects.

Robert Obwocha Oboko graduated in August 2012 from the University of Nairobi, Kenya. His PhD topic was *“Adaptive Learning and Metacognitive Regulation Support for Ill-structured Problem*

Solving Processes in Web-Based Learning". On completion of his PhD study, he was promoted at his University and is now a senior lecturer at the School of Computing and Informatics, University of Nairobi. He has published 8 journal articles and presented at one continental conference and two international conferences, during and after the grant period. Robert is actively involved in research capacity building at the School of Computing and Informatics where he has supervised over fifteen Masters students and is currently supervising two PhD students. He has also been active in research mentorship as evidenced by his active co-authorship of publications with his Masters supervisees. He is an active researcher in the area of technology-supported learning and training, one of the research areas of his institutions' Computing for Development R&D lab, and is currently involved in two collaborative research projects that include university, public sector and private sector partners. These projects include the Research Initiatives Program on developing technology-supported learning indicators, and a project undertaking a national institutional review of health information systems in Kenya, done in collaboration with AfyaInfo. He has recently concluded a project on developing digital creative media skills for employability in the 21st century in collaboration with GESCI. With respect to his career plans, he plans to continue developing human capacity through role-modelling and mentorship of upcoming researchers with the aim of improving the overall quality of research in Kenya and the East African region. He plans to write grant proposals to fund research and initiatives in the area of technology-supported learning such as educational games for pre-school and early primary school children.

Daniel Orwa Ochieng' graduated in December 2012 from the University of Nairobi, Kenya. His PhD topic was *"User-Centric ICT Adoption Model for Rural Agricultural Communities in Kenya"*. He is a lecturer at the School of Computing and Informatics, University of Nairobi. He has published one Journal article and presented at one international conference and one university seminar, during and after the grant period. He is slated to chair two sessions on Interaction Design for Development (ID4D) of indigenous communities in the upcoming HCI International conference to be held in Las Vegas, USA in July 2013. He is an active member of the Computing for Development R&D Lab at his institution, where he leads ICT4D related research themes. Currently, He is involved in a number of active research collaborations and partnerships with universities, private and public sector, where he serves as a principal investigator and project manager. These projects include the Rockefeller-funded *Nairobi Smart City Project* with collaborating partners SCI, Columbia University, GroupShot, and MIT; the USAID-funded *DHIS2 Project* on using technology in Data Transmission within Kenya's Health Sector with collaborating partners SCI, University of Oslo and ABT associates; The *Gameon Project* on technology use in sports in Africa and the *Learning by Doing Project* being undertaken in collaboration with the Nokia Research Centre, Africa. He is a founder member of the Kenya Health Informatics Association (KEHIA), which is Kenya's first professional association for health informatics professionals. On completion of his studies, his research focus has shifted from abstract concept development to formulation and implementation of practical solutions to problems that affect society. He plans to continue working in this area, with particular emphasis on furthering research and development into ways in which agricultural practices can be improved through acceptance and eventual adoption of technology.

Judith Kamau successfully completed her PhD study at the University of Pretoria in South Africa, and is scheduled to officially graduate on 16th April 2013. Her PhD topic was *"Distance learners' perceptions of the effectiveness of learner support services in a primary education diploma in Botswana: A Case Study"*. She is the current Director of the Open and Distance Learning centre at

the Kenya Methodist University, where she provides leadership in the planning, development and delivery of Open and Distance Education programmes. She has published one Journal article and participated in one international conference during and after the grant period. With respect to her career plans, she plans to continue engaging in research capacity building activities by working with Masters and PhD students. She also intends to use her expertise and research findings to benchmark course materials and improve ODL learner experience at her institution. She is an active member of the Distance Education Association of Southern Africa where she is involved in capacity building in ODL, sharing of information and study materials, as well as benchmarking of best practices in ODL.

Michael Murage¹⁶ was scheduled to graduate in December 2012. His PhD topic was “*Assessment Of E-Learning as a Course Delivery Method in Public Universities in Kenya*”. At the last point of contact, he was an assistant lecturer at Kenyatta University. He presented at a regional workshop on e-Learning and the Moodle Learning Management System.

Wondwossen Mulugeta Gewe is still pursuing his PhD programme at Addis Ababa University. He is scheduled to complete his study and graduate by December 2013. Due to misinformation, he received the grant when he was at the early stages of his PhD, and hence the longer time he has taken to complete the study. He is a lecturer at the university where he teaches undergraduate students and serves as a co-teacher for graduate programs in the area of information science and computational linguistics. He also has additional responsibilities of managing various IT projects. He is currently managing a project on automation of financial processes at the university. He has published one conference proceedings, and disseminated his research in one international conference and two workshops during the grant period. On completion of his PhD, he plans to use his expertise in computational linguistics to develop more human capacity in this area towards empowering citizens to access technology products and services using local languages. He hopes to develop resources such as machine readable dictionaries and applications for spell-checking and machine translation, in collaboration with the linguistics department at his university. He is a member of the ClingDing research group at Indiana University, the African Network for Localization (ANLoc) and the African Language Technology Network (AfLat).

