



EdQual

A Research Programme Consortium on
Implementing Education Quality in Low Income Countries

The Use of ICT to Support Basic Education in Disadvantaged Schools and Communities in Low Income Countries

RESEARCH PROJECT PROPOSAL

Prepared by

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SECTION 1. ESSENTIAL FACTS

Project Title (*maximum 120 characters*)

THE USE OF INFORMATION AND COMMUNICATION TECHNOLOGY TO SUPPORT BASIC EDUCATION IN DISADVANTAGED SCHOOLS AND COMMUNITIES IN LOW INCOME COUNTRIES

Short Title (*maximum 60 characters*)

The Role Of Information and Communication Technologies In The Promotion Of Quality Teaching And Learning Of Mathematics And Science In Rwanda and South Africa

Summary of Purpose of project (*maximum 200 words*)

This research project inquires into the use of information and communication technologies for teaching and learning in disadvantaged schools in low income countries. The purpose of the research project is in tandem with the global objective of the Research Partnership Consortium (RPC) that inquires into the practice of quality education in low income countries especially with regard to disadvantaged learners in difficult delivery contexts. The focus of the study will be on both the use of ICT in teaching of mathematics and science, at the basic education level, and the use of ICT for community development purposes in Rwanda and South Africa. A comparative view will be procured further from Chile. This task is premised on the fact that a growing number of learners in the two countries are increasingly marginalized due to lack of accessibility to physical and skilled human resources especially in the teaching of mathematics and science. The use of ICT is expected to energise teachers and motivate learners to excel in mathematics and science. Of particular interest is the closing of the mathematics and science education divide that exists between boys and girls through the application of effective ICT skills that provide impetus to learners in the teaching and learning process. Additionally, it is expected that involving the community in the project will contribute to the realization of the education related goals, help to ensure the sustainability of the project and specially, will increase the empowerment, hence development possibilities of the community members.

Specific to this proposal is the inquiry into how information and communication technologies can be used to support teaching and learning in schools and communities and how the various ICT initiatives can be developed to assist poverty reduction, ensuring gender equity and meeting the millennium development goals.

Name of Lead researcher/s

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Project Partners

Wits University, University of Bristol, University of Bath and Universidad de La Frontera

Start Date

April 2005

End Date

August 2009

Total Cost of Project**Breakdown of Total Cost by Financial Year**

FY:2006/07	FY:2007/08	FY:2008/09	FY:2009/10	FY:2010/11

Which countries will the project cover?

Rwanda and South Africa

SECTION 2. PROJECT INFORMATION**Rationale**

1. What is the rationale or the 'big idea' behind the project?
2. How will the project enable the RPC to meet its overall objectives?
3. Why is there a need for this research?
4. In what ways will the proposed research provide new knowledge and build on existing research?

(maximum 1500 words)

The RPC project is based on the understanding that educational quality is a multidimensional aspect and that in the current age of globalisation ICT is crucial in the assurance quality education especially in developing countries. One of the objectives focuses on the identification of examples of effective practice in implementing quality education through the evaluation of existing initiatives in ICT in education. It seeks further to develop, pilot and evaluate new practical initiatives in the area of educational quality and evaluate their impact in different groups of learners.

The introduction of information and communication technologies (ICT) into schools is a world-

wide phenomenon, not only among the developed countries, but also among developing countries. In the previous decades, this was an option that developed countries took, but today it has become a need for all schools. ICT has emerged as an indispensable tool for teaching and learning as well as a lever that helps to bring about change in schools (Venezky, 2002). Nations that lag behind in its adoption and use become marginalized and vulnerable to the negative currents of globalisation. The integration of low income countries, therefore, serves to bring the larger population into a global family that is at ease with the dynamics of an information-led knowledge society.

