

# Participatory re-action: reflecting on a Design-Based Research approach in ICT4D

*Izak Van Zyl*

[izak.jakobus.van.zyl@usi.ch](mailto:izak.jakobus.van.zyl@usi.ch)

*Cape Peninsula University of Technology, Cape Town  
South Africa,*

*Università della Svizzera italiana, Lugano  
Switzerland*

*Sara Vannini*

[sara.vannini@usi.ch](mailto:sara.vannini@usi.ch)

*Università della Svizzera italiana, Lugano  
Switzerland*

## Abstract

This paper explores the possibility for a design-based research (DBR) methodology in the broader ICT-for-development (ICT4D) domain. Specifically, the authors reflect on the application of DBR within a local development project, active in Mozambique, titled RE-ACT. Leveraging on DBR, said project studies the social conceptualisations of Community Multimedia Centres by stakeholders and funding agencies. These experiences are subsequently utilised as a basis for specific improvement actions. DBR is an adaptable and flexible methodology, capable of meeting the diverse needs of multimedia centres in various conditions. However, DBR is an emerging perspective and has not found its distinct position within the communication and social sciences, much less in ICT4D. It does yet offer important advantages, mostly in stimulating processes of public access, participant engagement, self-directed learning, and iterative design. This paper will reflect on a design-based research strategy in terms of RE-ACT, and will explore its opportunities, both for the respective research outcomes and for the discipline of ICT4D. The authors note the distinctive advantages of DBR, but conclude that the social impacts of the methodology are elusive.

## Keywords

Design-Based Research; participatory design; ICT for development; community multimedia centres; public access venues; telecentres; community radios.

# 1. Introduction

The discipline of ICT-for-development (ICT4D) is reaching maturity in its study of diverse social realities across the global technological landscape. A review of the literature suggests two perspectives (or, discourses) that seem to define the contemporary ICT4D undertaking: technology innovation (transfer, diffusion, socially embedded action), and development transformation (progressive and disruptive transformation) (Gómez et al. 2012; Avgerou 2010; Chepken et al. 2012). And yet, despite its remarkable theoretical capabilities to study technology innovation in relation to socioeconomic context, the discipline “remains weak in forming convincing arguments about IT-enabled socioeconomic development” (Avgerou 2010:1). In light of this latter objective, this study builds toward a more convincing argument for effecting technology-enabled development in low-resource settings. To achieve this, the authors look to design-based research (DBR) as a particularly appropriate methodology to enact local development priorities.

This paper reflects on a study of Community Multimedia Centres (CMCs) in Mozambique. CMCs, as formalised public access venues, can offer a multitude of platforms for individuals to create and share knowledge, to engage with peers, and to build desirable skills for the global workforce. Despite its relative advantages as information retrieval points, public access venues have some way to go in offering meaningful and inclusive services (see Pal 2007, Parkinson & Lauzon 2008; Rega 2010). In response to this context, DBR leverages on complex local dynamics, and offers a flexible, embedded approach for appropriating technology within the development landscape of Mozambique. The research questions that guide this study are grouped along three primary themes:

- 1) **Meaning:** What are the foremost social representations of CMCs in Mozambique?
- 2) **Agency:** (How) can local community members participate in improving CMCs?
- 3) **Development methodology:** How can we harness these factors (meaning and agency) for local development actions?

## 2. Design-based research: context and relevance for ICT4D

Design-based research is a methodology commonly used in educational research. It offers some distinctive features that make it an appealing methodology for developmental contexts:

Design-based research is an emerging paradigm for the study of learning in context through the systematic design and study of instructional strategies and tools...design-based research can help create and extend knowledge about developing, enacting, and sustaining innovative learning environments.

(Design Based Research Collaborative 2003: 5)

Two features deem this paradigm especially appropriate within the ICT4D realm. Firstly, DBR deals with **real-world settings** presenting constraints and complex dynamics, which are often difficult to foresee and isolate. In this vein, DBR is applied to investigate *complex, dynamic* and *uncertain* realities (McKenney & Akker 2005). Secondly, DBR focuses on **collaboration** among researchers and research participants, an often claimed

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sustainability requirement in development projects (KFPE 2012). Its underlying assumption is that social groups are well equipped to determine how to improve their own environments. Their involvement motivates them to keep pace with projects (the concept of “food for thought”, McKenney & Akker 2005), and allows for meaningful experience leading to a mutual benefit (“move one’s thinking forward”, Bakah, Voogt, & Pieters 2012). In light of this perspective, grassroots involvement is fundamental to locally relevant interventions, and assures sustainability in the long term (ibid.).