Klodwig Mgaya is still pursuing his PhD. He was forced to change his PhD topic when the ERP system in that was the focus of his study was put out of use, and it was no longer possible to collect the required data. He plans to embark on data collection for his new topic starting May 2013, and is expected to complete his PhD in early 2014. He is currently a lecturer at the University of Botswana where he is involved in teaching undergraduate courses and supervision of Masters research projects. He has published one book chapter, two Journal articles and two conference proceedings, and disseminated his research in one international conference, during the grant period. On completion of his PhD, he plans to continue working at the University, but hopes to relocate back to his home country of Tanzania at some point in the future.

¹⁶ This grantee did not respond to any of the communication initiated by the evaluator or the Project leader, and hence we do not have an updated status report. We are relying solely on the information contained in the 3rd technical report of June 2012.

Masters Scholarship Recipients

Joram Kinuthia Nduati graduated in August 2012 from the University of Nairobi, Kenya. His thesis title was *“A Produce-based credit service model: Case for Limuru Farmers Dairy Cooperative”*. He developed a prototype based on his research work that would assist dairy cooperatives in managing their daily processes and especially credit-related processes in an effort to remain efficient and profitable. In his efforts to scale it the prototype for roll-out, he participated in Pivot East, a regional competition that seeks to identify promising mobile application start-ups for funding. The competition brings together techpreneurs and financiers and the competitors are required to develop a business plan for their product and pitch it to potential financiers. He made it to the final round of the competition but was not lucky to secure financing from the participating venture capitalists and private financiers. He remains passionate about this prototype and continues to explore ways of developing it further for eventual roll-out. He is currently serving as the Chief ICT officer in charge of security at the University of Nairobi’s ICT department. He is responsible for ensuring confidentiality, integrity and availability of ICT resources in the University’s data centre, in addition to ensuring up-to-date security measures and controls in university-wide systems and IP networks. With respect to his career plans, Joram hopes to move to the R&D arm of the ICT department and carry on with ICT4D R&D activities from there. To progress in this position, he will eventually need to have a PhD and therefore has plans to register for one within a year.

Gideon Wananda graduated in January 2012 from Nkumba University, Uganda. His thesis title was *“The Data Infrastructure Mainstreaming Model: Government Enabled Creative Commons”*. On completion of his study, he got a job at the Uganda Ministry of Finance where he worked as a system analyst undertaking tasks such as system development, user requirements management and vendor management. During this time, he appreciated how government works and developed a passion to utilize his acquired ICT4D skills to impact society. He wrote a funding proposal to establish an educational resource centre, and received USD 5,000 for this purpose. The centre was established with the aim of undertaking action research, contribution to policy and social development through the use of ICT4D approaches. He is now serving as the head of this centre where he is in charge of budgeting and accounting, staff supervision, planning and supervising action research, and publishing. The centre works with local educational institutions to provide educational materials and there are plans to develop digital educational resources. He has authored a book, published one Journal article and one conference proceedings during and after the grant period. Gideon credits the research methods workshop with equipping him with highly relevant skills. He states *“The research workshop helped me shape my ideas on what I want to do - I had always recognized the existence of problems but did not see the solution. Now I appreciate how the concepts and practice of ICT4D can offer a response to community challenges.”* With respect to his career plans, he intends to first fund-raise for his organization before embarking on his PhD studies in two years’ time.

Abraham Kule graduated in November 2012 from Kampala International University, Uganda. His thesis title was *“Strategic Information Systems Planning and the management of Uganda Martyrs University”*. On account of disseminating his research findings at a University seminar, he has been invited to participate in, and advise a team that is looking at the automation of key processes at the University. He currently works as an editor at the Uganda Martyrs University where he is responsible for editing learning materials for the ODL programme. Completing his Masters degree has opened

up new opportunities for him at his institution such as teaching of undergraduate courses. During and after the grant period, Abraham has published one Journal article and another is currently under review. He has also submitted a conference paper to be delivered later in the year. He is very optimistic about his ICT4D career. He plans to enrol for a PhD if he gets the funding, or enrol in a Certified Information Systems Auditor (CISA) certification programme so that he can improve on his technical skills. He intends to continue with ICT4D research and to publish. He has plans to co-author a book with his Master's supervisor.