The reality in our societies and more so in Rwanda is that through ICT, the natural resource poor country has everything to gain from educating its citizens in the use of ICT in everyday life. In particular, the performance of learners in communication skills, foreign languages, mathematics and science remains lacklustre. Through the introduction of ICT in schools, the acquisition of effective skills in their use, the infusion of new teaching and learning methods using ICT and community involvement, there is trust that performance in these areas is bound to improve (Tikly et al (2003), Wagner, Day and Joseph (2004), Isaacs (2002), Gerster and Zimmermann (2005),. The DEEP project provides quite deep insights in the use of ICT in the teaching and learning process. Conducted in South African primary schools it came out with quite a number of experiences and lessons that are of intense interest for this project. It focused on marginalized schools and communities especially in Eastern Cape and would be of fundamental use in the design stage of this project. In particular the DEEP project will assist in the definition and understanding of the initial models for teaching and teacher development. The data from the DEEP project will also assist in comparing the baseline data collected in Rwanda and South Africa and appreciating the position of South Africa in the implementation of ICT use in basic education especially in disadvantaged schools and communities.

In this sense, the project's rationale is holistic, insofar as it will work with the main actors of the schools (students, teachers, administrators and related community members), instrumental, in so far as it conceives ICT as a tool that can be used to engage the community in a development process and focused, in so far it will identify and act on very specific learning and development related targets (i.e. learning: science and mathematics; development: HIV/AIDS, sex education, farming, sanitation and hygiene, malaria control, etc.). The process of effecting these three areas is explained in the project activities that span the whole RPC research period.

The proposed research will take place in schools and communities in disadvantaged areas in Rwanda and South Africa. It will study ways in which ICT is used and can be used effectively by learners, teachers, school managers and administrators and members of the community. The reality in these areas is the apparent existence of a digital divide between and within

them. Furthermore, there exists inequality in ICT access between boys and girls. In the interest of gender equality in ICT access the project will address the marginalisation especially of girls in the ICT programming policies and implementation.

In the course of the research it is specifically planned to develop approaches to teacher development in the use of ICT that might be transferred into other similar contexts in Africa. Teachers stand at the centre of skills transfer and cannot be excluded from any ICT empowering endeavours at the basic education level. The fact that learners are the focus of the study must incorporate teachers so that they become partners in the implementation of the ICT projects that are envisaged by the state and other nongovernmental organisations.

In Rwanda, the government is comprehensively committed to developing an ICT-based and led knowledge economy. This is vouched for in the recognition of the use of ICT as a cross-cutting issue in all sectors of development. In its policy statements in Vision 2020 and the Poverty Reduction Strategy Paper it pronounces that ICT is a reliable tool for building the country's prosperity, reducing poverty and improving the quality of life for all people especially the disadvantaged groups. Part of this ambitious programme lies in the extension of basic education to children up to the age of 15 or 16 and provision of computers to primary schools through a range of projects and initiatives. Indeed the distribution of computers has already started. The challenge remains now in the use of these computers and other related media for educational purposes. Besides this, specific initiatives have been put in place including the creation of an ICT unit to coordinate ICT use in schools.

The government in South Africa is also committed to using the potentials of ICT to improve the quality of education in the country and is in the process of developing policy to achieve this. The current provision of ICT in South African schools is variable but increasing as resources permit. ICT has been incorporated in the teaching and learning process in primary and secondary schools in South Africa. The experience of South Africa especially in using ICT in the teaching and learning of mathematics and science would provide a learning point for the integration of ICT in Rwanda, albeit with substantial adaptation. This is in consideration of the peculiarities in Rwanda with regard to the education system and [process].

However, in both countries the provision of ICT equipment (mainly in the form of desktop computers) in itself is just the starting point for their effective use. The reality in many schools is that teachers may have basic ICT skills but have yet to acquire the pedagogical skills to use ICT to support their teaching and their children's learning thus the impact of the introduction of the equipment is low.

This situation applies in many other countries not only those with low incomes. The use of ICT by children themselves is very limited at present and, although they will be quick to develop

ICT literacy, there are particular issues for children in disadvantaged areas where the use of the computers requires them to work through a language of instruction, which is likely not to be their first language. In Rwanda, this is likely to be the case in rural areas where there will not be so much exposure to that language (English or French) compared to children in more urban settings. In South Africa, there will be children at similar disadvantage but could well be in urban settings.

This research has a definite contribution to the realisation of objectives of the RPC. Quality education can be attained when the actual tools and skills of bringing out quality in teachers and learners are availed and the know-how for their use is effectively inculcated. This research is action-oriented and through evaluation it is expected that tangible results will ensue during and by the end of the project. It is envisaged that the research output will be of immense use not only to Rwanda and South Africa but to other areas where the use of ICT is desirable but not yet attained.

