

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/317638872>

Systemic Levers for Change Towards Sustainable Institutionalisation of ICT in Schools

Conference Paper · June 2017

CITATIONS

0

READS

11

4 authors:



Isabel Meyer

Impact Advantage

22 PUBLICATIONS 10 CITATIONS

SEE PROFILE



Meryll Ford

Council for Scientific and Industrial Research...

22 PUBLICATIONS 131 CITATIONS

SEE PROFILE



Mario Marais

Council for Scientific and Industrial Research...

47 PUBLICATIONS 112 CITATIONS

SEE PROFILE



Sifiso Dlamini

Council for Scientific and Industrial Research...

3 PUBLICATIONS 0 CITATIONS

SEE PROFILE

Some of the authors of this publication are also working on these related projects:



The transfer/exit process from an ICT4D project to a line budget item in the system that should sustain the use of ICT. [View project](#)

All content following this page was uploaded by Isabel Meyer on 17 June 2017.

The user has requested enhancement of the downloaded file.

Systemic Levers for Change Towards Sustainable Institutionalisation of ICT in Schools

Isabel MEYER¹, Merryl FORD², Mario MARAIS³, Sifiso DLAMINI⁴

¹*Impact Advantage, P O Box 331, Wapadrand, 0050, South Africa*

Tel: +27 12 841 3081, Fax: +27 12 841 4720, Email: iameyer@me.com

CSIR Meraka Institute, Building 43, CSIR, Meiring Naude Rd, Pretoria, South Africa

²*Tel: +27 12 841 4601, Fax: +27 12 841 4720, Email: mford@csir.co.za*

³*Tel: +27 12 841 3771, Fax: +27 12 841 4720, Email: mmarais@csir.co.za*

⁴*Tel: +27 12 841 3081, Fax: +27 12 841 4720, Email: sdlamini@csir.co.za*

Abstract: Many ICT4E projects fail once the implementation team withdraws. Although there are multiple reasons for this, the problem often lies with integration of the project into the day-to-day institutional arrangements of the education system. This puts pressure on the school environment, since schools are unable to sustain the change introduced without support from their formal support systems. Although the ICT for Rural Education Development (ICT4RED) initiative was successful in integrating technology into rural schools, this success did not translate into the district and provincial levels of the educational system, since the challenges experienced in these systems were under-estimated. On completion of the initiative, a task was undertaken to retrospectively assess the factors that are critical to the integration of provincial ICT4E initiatives across provincial structures, and across different hierarchical levels of the education system. The key systemic levers for change, as well as critical issues for integration at each level, were identified. These could form the basis for the development of an integrated strategy for the introduction of changes that an e-Education system at structural, process, operational, managerial and policy levels.

Keywords: ICT4E, implementation, sustainability, institutionalisation, e-Education

1. Introduction

One of the challenges in South Africa is to ensure equitable and quality educational opportunities for all children [1]. This is particularly difficult in rural areas, where the existing challenges in the education system are magnified due to the severe lack of infrastructure, poverty, unemployment and social issues [2]. Due to the complexity and breadth of these challenges, it becomes imperative to tackle them in a holistic, systemic way in order to ensure long-term sustainable change [3].

ICT4RED was an ambitious project to introduce technology (tablets and supporting ICT infrastructure) to rural schools in the Eastern Cape, in order to support evidence-informed learning for policymakers and practitioners. To date, it is the largest ICT for Education research programme in South Africa [3]. The fact that it was undertaken in a resource-constrained environment in one of the poorest-performing provinces is significant and makes the learning from the project valuable, as South Africa wrestles with issues of quality education.

Over the course of four years (2012–2016), 26 schools were provided with tablets, digital projectors, Wi-Fi networks and hotspots, content servers, satellite connectivity and secure storage and charging facilities [3]. More than 300 teachers were trained on how to integrate technology into 21st century teaching practices and more than 50 district officials were trained to support the schools in assessing technology use in the classroom. As part of

the National Rural Youth Service Corps (NARYSEC) youth programme, 52 trainee-technicians from the district were made available to schools. ICT4RED also trained 10 Cofimvaba teachers to become training facilitators as part of capacity development. The project is actively supporting six Masters and three PhD degree students and a further three Honours and two Post-Doctoral students were part of the human capital development focus of the project. The ICT4RED project team consisted of more than 30 individuals from more than ten organisations over the course of four years. Most importantly, more than 6000 learners have been exposed to the use of technology in learner-centred, 21st century teaching environments [3].