Eddons Munthali is scheduled to graduate in August 2013¹⁷ from the University of Malawi, Malawi. His thesis title is *"Application of Geographic Information Systems (GIS) in the Allocation of Health Professionals in Health Facilities in Malawi"*. During the course of his research, he has established contacts with the local city assembly and is providing advice on how the city can adopt his GIS-based work in mapping health facilities with a view to influencing how health personnel are allocated to health facilities. He is an assistant lecturer at the University of Malawi (The Polytechnic) where he is responsible for teaching undergraduate courses in Information Systems and ICT, New Media, Multimedia and Computer Graphics. He is currently serving as the Acting Director of Printing and coordinates the production of teaching and learning materials and binding of theses. He has presented his on-going research at two institutional seminars. Funds permitting, he plans to immediately enrol for a PhD program as soon as he obtains his Masters degree. Apart from his PhD ambition, he wants to become a trainer of trainers in ICT4D and grow into a recognised ICT4D researcher. He remains hopeful that he will realise his objectives, as expressed in this quote:

"After completing my masters in August this year, my ambition (funds permitting) is to immediately enrol for a PhD program. I am able to study my masters course because of the research grant I received. It was not going to be possible for me to study for masters. I had no funds. My poor parents could not afford to pay for me. The masters course has therefore energised my career prospect of becoming a highly learned person in ICT so that i can be able, as a teacher, to share knowledge to Malawians a poor and developing country very far behind in ICT skills - my skills will help to develop University of Malawi in particular and Malawi nation in general. Apart from my PhD ambition, I also want to become a trainer of trainers in ICT4D and a recognised researcher. I am quite hopeful that my ambition will be achieved. I also have job security because of this masters course".

¹⁷ Eddons was on course to complete his study on time, however the University calendar was disrupted by political happenings in Malawi, and this interfered with his progress.

Appendix G: Research Abstracts

PhD Abstracts

Nkqubela Ruxwana: *The Adoption of Quality Assurance in e-Health Acquisition for Rural Hospitals in the Eastern Cape*

The evolution of e-health has the potential to assist in the management of scarce resources and the shortage of skills, enhance efficiencies, improve quality and increase work productivity within the healthcare sector. As a result, an increase is seen in e-health solutions developments with the aim to improve healthcare services, hospital information systems, health decision support, telemedicine and other technical systems that have the potential to reduce cost, improve quality, and enhance the accessibility and delivery of healthcare. However, unfortunately their implementation continues to fail. Although there are several reasons for this, in this study a lack of project quality management is viewed as a key contributor to the failure of e-health solutions implementation projects in rural hospitals. This results in neglected aspects of quality assurance (QA), which forms an integral part of project quality management.

The purpose of this study is to develop a Generic Quality Assurance Model (GQAM) for the successful acquisition (i.e. development and implementation) of e-health solutions in rural hospitals in the Eastern Cape Province to enable improved quality of care and service delivery. In order to develop and test this model it was necessary to identify the QA methodologies that are currently used in rural hospitals and to evaluate their strengths and weaknesses, as well as their impact on project success.

The study is divided into four phases; in each phase different study designs were followed. The study used triangulation of qualitative and some elements of quantitative research approaches, in terms of which a case study approach was adopted to answer the research questions. This study did indeed develop a GQAM that can be used to ensure e-health solution success in rural hospitals. Furthermore, to aid in the implementation of this model, a set of QA value chain implementation guidelines were developed, as a framework, to inject the model into typical (SDLC) phases.

Keywords: *quality, quality assurance, e-health solutions, ICT4D, healthcare, project quality management.*

Margaret Nyambura Ndung'u: *Development outcomes of the new technologies to the quality of life of low income households in Kenya: A case study of Nairobi*

There has been a rapid increase in the use of new technologies (Internet, email and mobile phones) across the social-economic groups in Kenya. The mobile phone revolution, with penetration down to the poorest of the poor, has challenged the assumptions that low-income households have no use for the new technologies. It has demonstrated that despite their financial constraints, they value and use what they perceive to be of benefit. Usage has resulted in diverse development outcomes, influencing quality of life. The focus of the government, civil society, development partners and communication operators, however, has been more on the access of the new technologies and less on what happens after access in transforming individuals, households and communities.

This study aims at contributing to the body of knowledge in Information and Communication Technologies for Development (ICT4D). Using the Capability Approach as the theoretical framework, whose focus is expansion of people's capabilities to lead lives they have reasons to value, it examined development outcomes of the new technologies on the quality of life of low-income households in Kenya, using Nairobi as a case study. The study examines the factors that influence the usage and the capabilities enabled through the technologies. It discusses the role of choice in mediating the conversion of enabled capabilities to development outcomes, and the relationship between the derived development outcomes and the quality of life.

The study used quantitative and qualitative data derived from a secondary database comprising households distributed across the country, complemented by a detailed survey that focused on three clusters resided by low-income households in Nairobi. The quantitative data was analysed using statistical methods — specifically measures of central tendency and measures of relationships while the qualitative data was analysed using the framework based approach.