Quite a number of research studies on the use of ICT have focused on the use of computers in education (Haddad and Draxler (2002), Blurton (1997), Gerster and Zimmermann (2005), Lundall and Howell (2000). The emphasis has been on learning about computers and the acquisition of some basic skills such as the use word processing or construction of simple tables. In fact to a large extent the computer is considered simply as a word processing tool. This research study goes a notch higher, even at the basic education level, to consider the use of computers and other ICT equipment as effective teaching and learning tools in disadvantaged schools. It will point out the challenges that are encountered in the teaching and learning process and propose models for successful integration of ICT in teaching and learning.

The decision to pursue a two-pronged spatial research focus is to bring in a comparative approach on the use of ICT tools in rural Rwanda and urban South Africa; these being spots where the magnitude of disadvantage is higher. Each country will inform the other so that more balanced conclusions and recommendations can be made for scaling up ICT in education policies.

Aims and Research Questions

1. What are the aims of the project?
2. What are the key research questions that you hope to address?

(maximum 500 words)

The main aim of the research is to develop and evaluate models for effective introduction and use of ICT at basic education level in Rwanda and South Africa. In the initial field research phase two primary and two secondary schools will be studied and later the sample will be broadened. A focus will be on teacher development intervention programmes in schools and

communities in disadvantaged areas. It will inquire into how to support teachers' confidence and competence within the framework of increasing the quality of ICT use (with a particular focus on teaching and learning mathematics and science) It will also delve into the quality and magnitude of ICT use by pupils and at the same time raise awareness of ICT with parents and local communities.

The main aim of the research is to develop and evaluate strategies for effective introduction and use of ICT to support teaching and learning in basic education in Rwanda and South Africa, particularly by building teacher capacity on how to exploit the available technology for teaching and learning mathematics and science.

Additionally, the project aims to support the implementation of ICT in education policy in Rwanda and South Africa, by continuously transferring its results to the ICT in Education Unit at the Ministry of Education of Rwanda and South Africa (or the Educational Policy Unit in WITS).

Also, the project seeks to support government strategies for ICT literacy/skills development of the school members and the community.

Finally, the project aims at building capacity on ICT in education at KIE and WITS.

To this end the research will attempt to answer the following questions

- What is the current status of ICT infrastructure and application in schools in Rwanda and South Africa, especially in disadvantaged schools in both rural and urban settings?
- What level of ICT know-how exists in schools among teachers, learners, school administrators and the school PTAs and the adjoining community?
- How can ICT be used to support teachers and pupils in teaching and learning of mathematics and science and assisting teachers in their professional development?
- How can the use of ICT narrow the gender divide and reform attitudes towards the teaching and learning of mathematics and science?
- What contribution will ICT add to community development especially with regard to resolution of current development problems?
- How can collaborative enquiry and intervention centred on the use of ICT in science and mathematics improve the quality of education in disadvantaged schools in Rwanda and South Africa?

Outcomes

1. What new initiatives are you hoping to develop?

2. What guidelines/ strategies do you intend to produce to assist with the mainstreaming of initiatives?
3. What other outcomes are anticipated?

(maximum 500 words)

- Through action research teachers and learners will be active and integral participants in the use of ICT in project schools and adjoining communities
- Models of teaching and learning using ICT for Mathematics and science will emerge from the research to assist in mainstreaming of ICT in the curriculum
- In-service multimedia and text materials for science and mathematics to be used beyond project schools for training and learning will be developed
- A model for teachers professional development
- Research reports and articles will published
- Policy recommendations will emerge especially with regard to training of teachers, design of science and mathematics kits.

Poverty reduction

1. How will your project contribute to poverty reduction?
2. What indicators will you use to monitor the impact of the project on poverty reduction?