While the project was successful in its implementation at school level, the integration thereof at district and provincial level remained problematic—as is the case with many pilot ICT initiatives [4]. On completion of this project, a task was undertaken to (retrospectively) assess the factors that are critical to the integration of ICT initiatives in support of teaching and learning into provincial structures.

Successful integration of ICT into teaching and learning requires initiatives beyond the roll-out of technology, that include aspects such as concurrent teacher development, technology support, communities of practice, etc. [2]. Furthermore, at the provincial level, integration is required across departments (E-learning, ICT, curriculum), and across different levels (school, district, province) [4]. Objectives for ICT integration should be clear, and measurement of progress should be aligned with an understanding of the path towards success. All of these, in turn, require an integrated strategy that extends beyond technology implementation, and that is translated into a well-supported implementation plan [1].

This paper identifies the key drivers of change at the provincial level of the school system in South Africa, and highlights key issues for integration of ICT in support of teaching and learning. It firstly provides an overview of the objectives of the post-project assessment the methodology followed (sections 2 and 3), after which it provides an overview of some of the systemic integration challenges experienced by the ICT4RED project, that prompted this analysis (section 4). This is followed by the identification of key drivers for change, and key pointers for integration of ICT initiatives into the education system (sections 4 and 5). Conclusions are drawn in section 6.

2. Objectives

ICT4RED aimed to design systemic and sustainable approaches to providing access to digital content by learners at resource-constrained schools in South Africa. While the project was successful with its technology integration at the school level, the sustainability thereof failed, and systemic influences were identified as a potential reason for sustainability failure. The objective of this post-project assessment was to:

- Identify systemic levers for change within the education system
- Interpret the implications of such levers for integration of ICT4E initiatives within the education system.

3. Methodology

A research task was conducted to capture and integrate learning from the ICT4RED project, as well as general experiences within other provinces, with respect to the integration of ICT initiatives into the education system, i.e., in support of Technology-Enabled Learning (TEL). The purpose of the task was to gather and share guidelines for the integration of future ICT implementations in support of education.

The task was conducted from a change management perspective, i.e., the integration of ICT solutions is seen as a process that straddles different spheres of an organisation and different expertise bases [1]. It requires coordination around a strategy that is focused on an often ill-defined goal, which reaches across different levels of the educational organisation and across service provider-government organisational boundaries, as well as the integration of processes and systems that extend across organisational boundaries. People are seen as key to the overall success of ICT integration [5]. The focus of this work was on gathering learning from participant experiences, and on understanding the constraints that people face in this regard. The intent was to define aspects that are critical to ICT integration retrospectively, and to capture them in a format that is useful for future implementations.

The process involved discussions with the Department of Basic Education (DBE), Departments of Education of different provinces, and in more detail with stakeholders associated with the ICT4RED project (at provincial, district, school and project team level). Other role players involved with the implementation of ICTs in provinces were also consulted (NGOs, academic institutions).

The research was conducted over a limited period of three weeks, which constrained the extent of data gathering and analysis. Within the limitations of time and availability of participants, data were collected from the following role players, by means of semi-structured social media conversations and interviews: Provincial Departments of Education (Eastern Cape, Western Cape, Free State), NGOs, researchers, and consultants involved with ICT implementation in education (National Education Collaboration Trust, CoZaCares, and others), as well as subject advisors and teachers that participated in the ICT4RED project.

Analysis of data involved thematic mapping of interview notes, and identification of recurring as well as important aspects that affect the implementation of ICT solutions in support of education. A workshop was held to discuss and triangulate the data. Interpretation was informed by the experience of the ICT4RED project team, as well as by a review of literature related to the integration of technology into organizational systems.