The study argues that individual choices influence the ultimate decisions made and dictate the development outcomes derived from the usage of the new technologies. It establishes that households have different perceptions on the role that the new technologies should play in enhancing their quality of life and this influences the choice they make. The findings demonstrate a relationship between the development outcomes of using the new technologies and the quality of life: The positive development outcomes lead to an improved quality of life while the negative development outcomes negate the general expectations of good quality of life. Age, income, gender, marital status, education and skills influence the usage of the new technologies in different ways. Perceptions and preferences influence the usage too.

The study contributes to knowledge through: developing a context-specific list of enabled capabilities from the use of the new technologies; identifying twelve development outcomes from the enabled capabilities; showing a relationship between the development outcomes and the low-income households' desired quality of life; and a summary table indicating the extent of the role demographic factors play in influencing the development outcomes. A template is derived from summary for use by scholars.

The study concludes by noting that as the new technologies continue evolving and being integrated into the daily activities of the low-income households, expectations that they would solve development challenges should not ignore individual capabilities, power relations, and social

structures. The study notes that vision 2030 has emphasized the overarching role of Science, Technology, and Innovation (STI) and observes that with the spread of the new technologies, it is becoming less viable to measure individual work inputs by just verifying time of physical presence. The policy implication is that the government and employers would need to come up with different measures of productivity. The study recommends for guidelines and policies that would ensure that rational choices are made when engaging through the new technologies.

Keywords: *Capability Approach, Low-Income Households, Choice, Quality Of Life, Mobile Phones, Internet, ICT, Capabilities, and Development Outcomes.*

The role of technology among populations in developing countries continues to be a topic of immense interest to researchers. Whereas technology acquisition is easily discernible externally, the ways to which a piece of technology is put to use is a process wrought with various dynamics, some evident and some not. In the field of ICT today, there are numerous technological devices available and unlike in the past, the device prices have become affordable even to those at the base of the pyramid. Ensuring that the technology is put to efficient use is dependent on many underlying factors such as the relevance, the design, and the cost of use among others. The last decade has seen proliferation of the mobile phones in Kenya. During the same period, there has been increased competition from mobile service providers making the mobile phone a choice device for many Kenyans. Indeed the current mobile phone subscriptions surpassed past projections by considerable margins. Whereas those in formal employment find technology use part of the job or leisure, farmers in Kenya for example, have had to rely very little on technology use except for communication and to a large extent money transfer services such as Mpesa, Zap, Orange Money and Yu cash. Several researchers in both in developing and developed countries have studied the concept of technology adoption and several models from such studies exist in literature. Nevertheless the studies have tended to concentrate on technology adoption within formal structures, where the users are literate and where resources are readily available. For semi-illiterate users mostly within developing countries, availability of communication infrastructure and technological resources are a big challenge. Therefore the technology needs of such users have seldom been fully understood partly due to assumptions about their requirements and partly due to high costs associated with technology acquisition and deployment within the rural areas.

This research focused on technology adoption process from the standpoint of farmers; more specifically farmers' ability to use and adopt ICT in their daily lives. We enlisted farmers living in rural areas where apart from Mobile phone there is no alternative communication infrastructure. The farmers are organized in groups and are drawn from three different areas of Kenya namely Mtito Andei, Kiangwaci and Bumala each having different geographical and demographic data. The farmers are engaged in both subsistence and cash crop farming and all seem to have had comparable issues affecting them mainly lack of information on the crop diseases and pests, the challenges posed by middlemen and the need to try different crop varieties. In addition the lack of technological resources was a big challenge to the use of any technological innovation. The objective was to engage with the farmers from the onset to ensure that we understood the needs from their standpoint and in the pre-study period spent time with them in their homes to gain trust and ensure that the process was user-driven and user participatory throughout. Our approach was a combination of user-centric process and socio-technical experiments to bring to the fore the critical factors that determine adoption among rural agricultural users.

We designed a Case Based Reasoning expert system known as Mobile Interfaced Crop Diagnostic Expert System (MICDES). The system enabled farmers learn about pests and diseases affecting their crops and it also helped us study the adoption process of ICT among the farmers. The MICDES design and development was based on the needs and feedback from several interactions with the farmers. The feedback obtained was used to improve the system continuously and to study the process of adoption among the farmers. Resources such as computers (laptops and desktops), mobile phones,

Internet modems and airtime was provided to ensure that the farmers were able to use the system. To ensure that distance to the centers were not a hindrance and also to accommodate different schedules, we visited the farmers at their homes so that they could learn and use the system comfortably and with added flexibility. To further ensure inclusion, the system was translated into different local languages and we studied the farmers' interaction with it over a period of almost one year. This approach was to ensure that we presented a model that reflected the reality that the farmers were heavily involved in the design and development of the system and not just as ordinary end users.