(maximum 1000 words)

At a general level, this project has the potential to impact on poverty by reducing the existing digital divide in the communities, through empowering teachers and learners with appropriate ICT skills. More specifically, the project has potential impact in the following areas:

- Improving the “digital literacy” of the community. In the same way as literacy and numeracy, the range of skills and processes supported by ICT is brought together in the notion of digital literacy, which becomes both a requirement and a right for all learners. In this sense the project will compensate those with limited access to ICT including students, teachers and the community. As usage of ICT becomes more extensive across society, wider benefits could also flow – better links between community and school, greater parental involvement in student progress, and greater scope for schools and other educational institutions to play an inter-active part in community life and development (OECD 2001; Hinojosa, Clabbé et al. 2005).
- Develop ICT skills that could be an opportunity for economic development and an improvement of employability. Knowledge of and familiarity with ICT is an important aspect of employability today (OECD 2001). The project could help the awareness of this economic dimension and may encourage learners to acquire ICT skills, and some to take ICT as an additional optional subject leading to a vocational specialist, including the study of computer science or programming in further or higher education
- Improve teaching and learning strategies in mathematics and science. This is at the core of the project and it is directly related to poverty reduction, since in developing countries, low income communities also have low educational results and lack of

access to ICT (Mideplan 2004; Enlaces 2005). In this sense, the potential for this has developed rapidly with advances in ICT. It can increase the breadth and richness of learning, not least through the topicality and realism that the new resources can bring. It can support the development of higher-order thinking skills, including analysis and synthesis and increases motivation of students and teachers (OECD 2001). On the other hand, despite the number of national and international studies that have tried to unveil the “expected” causal relation between ICT availability and use in schools with students’ higher achievements, results still show that, although there is evidence of impact in specific areas, computer-based technology is only one element in what must be a coordinated approach for improving curriculum, pedagogy, assessment, teacher development, and other aspects of the schools culture (McCombs 2000; Roshelle, Pea et al. 2000). In fact, more recent studies claim that “there is a growing body of evidence relating to the positive impact of ICT on learner attainment and other outcomes, but we need to develop further our understanding of effective ICT pedagogies and how they can be supported.” (Becta 2005, p. 4).

- Improve educational management. ICTs are key tools that permit (and eventually produce) the change from the traditional bureaucratic culture of organisations to a new professional culture (Semenov 2005). In this sense, the project will develop ways in which schools can be reorganized so that working with ICT becomes part of the culture. Educational institutions are often resistant to radical change, but ICT could be a “Trojan Horse” - the means through which change is delivered being also the way that resistance is overcome (Olson 1988); as well as a “Lever” - a tool that must be applied purposefully for a task to be of value (Venezky 2002).

In this scenario, this project will explore and investigate the introduction of ICT in schools, in order to understand the potential impacts that it can have in the above mentioned dimensions and to realise the complexities of such a process. All these dimensions are closely related to poverty.

In particular, groups of learners have been identified on the basis of disadvantage, which reduces their opportunities to access future potential employment and lifelong learning. These groups include rural boys and girls, children with special needs in integrated schools, boys and girls in poor urban settings and households. Access to ICT and acquisition of skills on the use of ICT in specific circumstances will contribute to attainment of an improved quality of life. ICT skills are lifelong skills, which become handy within the ever-changing ICT environment. They are manifested immediately after initial acquisition and linger on in life, long after.

Poverty reduction in this respect is a long-term goal, which might not be discernible immediately. However, immediate results can be seen when the children get the opportunity

to access an ICT environment where they can access information on community relevant themes, such as HIV/AIDS, sex education, farming, sanitation and hygiene, malaria control et al.

Also, given that the inability to access information has been a barrier to accessing opportunities for individual and community development in developing countries. It is expected that through the acquisition of ICT skills the teachers and learners will be able to acquire and assess information for their own benefit. In particular, teachers will evidently be able to access material for their professional development through online courses. Learners will also be able to network with other learners in the globe and share information that is beneficial for their urge to compete in the knowledge based economies. It is our conviction that those learners who benefit from this program will act as change agents in their communities and the multiplier effects are bound to be bountiful.