4. ICT4RED Institutionalisation Challenges

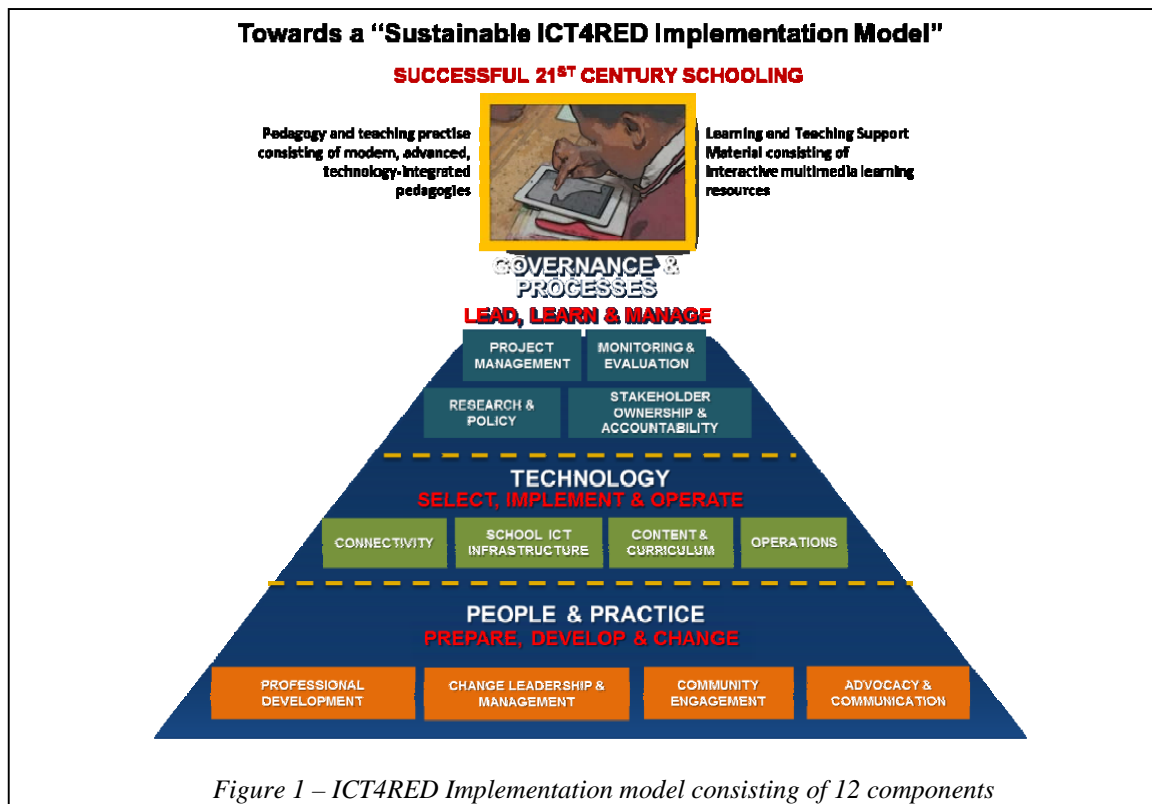
ICT4RED was both a research and implementation project. It used a Design Science approach, focused on continuous improvement and redesign based on the learning in each iteration.

The project set out to take a high level systems view of all the components that need to be in place in order to ensure successful technology implementation in schools. The intention was to use the learning gained during the project to inform and adjust project implementation components and activities, to ensure the project was reactive to the needs on the ground [3].

The final model (*Figure 1*) consists of 12 components within three focus areas (GOVERNANCE & PROCESSES, TECHNOLOGY, PEOPLE & PRACTICE). The model focuses on the activities and processes directly affecting implementation. It highlights the most important things discovered during the project and attempts to make them pragmatic and replicable under similar project conditions [5].

Within constrained environments, the challenge becomes one of deciding on the various levels of implementation of each component, based on budgetary and resource challenges, whilst still ensuring sustainability.

In this model, components that link to systemic institutionalization include “Professional Development” (for district officials, in particular) and “Stakeholder Ownership & Accountability”. Difficulties in the implementation of these components pointed to barriers to institutionalization.