Training on the system was carried out and quantitative and qualitative data collected through structured questionnaires and Focus Group Discussions (FGDs). The data was collated and analyzed and interpreted using Principal Component Analysis (PCA) and theme coding. The analysis generated the principal components that were significant in explaining the adoption process by the users. Through PCA three components were derived namely; Usefulness and Persistence of usage, Group Dynamics in usage and Learnability and Control in usage that defined the adoption process for the rural farmers. These components had the following constructs respectively; task fit, usability, user friendliness and attitude; self-image and opinion leadership, support system and resources. Together these constructs and the corresponding variables defined our model, user-centric adoption Information and Communication Model for rural farming communities in Kenya. It is also significant that respondents within the rural areas categorize issues as individual, communal or national and we used the same in this research. The individual determinants are task fit, usability and user friendliness and attitude towards technology; community determinants are self-image and opinion leadership and national determinants are control, having resources for use and availability of support system. The construct corresponding variables are moderated by gender and age. It is noteworthy that unlike in the Unified Theory of Acceptance and Use of Technology model, experience and voluntariness of use were not moderators. This is a significant finding based on our user-centric approach through which we trained the users extensively thereby mitigating the lack of experience. Similarly all our respondents were using MICDES voluntarily. The research has also put forward an ICT application in seven different languages (5 of which are Kenyan local languages), which are capable of providing farmers with a first line of defense against pests and diseases. This is done from the convenience of their phones and at an affordable cost. This application can mitigate the shortage of agricultural extension officers in Kenya whose numbers have continued to dwindle over the years.

The research therefore makes the following contributions; a user-centric ICT adoption model for rural farming communities; an expert crop diagnostic system with five different local language interfaces, the application of PCA within the context of ICT adoption studies among rural farming communities; the importance of user-centric approach in adoption studies among rural communities and the importance of user-centric approach in mitigating culture, experience and low educational background among rural communities. We recommend areas for further research such as investigating adoption holistically from the point where resources are not provided, illiteracy, occupation, more cultural dimensions and different application areas to see how the dynamics of adoption change. We believe that the research and its outcomes have made a significant contribution to academia, policy makers and practitioners who are targeting the application of ICT among rural farmers within Kenya.

Robert Obwocha Oboko: *Adaptive Learning and Metacognitive Regulation Support for Ill-structured Problem Solving Processes in Web-Based Learning*

This research was set up to investigate the effect of adaptive user interface and self-regulation learning supports, in a web-based non-collaborative learning system, on the learners' cognition, metacognitive awareness and application of problem solving processes. The research was designed as a mixed study with two quantitative experimental studies and a qualitative cross-case comparative study. Study 1 investigated the effect of adaptive user interface supports on the learner's cognitive performance, measured as test scores, and perceived value of the adaptive features of the learning environment. Study 2 investigated the effect of self-regulation scaffolds on the learner's level of metacognitive awareness and level of application of problem solving processes. The qualitative study further investigated the effects of self-regulation scaffolds by using the think aloud method.

Results from Study 1 indicated no significant difference in mean test scores between learners using and those not using adaptive features. Regarding perceived value of the adaptive features, both groups "starting with" and "starting without" adaptive features perceived the features as useful. The results show that the order of sequencing course content as well as the strategy of presenting adaptive user interface supports has an impact on learner performance and experience. From Study 2, learners who used the scaffolds had a significantly higher metacognitive awareness and application of problem solving processes, compared to the control group. However, whereas the scaffolds were effective for knowledge of regulation of cognition, they had minimal effect on knowledge of cognition. Hence, there is need for a different set of scaffolds for knowledge of cognition. Study 2 also showed that the effect of scaffolds on the learners' cognitive processes is better measured using the self-report method followed by solving of a task.

Keywords: *Scaffolding, cognitive load, metacognition, cognition, ill-structured problem solving, adaptive web-based learning, Machine Learning algorithms, instructional design.*

Judith Kamau: *Distance learners' perceptions of the effectiveness of learner support services in a primary education diploma in Botswana: A Case Study*

This study was motivated by my desire to understand participants' perceptions about the effectiveness of learner support services and their contribution to distance learners' progress and programme completion in the DPE programme. The investigation was carried out to find out why despite the provision of learner support services, there were low completion rates and high incomplete rates in the final year (2002/2003 cohort) of the DPE programme. The study also intended to understand the strengths and weaknesses of learner support services and make recommendations for improvement. A qualitative case study research design was applied. Group and individual interviews were conducted with participants. Data were analysed using Atlas ti computer software which simplified the management of the large corpus of data generated during the fieldwork.