The gender factor in poverty reduction features prominently since the proportion of girls and boys in Rwandan schools is almost at par but the reality of ICT skills acquisition tends to favour boys to the disadvantage of girls. In particular the acquisition of these skills by girls in sciences and mathematics will be a motivating factor for them to excel in these disciplines. ICT empowers children, and in this case, girls will be a conspicuous target for ICT skills acquisition. Key indicators in this regard will include:

- Changes in parents/community perception of the school and development possibilities/opportunities. For example, children's perception of future work opportunities, career development, teachers' perception of their professional development.
- ICT skills related indicators such as:
 - o Changes in students, teachers and parents ICT skills (basic use of computers and internet). Particularly, the number of boys and girls that will have acquired ICT skills in science and mathematics
 - o Changes in the frequency of access and exchange of information considering also the quality of information accessed vis-à-vis community and personal development needs
- The influence of accessed information on general community development especially in issues such as environmental conservation, gender sensitivity.
- Change in the quality and richness of teaching and learning resources.

In Rwanda today, one can see a proliferation of Internet Cafes and secretarial bureaus, which require prior knowledge in the use of ICT skills. The ability to have an educated citizenry in these skills will enhance integration and participation at equal levels. This is a fundamental approach to poverty reduction in Rwanda which is not essentially materialistic but includes among others the opportunity to access personal development

resources of which information is one. In addition, integration through access to income generating opportunities enhances acceptance that goes beyond the unique social inequities that the country has experienced since colonial times.

Addressing disadvantage

1. Which disadvantaged groups are you hoping to target in your project and why?
2. How will your project contribute to reducing the disadvantages faced by these groups?
3. What steps will you put in place to ensure that the outputs of your project are relevant for these groups?
4. What indicators will you use to assess the impact of your project on these groups?

(maximum 1000 words)

In Rwanda, the focus will be on learners in selected primary and secondary schools in rural areas and urban area where there are additional language issues resulting in disadvantage as well as issues of low income and conditions of living. Rwanda is a multilingual society whereby English, French, Kinyarwanda and Kiswahili claim a stake each. Lack of access to ICT and inability to use them could be a result of language barriers, which also have a forward negative effect on the acquisition of knowledge and skills as well as developing positive attitudes towards mathematics and science.

Performance in mathematics and science is definitely affected by the lack of accessibility to user-friendly teaching and learning materials. Though the government has tried to supply computers to an increasing number of schools, there still exists a gap in terms of the skills and software to use. This has created a divide amongst schools in terms of the ability and capacity to utilise these resources. Hence the more computer skilled teachers a school has the higher the probability that these teachers will integrate computers in their daily teaching and learning chores.

This is a collaborative inquiry project in which the different players are expected to play specific roles. In particular, the initial practical intervention is envisaged to involve the building of the capacity of a selected number of teachers in the use and manipulation of ICT resources in the teaching and learning process. This is planned to involve teachers of mathematics and science in the selected schools. The number of teachers is planned to increase over the project time frame. Through evaluation and monitoring of the use of ICT skills in teaching and learning specific lessons will be learnt that will inform the development of models for ICT introduction and use in schools.

The impact of the initiatives in schools shall be measured by

- Number of teachers involved in the inquiry
- Number of learners benefiting from the interaction with the teachers

- Level of performance in mathematics and science as a result of use of the ICT
- Intensity of use of the ICT by learners as well as teachers for educational purposes measured by number of hours/minutes spent per day
- Accessibility to software for teaching and learning
- Capacity to develop and use software for teaching and learning
- Capacity to use and manipulate various hardware and software for teaching and learning

Learning Contexts

1. Which learning contexts are you hoping to address and why?
2. If the focus is on institutions such as schools then how will the project benefit broader processes of community learning/development/empowerment?

(maximum 500 words)

The research will take place mainly in the formal educational setting of schools. In Rwanda, the schools chosen have Parent Teacher Associations (PTAs), which have an important role in the running of schools. All work in the school will be negotiated with the PTAs thus providing a link with the parents and through them with the local community. As part of the project, opportunities will be sought to inform and involve parents to raise their levels of awareness of ICT. If possible this could be extended to encouraging parental and community use of ICT in the schools. Similar contexts are envisaged for South Africa. The target schools are briefly described below:

Gahini Primary School

This is a primary school located in Eastern province in Rwanda. It has a population of 868 students both boys and girls. It uses French as a medium of instruction and has 3 computers located in the principal's office that were provided by World Links Programme. They do not have Internet access and use the printer at the nearby hospital to print. Two teachers were trained in ICT by World Links. After this, the school hired an ICT trainer to train 5 teachers because they felt that the training facilitated by the Ministry of Education was not enough. Altogether 10 teachers have worked towards an ICT certificate. They work as a peer support group, very much initiated by and supported by the head teacher using the few ICT resources they have.