Despite including district officials in all aspects of the project, together with high-level political support that resulted in higher than normal endorsement and engagement, handover to the ECDoE was problematic. There was difficulty in obtaining commitment with regard to both budget and resources and a general low prioritisation of the needs of the project. Core systemic issues (rather than a lack of willingness) seemed to hamper integration. These included resource constraints as well as structural design issues. The following aspects were identified within the district and provincial environments:

Resource constraints

- Lack of dedicated capacity and skills, in both the district and the province;
- Lack of stability in the district (e.g. the District Manager has been in an “acting” position for four years) and delayed decision-making regarding the consolidation of EC districts has led to insecurity and demotivation amongst the district officials;

Structural design constraints

- Problems with the silo-based budgeting and management structures in the province make it difficult to fund (and manage) cross-cutting initiatives;
- The organisational structure, governance and business processes in both the district and province are still based on the traditional paper- and human-intensive paradigm and do not make sufficient provision for e-enabled environments;
- In many cases, roles and responsibilities are not geared towards e-learning, e.g. subject advisors are not required to integrate ICTs into their workflow; and
- There is an absence of a long-term integrated ICT in Education vision and strategy to provide a shared understanding and framework to guide ICT planning and decision-making at all levels in the province.

An increasing awareness of the above issues during project implementation prompted the team to take a systemic, organizational change perspective on the institutionalization of ICT4E projects in its post-project assessment.

5. Key Levers for Change

Based on interpretation of the interview data, and learning from the ICT4RED implementation, the following views are useful to consider when defining and differentiating change strategies:

5.1 Levers for Change are at Different Places within the Province

Change needs to take place in the school environment, where ICT is adopted and implemented. However, change is required at all levels within the organisation. Specifically relevant are the following:

Strategy

An integrated strategy is required that is clear in terms of what the province wants to achieve with ICT at different parts of the education value chain, and how it will be measured. The key to success is strategy that is guided by educational outcomes, is sensitive to differences between schools, and directs the nature of ICT solutions.

Funding

The educational environment is resource-constrained. Available funds need to be used to unlock value from the various external sources that want to contribute to education.

Leadership is required

- At the provincial level, to define the direction, goals, strategy and approach for the implementation of ICT in schools.
- At the school level, to create an environment within which teachers can implement ICT in teaching and learning, and be recognised for it. Operationally, leadership needs to ensure that all operational procedures and processes are in place and working.

Energy and Enthusiasm

ICT in education works in the system when it is adopted at the school level. Change leaders are those enthusiastic individuals that make it work, in spite of constraints. Recognising and encouraging their enthusiasm, and supporting them to spread the message, will create change throughout the education system.

Skills (Teaching with Technology)

The focus of skills development should be on enabling teachers to teach with technology. Training needs to be ongoing, relevant and integrated with teacher development programmes, and needs to enable personal and professional development paths.

Organisational Integration

A number of different approaches are required to make technology work at schools. It requires integration of activities at the Provincial level, across departmental silos and budgets. At the district level, integration is required to ensure that teachers and subject advisors work towards a common goal. Between schools, integration is required to support peer-to-peer learning, collaboration and information sharing.

The implication is that successful integration of ICT in support of education requires a strategy that actively enables change at different levels, and from different perspectives. This is illustrated in *Figure 2*.

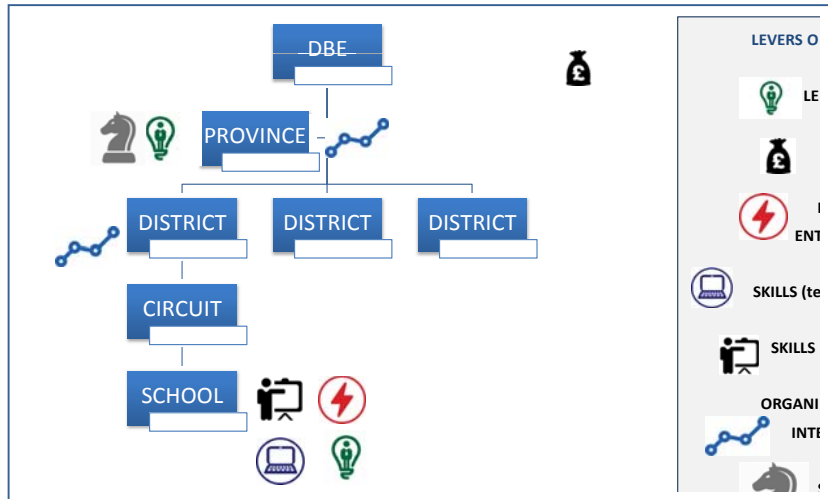


Figure 2: Key levers for change across the system [1]