The study found that there was need for sustained learner-tutor and learner-learner interaction and regular communication with the supporting institution during the learning process. This would require aligning learner support services to identified needs of distance learners, access to learning resources including effective monitoring and supervision mechanisms for academic, counseling and administrative support in order to ensure commitment and accountability of learner support providers in responding to the needs of distance learners. In order to reduce isolation which is created by the physical separation between learners and service providers, the study recommended a structure for the provision of learner support services that are as close as possible to where distance learners live and work for ease of access. The study further found that there is need for policy guidelines and a structure to facilitate the provision of effective learner support services for the benefit of distance learners.

Key words: *Learner support, distance learners, diploma in primary education, academic, counselling support.*

e-Learning is the acquisition and use of knowledge distributed and facilitated primarily by electronic means through the multi-media, telelearning, the flexible learning and the intelligent flexible learning models. This form of learning currently depends on networks and computers but would likely evolve into systems consisting of a variety of channels like wireless, satellite and technologies like cellular phones as they are developed and adopted. e-Learning may incorporate asynchronous or synchronous access and may be distributed geographically with varied limits of time. The central problem in this study was that despite the fact that e-Learning as a mode of course delivery in institutions of higher learning in Kenya has several positive attributes including: high degree of interactivity between users, capacity to cater for high enrolment against the background of insufficient physical facilities, promoting education for the working population at low opportunity costs, and reducing administrative loads by making routine information and resources available online among others, the paradox was that the emerging body of literature globally and nationally indicate that e-Learning as a mode of course delivery is not being practically implemented effectively and efficiently. As a consequence, the full benefits that could be realized by expanding the implementation of e-Learning to meet the high social demand for education and training in Kenya public universities and eventually enhance the capacity of educational planners and university management in broadening the market of university courses will not be realized.

To this end, this study was designed to determine the status of e-Learning as course delivery method and assess the range of barriers faced by public universities in implementing e-Learning. The specific objectives were six fold: assess the e-Learning components applied and status of e-Learning infrastructure in public universities in Kenya ;identify the features that are associated with the current e-Learning in public universities in Kenya; establish costs involved in development and production of e-Learning courses, maintenance of e-Learning courses in presentation, storage and delivery including transmission of e-Learning courses and materials in public universities in Kenya; determine the benefits of e-learning course modules from both the demand and supply sides; identify the constraints faced by the public universities in implementing e-Learning; and propose possible strategies and interventions that can be applied to improve dissemination of course modules via e-Learning in Kenyan public universities.

The study adopted an exploratory descriptive survey design. The units of sampling were the seven public universities in Kenya. From each sampling unit the researcher collected data from all ICT managers/e-Learning directors and university e-Learning technicians and purposively sampled members of the academic staff on the criterion of their specialized role in e-Learning course delivery. The study utilized questionnaires, interview schedules, direct observation and observation schedules for data collection. The instruments were piloted to determine the reliability using split half method. Validity was determined using experts opinion. Data analysis was done using both qualitative and quantitative approaches. The following conclusions have been drawn on the basis of results obtained from the current study; it was clearly outlined that one very important factor that the universities' should embark on is to develop a university policy on e-Learning which should be supported by all the stakeholders, establish centralized e-content repositories; compulsory computer literacy courses for students and lecturers; eradication of use of hand written notes in teaching; all course materials to be made available in e-Content form; universities both private and

public to collaborate and make common e-Learning courses, commitment and deliberate planning for e-Learning, training and provision of access points and connectivity, university policies to highlight on the importance of e-Learning, allocate enough funds to initiate and support e-Learning, sensitize staff and students on e-Learning development and implementation, integrate ICT in the operation of the university and encourage use of e-content and e-evaluation.

The following recommendations were arrived at in the light of the study findings. e-Learning coordination to be restructured to be under ICT departments. It is also recommended that the server should be re-located to KENET offices. Students and staff should be encouraged and motivated to use the e-Learning systems through sensitization on matters related to e-Learning and its importance through seminars and training workshops. All lecturers should be trained and exposed to writing e-Learning materials and content development tools. Lecturers should be sponsored to e-Learning conferences and establish a directorate to specifically handle e-Learning issues.

Joram Kinuthia Nduati:

A Produce-based credit service model: Case for Limuru Farmers Dairy Cooperative

For many years, Kenya has relied on coffee, tea and horticulture for empowerment of small holder farmers in the rural areas. This trend is changing as dairy farming has taken a key role complementing the traditional cash crops in many rural households. The dairy industry is a major source of income and employment to an estimated 1.5 million people mainly in rural Kenya.