St Vincent Girls Secondary School

This is a girls only secondary school located in Northern province in Rwanda. It has a population of 404 students. All of the students board. It has 21 teachers and uses French as a medium of instruction. The school has 46 computers donated by the Ministry of Education (10), World Links (16) and Congregation of Sisters (20). Only 26 were in working condition during the first visit in May 2006. They had Internet access but the connection normally breaks down. The school has an old projector in the lab and a printer in the principal office.

They use the computers mainly to train students for secretarial studies. The rest of the students also use them to learn how to use Microsoft Word and Excel. Each class uses computers for 2 hours a week even though ICT is not in the curriculum. They don't use them to teach other subjects. But if computers were connected to Internet, they would use them to teach maths and science. The school teaches mainly maths/physics; biology/chemistry and secretarial studies

Sonrise Primary School

This is a primary school located in Northern province in Rwanda. It has a population of 456 students (boarding) both boys and girls. 75% of the students are orphans. The school was opened 5 years ago and uses English as a medium of instruction. It has 3 computers and no Internet connection. Two teachers have been trained in basic computer skills by the World Links Programme. It has plans for receiving 180 computers which will be used to teach ICT skills as well as equip every classroom with a computer. They also have a plan for all teachers to be trained in computer skills and how to use them for teaching and learning. They are also trying to equip their new science lab in the primary school.

Kacyiru Secondary School

This is a secondary school located in Kigali City. It has a population of 275 students (boys and girls) and 16 teachers. The school opened 4 years ago and uses French as a medium of instruction. It has 12 computers donated by the Ministry of Education (10) and the former district office (4). It has no Internet access. They hope that when they have internet access they can offer the computers services to the community (at a fee). Computers are not used by students after 16:30. Two teachers were trained in basic ICT skills and students learn how to use Microsoft Word for one hour per week. Many students from this school said that they had used internet in the Internet cafés before.

South African schools

A sample of South African basic schools will be selected. Current research especially the DEEP project indicates that quite a number of schools in South Africa use ICT devices in the teaching and learning process. An evaluation of the current use of the ICT will be undertaken in a selected number of disadvantaged schools and communities. Two schools will be identified in the first instance. This number will be increased during the course of the research.

Methods

1. What methods do you anticipate using in your project and why?
2. How will the methods support the realisation of the project aims and research questions?

3. What participatory methodologies will you use if any?

(maximum 1000 words)

The overall design of the research is conceived as a collaborative enquiry involving the African, UK and international project partners working with the staff of the schools themselves (and parents and community groups where possible) in producing a plan for a programme to enable teachers to make the best use of the ICT resources available in their schools. It is planned as a two-stage project ; the first stage working with two schools in Rwanda and two in South Africa for the phase lasting about 9/10 months (see attached spreadsheet). The second stage would extend to a further eight schools in each country implementing an intervention programme based on earlier research.

The research project will largely be action research oriented. This will involve participatory and collaborative inquiry in which teachers and students will be the main actors. The research will be done in the context of the teacher's environment – that is with the students and at the school in which the teacher works - on questions that deal with the use of ICT in the teaching and learning process. This methodology is based on the idea that teachers will begin a cycle of posing questions, gathering data, reflection and deciding on a course of action. When these decisions begin to change the teaching and learning environment a different set of circumstances appears with different problems posed with a new look. The research process will be cyclical for purposes of eventually arriving at optimal models and kits that will have a Rwandan input and character. The method is empowering especially to the teachers since it incorporates professional development and sharpening of competencies in the course of the research. It will therefore enrich traditional academic research tools.

This process will generate both quantitative and qualitative data through the use of standardised instruments. The instruments will be pre-designed, tested and used to collect baseline data on ICT use as well the use and attitudes towards the ICT kits use that will be developed in course of the research. Where necessary interviews will also be conducted to explore the impact in more depth..