5.2 Recognise that Schools Live in Different Contexts

There are many differences between schools, such as location (urban, peri-urban, or deep-rural), the quality of the infrastructure, the skills and motivation of teachers, teacher to learner ratios, etc. One key factor emerged in the interviews: A “well-managed” school made the difference between schools that used available resources effectively and those that did not. The principal’s leadership and management made the difference, regardless of style (from authoritarian to the building of teams), and regardless of whether the schools were well- or poorly-resourced. In Figure 3, the vertical axis shows the amount of resources available to a school. The horizontal axis shows the differences in the quality of leadership at the school and the associated motivation levels.

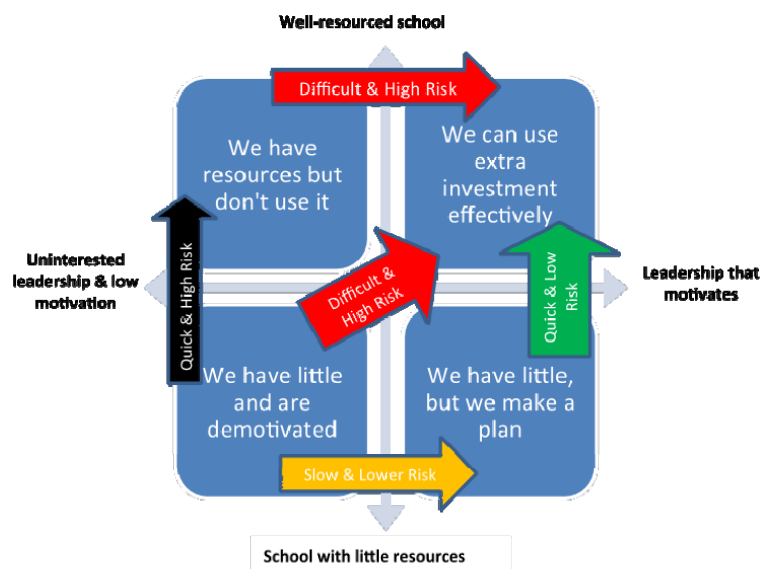


Figure 3: Leadership and resources [1]

The arrows indicate the risk of investment and speed at which an intervention can be implemented. An investment in a school with:

- Good leadership and low resources is seen as quick and low risk—“the ground is prepared”.
- Uninterested leadership and low resources is seen as quick and high risk, and probably leads to “we have resources but don’t use it”.

- Rather focus on motivation via change management, the slow and lower risk strategy.
- The difficult and high risk strategy would attempt to rapidly increase resources and work at change management at the same time to get to the ideal state.
- Resources that are not used is seen as difficult and high risk if the aim is to do too much too quickly. Resources should be introduced slowly with a greater focus on motivation, that is, move to the state of “we have little, but we make a plan” first.

An intervention strategy needs to accommodate these differences. *Thus, the change management and skills development strategies must take the social and infrastructural building blocks into account, to ensure that schools are “met where they are” and not “where they should be.” Expectations and measures of progress need to be adapted as well.*

5.3 Different Provinces have Different Challenges

There is a need to be cognisant of the context of the province. For example, in South Africa provinces are predominantly rural (e.g., Eastern Cape, Limpopo and KwaZulu Natal), with some more urban provinces (e.g., Gauteng and Western Cape). Key differences and their implications include (but are not limited to) the following:

Table 1: Key differences in school contexts

Rural or urban?	Predominantly rural provinces have schools that are difficult to reach for technology and teaching support.
Provincial infrastructure	Poor roads, limited training facilities, poor connectivity and poor electricity supply demand solutions that are less dependent on infrastructure.
Resource rich or resource poor?	Provinces with predominantly adequately-resourced schools can focus their investment on strategies and solutions that enable use of existing technology, while provinces with poorly-resourced schools need to emphasise technology infrastructure development and exposure to technology.
Quality of teaching	Provinces with teacher shortages and / or less skilled teachers need to invest in strategies that develop teachers ahead of, or concurrent with, ICT-enabled solutions.
Quality of management	Schools need to be capable of managing and integrating ICT into their day-to-day operations. This is a precursor to successful ICT-enabled education at school level.
Learner performance trends	ICT is often seen as the solution to poor learner performance. However, many factors influence learner performance, and root causes need to be understood before ICT investment is made against inflated expectations of success.