Small scale farmers face several challenges some of which include difficulties in accessing credit, inability to build milk produce with economic value, marketing, and quality assurance. To overcome these challenges, the farmers have formed dairy cooperative societies, which facilitate milk collection, bulking, processing and marketing for the more advanced ones. In these cooperatives, the small holder farmers benefit from economies of scale, access to credit, and also access to markets. Dairy cooperatives - the business units - are faced with several challenges and key among those is providing access to credit against milk delivery. Farmers often run into arrears, and spend money and time that could have been spent on other activities such as travelling to cooperative's head office to access information. Suppliers, service providers and shop owners are unable to accurately determine credit to be advanced to farmers. The cooperative management incurs overheads each month from manually reconciling credit information before making payments to members, resulting in delays. The credit process is offline, largely manual, prone to errors and fraud.

Limuru Dairy Cooperative was selected as a case in this research. Focusing on the small holder dairy farmer, the credit process was analyzed and a mobile phone based solution developed using evolutionary prototyping. Farmers were able to use SMS to access credit information. Shop owners and cooperative management were able to use a smart phone application to advance merchandise to farmers against value of milk delivered. From the pilot data analysis, the solution showed that if adopted, service delivery at the cooperative would be enhanced, efficiency enhancement in the credit process, and the livelihoods of Limuru Dairy small holder farmers improved.

¹⁸ We did not manage to obtain Eddons Munthali's abstract.

Abraham Kule: *Strategic Information Systems Planning and the management of Uganda Martyrs University*

The study assessed the factors contributing to Strategic Information System Planning ineffectiveness in private universities of Uganda with special regard to Uganda Martyrs University for formulation of a framework to assist in achieving effective Strategic Information Systems Planning (SISP).

The researcher set out to investigate the significant factors and their interrelationships relevant for effective SISP, identify the gaps and deficiencies of SISP and develop a suitable framework for effective SISP at UMU. The researcher used data triangulation. The Spearman correlation was used to investigate the significant factors and their interrelationships relevant for effective SISP; descriptive research design was used to collect data about the gaps and deficiencies of SISP and, the Chi Square Test was applied to compare the observed data with data the researcher expected about Strategic Information Systems Planning in view of formulating a SISP framework. In qualitative design, the researcher used interviews; document analysis and observation to be able to identify the gaps and deficiencies of SISP.

The study concluded that for private universities to have an effective Strategic Information Systems Planning to enhance management, it should have a clear framework to all the people involved in the planning process. As such, the researcher recommends that: private universities should effectively use the critical success factors to achieve an effective Strategic Information Systems Planning process. Top management should take a lead in Strategic Information Systems Planning and employ the qualified personnel in the Information and Communication Technology (ICT) Department to facilitate an effective Strategic Information Systems Planning; private universities should consider using the developed SISP framework in this study.

Keywords: *SISP Framework, Strategic Information Systems Planning, University.*

Gideon Wananda: *The Data Infrastructure Mainstreaming Model: Government Enabled Creative Commons*

The gender equality movement has been quite very successful in developing countries and thus offers suggestions as to how we can bring ICT4D to the center in governments of developing countries. It confirms among other things, that the influence of government as a key player through its policy formulation is very important for bringing about positive change.

The Data Infrastructure Mainstreaming Model is a model targeting policy of governments in developing countries. It is a result of analysis of three development situations in Uganda which call for a response from ICT4D but perhaps with a slightly novel approach.

There have been efforts to develop a national Spatial Data Infrastructure (SDI) since 2001 but these have not yielded. There is therefore currently a situation where various organizations have created and continue to create similar Geographic Information Systems (GIS) data holdings with the use of public or donor funds. This wastage of funds in millions of dollars would have been abated if there was an SDI specifying common standards for creation of spatial data and providing a platform for data sharing at a small cost, among other benefits. Secondly, there have been various efforts to develop digital libraries for secondary school by government, private enterprises and donor funded organizations or researchers in the past 10 or so years. These have enabled access to digital libraries for less than 10% of schools with a syllabus content coverage of less than 3%. The content developed in all these cases is not available for free copy, download or re-use posing a challenge for wider access and use or rather creating a further digital divide. Thirdly, the Uganda Revenue Authority has recently introduced an online – offline method for businesses and individuals to conveniently file tax returns. This approach however presupposes the capacity of these businesses to maintain accounting records throughout the year from which such returns should be derived – they need a common application for accounting and tax reporting which conforms to local tax and reporting standards.

In the DIM Model, a government enabled creative commons (GECC) license model is proposed by which certain digital resources or infrastructure that are for the common good can be more widely accessible and useable by the masses to answer the above and other similar situations. The GECC would be operationalized through legislation and policy through which owners of identified digital infrastructure would be compensated and then such infrastructure would be rendered open for say, copy, re-use, distribution, download, etc. within the country where the legislation is effective. Additionally, such legislation would render digital resources developed by the use of public or donor funds automatically open. The GECC approach would not be a radically new one because there exists practice of compensation by government to private owners for resources such as land with the aim of developing what the government already acknowledges as infrastructure for the common good such as roads, hospitals, electricity lines, etc. In doing this, the government is empowered by existing relevant legislation and policy.