In particular, the project will develop “teaching with ICT kits (TICT Kits)” for science and mathematics (materials, resources, guidelines, software) to support teachers to enhance teaching and learning using ICT. Incorporated in these Kits will be a range of classroom-based scenarios that the project teachers can use as a starting point for their own design. In this respect the initial TICT Kits will be proposed by the research team and will be refined in Phase 1 of the Project with a group of teachers from 3 selected schools (2 in Rwanda and one in South Africa). At least 4 or 6 teachers from each of the schools will work within the project.

In Phase 1 (September 2006 – December 2007) project teachers will develop teaching and learning scenarios around a focused area of mathematics and science, drawing on the materials and resources in the TICT Kits. These teaching and learning scenarios will be followed up and investigated (data collection). Results of this process will be used to enhance the TICT Kits.

The process of working with teachers in Phase 1 will be documented (Model 1). This model will be evaluated and refined for working with teachers in Phase 2 (Model 2).

The evolved model of teacher development (Model 2) and resulting TICT Kits will be used with the extended team in Phase 2, involving a larger sample of schools/teachers. In this phase, 10 more schools will join the project, 8 from Rwanda and 2 from South Africa and at least 4 teachers from each school will become part of the micro level team (40 teachers in total). These teachers will become part of the extended researcher/teacher micro-level teams.

As in Phase 1, project teachers will be supported to develop teaching and learning scenarios for mathematics and science. The process of implementation will be researched in order to be able to refine the Kits and produce a further refined model of teacher development (Model 3).

One TICT Kit should contain at least the following:

- Relevant literature.
- Example teaching and learning scenarios for mathematics or science.
- Guidelines for the teacher.
- Contents for the teacher and the students.
- ICT literacy/skills development resources (to enable some to start using ICT).
- Teaching resources for the teacher, such as software or others.
- Learning resources for students.
- Evaluation guidelines and instruments.

Regarding data collection, the project considers:

- Semi structured interviews of teachers, principals and students
- Non participatory observation of classes before Phase 1 intervention
- Non participatory observations of classes during Phase 1 intervention (+ selected video recordings)
- Teachers' self report
- Pre-post questionnaires for teachers (attitudes, motivation, subject knowledge, use of ICT out of school)
- Pre-post questionnaires for students (attitudes, motivation, subject knowledge, use of

ICT out of school)

- Schools' data (attendance, performance).

Plan of Project Activities

1. Provide a work plan of main activities, including approximate time allocated to each activity.
2. What are the main milestones/ outputs in the project?
3. How will responsibility for each activity be distributed amongst research partners?
(maximum 1000 words)

See attached schedule of activities for Rwanda and South Africa. The attachments are Microsoft Excel files that cannot currently fit in this document without losing part of the document. Please download it separately.

Rwandan Plan of Activities (see excel attachment)

South African Plan of Activities (see excel attachment)

Risks

1. What are the most likely problems, which will inhibit the proposed project from achieving its objectives? How will you counter them?
2. How likely are these to happen and how serious the consequences to the project if they occur? What means have been/will be taken to minimize or mitigate potential risks?
3. Evaluate the risks which might prevent the project from influencing policy and practice.

(maximum 500 words)

There is a risk experienced and trained researchers and teachers leaving the project before completion. This will be countered through replacement and incorporating other lecturers at KIE who have interest in ICT in the capacity building sessions in the course of the project.

The EdQual team is essentially Anglophone while the most of the schools we shall be dealing use French as their medium of instruction. There will hence be need for translation services at almost every level of interaction with the schools. Translations services should be budgeted for to facilitate the implementation of the project.

In Rwanda and South Africa steps have already been taken particularly, in the inception phase, initially to secure political support for the project. The interest of the state in promoting ICT in school has been recognised and policy makers at the top level in the ministry of education have been involved in the initial phase of this project. Expectations from this project are therefore very high.

The highest risk, however, is non-exhibition of immediate results at the school level as evidenced by similar projects in the past. There is hence a need to integrate immediate areas of ICT skills acquisition and use by teachers, pupils and school administrators. This task is possible within the realm of the project, especially through the collaborative and action research methodology that the project is premised on.

Through organising of capacity building workshops for the teachers and school administrators, the likelihood of inertia will be mitigated. This will involve following up the trainees to the schools to engage them on the actual of use of the ICT in the teaching of mathematics and sciences.