The implication is that the unique character of each province determines the way in which provincial investment should be balanced in support of its overall ICT integration in Education objectives.

5.4 Different ICT Interventions have Different Impacts

ICT solutions in Education should be aimed at **support for an education value chain**. Different ICT solutions support different parts of the value chain. The role of each solution should be understood, so that investment can be targeted to support provincial objectives. Some solutions enable access to information, while others provide access to different teaching aids, or even to remotely-located teachers. The goal of the province, and the impact that is to be achieved, determines the solution and the way in which the success thereof is measured. This is illustrated in *Table 2* below:

Table 2: Linking objectives to possible solutions to reach a measurable output

Objective	Possible solution(s)	Expected effect, to be measured
Access to learning material (textbooks not distributed)	Server-based material Photocopier	On-time access to teaching material
Access to better qualified teachers	Telematics	Percentage of lessons delivered by qualified, competent teachers
Access to additional & new content	Server-based material Internet access	Access to enriched teaching environment
Exposure of learners and teachers to technology, and technological competence	Computer laboratories Shared access to devices Individual access to devices	Technology competence
Electronic teaching aids	Electronic whiteboards Projectors	Degree of enrichment of the classroom learning environment
Integration of technology into teaching and learning	Integrated programmes providing technology and technology support, teacher training for technology-enabled teaching methods, teacher and learner technology training, community engagement, etc.	Mastery of teaching strategies and methods integrated with ICT use (teaching with technology). Appropriate use of technology in teaching. Technology competence

The impact of each of the above types of interventions on teaching and learning outcomes depends on many factors. For example, if a school has in the past only received textbooks by the middle of the school year, and a solution of server-based material and a photocopier now delivers this content at the beginning of the school year, one might expect an improvement in educational outcomes. However, if teacher attendance and competence is poor, this may not be the case.



Figure 4: A progression of ICT solutions, each impacting educational outcomes differently

The many factors that influence the path to improved educational outcomes following the introduction of technology is not clear. A progression of ICT solutions and their specific impact on educational outcomes need to be defined when making ICT investment decisions (see Figure 4).

Solutions need to be designed in support of the provincial objectives for ICT in education, and in line with the outcomes that are to be achieved along an educational value chain. There are no one-size-fits-all solutions, at provincial or at school level.

5.5 Change Happens Through People

Enthusiasm and leadership are essential building blocks of sustained change. Leadership happens at any position within the organisation, and change should be owned and lead throughout the organisational structure. The following concepts are key to the integration of change.

Leadership is collective and collaborative [8]

The more complex the world becomes and the more demanding the context of leadership in an organisation, the wiser it is for leaders to appreciate the value of collective leadership. A sole authority leader runs more risk than a leader who aims to understand more than what is obvious to a single individual. Aware of the benefits of embracing diversity, leaders widen their leadership circle to include all leaders in the leadership community. Even a few leaders at the top need the involvement of others to move an organisation. It is about everyone leading together, in teams and in everyday situations. Collective leadership implies collaboration – a genuine working-together. Collaboration is an invitation, not only to work together, but to share power. The sharing of power happens

when people who are affected by decisions, are given the opportunity to share in making the decisions. Being partners in decision-making also implies sharing control and ownership of the work to be done.

People make or break change. Coordination and leadership are key to the successful implementation of change initiatives. A supportive, collaborative environment that enables change leaders to participate needs to be developed concurrent with the technology design.

6. Key Pointers for Integration

Interviews with various stakeholders highlighted a number of key issues across different levels of the educational system that need to be addressed to enhance the integration of ICT in education. Learning is based on integration of ICT projects in general, in different provinces, as well as with specific reference to ICT4RED where applicable.

The Western Cape and Gauteng provinces have been making significant progress in their roll-out of ICT in support of teaching and learning [1]. The following are considered as critical to the success of such initiatives:

- ICT integration has high-level support and advocacy from the Provincial Government (specifically, the Premier's office).
- Roll-out of ICT forms part of a well-defined provincial ICT integration strategy.
- Objectives for the integration of ICT in support of teaching and learning are realistic, and milestones along a path to success are measured.
- There is a focus on the professional development of teachers and subject advisors, to enable competence in teaching with technology.