The methodology used in this research was systems and critical thinking.

Keywords: *Data infrastructure mainstreaming model, Common good, Government policy, ICT4D, Government enabled creative commons.*

Appendix H: Grantee Selection Criteria

Doctoral Awards Selection Criteria

Criteria no	Overall Selection Criteria	Overall Weight	Detailed Selection Criteria	Weight
1	Eligibility	Mandatory	University in one of the 24 countries in Eastern and Southern Africa	0
		Mandatory	Citizenship in one of the 24 countries in Eastern and Southern Africa	0
		Mandatory	Carry out PhD research project in one of the 24 countries in Eastern and Southern Africa	0
2	Registration	Mandatory	Full registration	0
3	Relevance of PhD research	15	Relevance of PhD research to IDRC's Acacia program priorities: Highly relevant = 10; relevant = 6; slightly relevant = 2; irrelevant = 0	10
			Relevance of PhD research to country's needs and priorities: Highly relevant = 5; relevant = 3; slightly relevant = 1; irrelevant = 0	5
4	Quality of PhD research	8	Quality of PhD research: Excellent = 8; Good = 6; Average = 4; Below average - poor = 2; Very poor = 0	8
5	Stage of PhD	20	Readiness for field work: Supervisor(s) given permission to start data collection/experimentation/etc. = 20; still writing the 1st 3 chapters = 15; just obtained full PhD registration = 10; just completed course work = 5; still doing course work = 0	20
6	Time to completion of PhD	10	Period before completion of PhD: < 18 months = 10; 18-24 months = 5; > 24 months = 0	10
7	Support	20	Level of other forms of support for the PhD program	5
			Amount of budget sought <= CAN\$15,000 = 10; > CAN\$15,000 = 0	10
			Duration of support: 3-12 months = 5; > 12-	5

Criteria no	Overall Selection Criteria	Overall Weight	Detailed Selection Criteria	Weight
			18 months = 3; > 18 months = 0	
8	Masters and undergraduate degrees	10	Class of 1st degree: First class = 5; Upper second = 3; Lower second = 2; Third class = 1; No class = 0	5
			Masters degree: Distinction = 5; Credit = 3; Pass = 1; Other = 0	5
9	Experience	5	Employment experience: > 3 years = 5; 2-3 years = 3; 1-2 years = 2; 6-12 months = 1; none = 0	5
10	Other considerations	12	ICT skills: Advanced = 3; intermediate = 2; beginner = 1; none = 0	3
			Publications/presentations: 2 papers and above = 4; 1 paper = 2; presentations = 1; none = 0	4
			Professional membership	1
			Gender: male = 1; female = 2	2
			Age: <30 = 2; >30 = 1	2
	Total	100		100

Masters Scholarships Selection Criteria

Criteria no	Overall Selection Criteria	Overall Weight	Detailed Selection Criteria	Weight
1	Eligibility	Mandatory	University in one of the 24 countries in Eastern and Southern Africa	0
		Mandatory	Citizenship in one of the 24 countries in Eastern and Southern Africa	0
		Mandatory	Carry out Masters research project in one of the 24 countries in Eastern and Southern Africa	0
2	Relevance of Masters program	25	Relevance of Masters program to IDRC's Acacia program priorities: Highly relevant = 15; relevant = 10; slightly relevant = 5; irrelevant = 0	15
			Relevance of Masters program to country's needs and priorities: Highly relevant = 10; relevant = 6; slightly relevant = 2; irrelevant = 0	10
3	Admission and registration	15	Admission into a Master program	10
			Registration: Full registration = 5; partial/conditional registration = 3; no registration = 0	5
4	Support	20	Level of other forms of support for the Masters program	5
			Amount of budget sought	10
			Duration of support: 18-24 months = 5; > 24 months = 0	5
5	Undergraduate degree	15	Class of degree: First class = 15; Upper second = 10; Lower second = 5; Third class = 3; No class = 0	15
6	Experience	5	Employment experience: > 3 years = 5; 2-3 years = 3; 1-2 years = 2; 6-12 months = 1; none = 0	5
7	Interest	10	Interest: Highly interested = 10; interested = 6; slightly interested = 2; not interested = 0	10

Criteria no	Overall Selection Criteria	Overall Weight	Detailed Selection Criteria	Weight
8	Other considerations	10	ICT skills: Advanced = 3; intermediate = 2; beginner = 1; none = 0	3
			Publications/presentations: 2 papers and above = 2; 1 paper = 1; none = 0	2
			Professional membership	1
			Gender: male = 1; female = 2	2
			Age: <30 = 2; >30 = 1	2
	Total	100		100