Problems of language at the school are anticipated. There maybe need therefore to integrate language facilitation during the research and holding sessions with teachers and learners. In addition, there will be a need to incorporate translation services in the budget so that interaction hiccups with policy makers in English, French and Kinyarwanda can be overcome.

Monitoring and Evaluation

1. How do you intend to monitor and review the implementation of the project and assess its impact?
2. What existing key indicators of quality will you use in your project and what indicators will you seek to develop?
3. What baseline/benchmarking data will be used?

(maximum 500 words)

The project is in form of collaborative inquiry, which will be implemented in a phased manner; each annual phase will undergo a monitoring and review process so that it can inform the next phase. This gradual implementation of the project will ensure that at the end of every phase key tangible milestones are identified. These milestones should have specific impacts at the school level.

Communication with User Groups and Policy Makers

1. How will you communicate and work with user groups?
2. How will you ensure that your main research findings are accessible to non-academic audiences?
3. How do you hope to use popular media to disseminate research findings?
4. What are your intended pathways to policy influence?
5. What steps will you take to ensure that policy makers take ownership of the research and to support the mainstreaming of initiatives?

(maximum 1000 words)

Through the facilitation of the communication component of the project it will be feasible to contact user groups through

- The project newsletter
- Publications on the EdQual website
- Hold a workshop at the end of each phase to involve interested players in the ministry of education especially teachers, school administrators and selected PTA members
- With the support of KIE to buy space in all language newspapers and time in the national radio including selected private FM radio stations to publicise the project and its findings
- Engage policy makers in all phases of the project for purposes of seeking advice, support and active participation

Throughout the course of the project, policy makers will be involved so that the results of the project are progressively understood by them. Accessibility to policy makers will be made from the inception phase for purposes of creating initial acceptance and easing accessibility to teachers and learners at the school level.

Capacity strengthening

1. Within a limited budget what are your most pressing capacity strengthening needs as a team?
2. How do you plan to realise these?

(maximum 500 words)

The project team in Rwanda requires capacity building in the following areas:

- A three days facilitation workshop on research methods especially in action research and participatory research methods. This can be facilitated through the budget on capacity building. This is a one time budget item
- A five days capacity-strengthening workshop will be needed to appraise the team on new trends in ICT development and how it can effectively be integrated in teaching and learning of mathematics and science.

Additional equipment in terms of LCD projector to assist in data presentation

Key Researchers

1. Name the principal researchers from the lead institution and collaborating partners.
2. Specify the amount of time to be devoted to project activities by each researcher.
3. How will the skills of the team complement each other in realising the project goals?

(maximum 1000 words)

Lead researchers:

At the national level **Edmond Were (KIE)**, **Casian Muhire (KIE)** shall lead the research and will be assisted by **Ali Kaleeba (KIE)**. In addition **Alphonse Uworabayeho (KIE)** and **Brigitte Umubyeyi (KIE)** will be the Wits link resource person in the application of ICT in mathematics and science. At this level specific amounts of research time of up to 30 days in a year has been allocated

At the international level **Paul Denley (Bath)**, **Rosamund Sutherland (Bristol)** and **J. Enrique Hinostroza (Chile)** will be responsible for integrating the international face of ICT in the project. In addition, **Mphela Motimele (Wits, South Africa)** will be on the team to bring in the South Africa experience in mathematics and science.

Project Management

1. How will responsibility for managing the project be shared?
2. How will you ensure effective communication between research partners?

(maximum 500 words)

1. National Project Coordination – Institutional Coordinator
2. Host institution Administration and Partner Collaboration - Vice rector (Administration) and KIE Project Administrator

3. Research Coordination – Lead researcher(s)
4. Project Advisory – ICT Unit MINEDUC

The National Projector Coordinator and the Projector Administrator will be responsible for effective communication between research partners. This will be done especially through sharing of information in administration, visits, research, workshops and capacity building sessions.

SECTION 3. FINANCIAL INFORMATION

Other Sources of Funding

1. What other sources of funding besides that available through the RPC are you hoping to attract?
2. How do you plan to go about accessing these alternative sources?
(maximum 500 words)

Seek funding from possible sources whenever opportunity arises

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