Figure 5 highlights the key issues for ICT integration into the schooling system. It provides a basis against which the system can be analysed from a macro, meso, and micro perspective [7], as well as a means of recognizing and defining what good practice should be at the various levels.

It is clear that successful integration of ICT requires initiatives beyond the roll-out of technology, that include aspects such as concurrent teacher development, technology support, communities of practice, etc. Furthermore, at the provincial level, integration is required across disciplines (E-learning, ICT, curriculum), and across different levels (school, district, province). Objectives with ICT integration should be clear, and measurement of progress should be aligned with an understanding of the path towards success. All of these, in turn, require an integrated strategy that extends beyond technology implementation, and that is translated into a well-supported implementation plan.

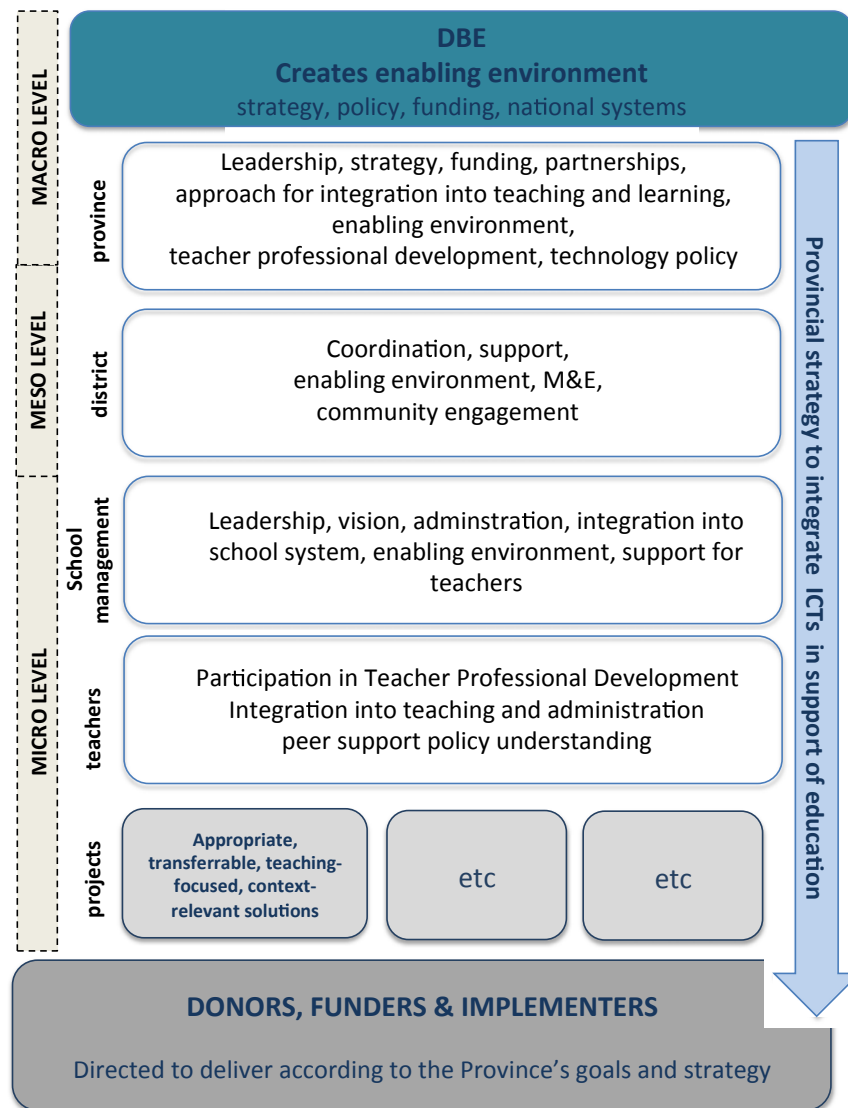


Figure 5: Key issues for integration at the various levels of the education system [1]

7. Conclusion

A brief review of the current status of the integration of ICT initiatives at provincial level indicates that fragmented activities can benefit from integration within a structured provincial strategy for ICT integration. Such a strategy needs to be targeted at delivering on a well-defined objective for the role of ICTs within the educational value chain in each province.

Learning from ICT4RED, as well as from ICT implementations in other provinces, indicates that there is an opportunity to harness the enthusiasm created by projects at the school and district level for the diffusion of ICTs in support of teaching and learning within the province. This requires a coordinated change leadership strategy, which complements and enables the execution of the provincial ICT integration strategy.

Provincial departments of education have a role as both change agents and implementers in this regard. They need to define the strategy, policies, and processes that are required to make change happen around educationally-driven ICT implementations. A critical aspect is to move the role of ICTs in education from being supplier-driven (and hence technology driven) to being a well-defined approach that is targeted at the priority needs of each province, and at supporting education along a well-defined and well-understood value chain.

This paper captures the findings of exploratory work regarding the levers of change across different levels of the education system in South Africa, and outlines key considerations for the development of a provincial strategy. The work takes a systemic view on reducing ICT failures. As such, it has the potential to unlock the value of investment in ICT4E initiatives, by developing the systemic capacity of the education system to benefit from such initiatives. Next steps would involve the development of guidelines and that can be translated into comprehensive implementation plans, customised for and in line with the priority needs of each province. Such plans should be cognisant of the unique challenges and readiness of each province to integrate ICT initiatives into the organizational system that supports education, and should meet provinces where they are, for gradual progression towards full integration.

References

- [1] Department of Basic Education. (2004). E-Education White Paper. <http://www.education.gov.za/Resources/Legislation/WhitePapers.aspx>. Accessed 2 December 2016.
- [2] National Planning Commission. (2014). National Development Plan 2030, Our Future-make it work. http://www.nationalplanningcommission.org.za/Downloads/ndp-2030-our-future-make-it-work_0.pdf. Accessed 5 December 2016.
- [3] Herselman, M, Botha, A and Ford, M. (2014). Designing and implementing an ICT4RED initiative. Designing and Implementing an Information Communication Technology for Rural Education Development (ICT4RED) Initiative in a Resource Constrained Environment: Cofimvaba School District, Eastern Cape, South Africa. Creative Commons, South Africa.
- [4] Ford, M. (2016). Discussion Document - ICT4RED Institutionalisation. Unpublished project report. CSIR Meraka Institute, Pretoria, South Africa.
- [5] Ford, M., Botha, A., Herselman, M., (2014). ICT4RED 12-Component Implementation Framework: A conceptual framework for integrating mobile technology into resource-constrained rural schools. IST Africa, 2014, Mauritius.
- [6] Meyer, I, Marais, M., Smit, R., "Approach to Delivering Sustained Benefit in high-value, high-impact projects" (2016). Unpublished project report. CSIR Meraka Institute, Pretoria, South Africa.
- [7] OECD, n.d. DAC criteria for Evaluating Development Assistance. Available online at <http://www.oecd.org/development/evaluation/49756382.pdf> . Accessed November 2016.
- [8] Pade-Khene, C., Mallinson, B. and Sewry, D. (2011). Sustainable rural ICT project management practice for developing countries: Investigating the Dwesa and RUMEP projects. *Information Technology for Development* 17(3): 187-212.
- [9] Marais, M.A. 2014. ICT4D and Sustainability in: *International Encyclopedia of Digital Communication and Society* (in press), Wiley-Blackwell: London.
- [10] Madon, S., Reinhard, N., Roode, D. and Walsham, G. 2007. DIGITAL INCLUSION PROJECTS IN DEVELOPING COUNTRIES: PROCESSES OF INSTITUTIONALISATION. Proceedings of the 9th International Conference on Social Implications of Computers in Developing Countries, São Paulo, Brazil, May 2007.
- [11] Miller, D. 2011. *IOM Project Handbook*, Geneva: International Organisation for Migration.
- [12] Meyer, I.A. and Marais, M.A. 2014. Sustainability and Value through Improved Decision-making, in: *Designing and implementing an Information and Communication Technology for Rural Education Development (ICT4RED) initiative in a resource-constrained environment: Nciba school district, Eastern Cape, South Africa*, Herselman M E and Botha A (eds.) pp.205-236, Edition: 1 published by CSIR, Pretoria. ISBN 978-0-7988-5618-8 (hbk).