**Iteration** and **flexibility** also characterise the DBR research process, which is continuously developed and elaborated. Iterative cycles of work permit a greater chance to cope with contextual factors that may not have been considered during earlier phases of the design. **Formative evaluations** are performed after each cycle, to identify gaps and improve the design, so that the desired goal is achieved through successive approximations. These processes also allow for mixed, cyclical research designs, enabling continual theory and refinement and flexible implementation (Penuel, Fishman, Cheng, & Sabelli 2011:331).

The ICT4D community has gradually recognised the significance of design-based approaches in developing contexts (Winschiers-Theophilus et al. 2013). A number of perspectives have encouraged in depth, culture-specific interventions. Beyond the hegemonic ideologies of past interventions, one “reimagined model” is postcolonial computing:

When we see claims of inherent technological and cultural difference, we apply STS [science and technology studies] methods symmetrically to both the technology and the culture at hand. But we do not stop there; we proceed to deconstruct the binary between technology and culture and study the impure crossings between them.

(Philip, Irani, & Dourish 2012: 13)

This postcolonial framework conceptualises design in terms of engagement, articulation and translation, with an attempt to embrace heterogeneity rather than hegemonic (or common) standardisation (Winschiers-Theophilus et al. 2013). Another reimagined model in ICT4D is that of ‘situated computing’ (Gero 2003; Harrison et al. 2007), appropriated from human-computer interaction studies. Within this paradigm, the design of computational interventions is based on phenomenologically situated interaction. Situated approaches, such as value-sensitive and participatory design, action research, and living labs, treat interactions of all types as a form of meaning-making. In this vein, activities, artefacts, and their contexts are mutually defining and thereby endorse locally meaningful design (Winschiers-Theophilus et al. 2013).

Although postcolonial and situated interventions are desired (but wanting!) in the ICT4D enterprise, design-based research has not found a concrete *methodological* position. This is especially the case for educational researchers, policymakers and practitioners, or for projects that incorporate learning and development. In light of its flexible, practical orientation, we hold DBR to be a relevant methodology for ICT4D projects in general, and for RE-ACT in particular. As will become evident in the following sections, the depth consideration of local dynamics and specificities becomes critical for project sustainability. DBR also allows for the use of mixed methods, which may help to triangulate diverse datasets, and reduce cultural misalignment and bias between researchers and users (Clarke & Dede 2009). Adaptable, iterative planning, followed by cyclical evaluation, add further impetus to local improvement actions.

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### **3. The RE-ACT project: a case for DBR**

This study reflects on the use of DBR methodology as adopted within the RE-ACT project – social **RE**presentations of community multimedia centres in Mozambique and **ACT**ions for improvement. RE-ACT is a research and cooperation project active in the field of ICT4D. The project aims to contribute to ICT4D research in two ways: (i) by improving the knowledge around public access to ICTs in developing countries and, (ii) by developing a methodological framework for the field, which is deeply rooted into its specific context of application. The following sections will provide an overview of the project, its context, and the relevant results for developing and applying DBR.

#### **3.1 Public Access in Mozambique**

Community Multimedia Centres (CMCs) are community-based Public Access Venues (PAV) that combine a community radio with the facilities of a telecentre. This simultaneously allows for the public broadcasting of information, and for the inclusion of remote communities in creating locally relevant content (Fraser & Restrepo Estrada 2001).

In 2001, UNESCO established the International Initiative for CMCs, to be implemented in Africa, Asia and the Caribbean. In 2003, Mozambique was one of three African countries selected for a scale-up phase of the initiative, due to the success of a former pilot project. Supported, among others, by the Swiss Agency for Development and Cooperation (SDC), the scale-up phase envisaged to build 20 new centres in each of the selected countries in the next two years, and at least 50 in the long term, depending on the availability of funding (UNESCO 2004). The Ministry of Science and Technology currently manages an expansion programme of CMCs. It is investing aid funding – mostly provided by the World Bank and the Finnish Government – to implement CMCs in all 128 districts of the country (see MCT 2008).

Formerly, telecentres were considered among the few places where underserved communities could access and use a series of information and communication technologies (ICTs), such as computers, the internet, printers and photocopy machines (Rega 2010). In rural Mozambique, however, community radios are the most pervasive means of information access. Community radios broadcast relevant information both in local and national languages, their range of reception reaches up to 150 km, and they are managed by staff members who develop local or localised content. Hence, CMCs as a combination of services have become “powerful instruments not only to inform, entertain and educate the population, but also to give voice to the communities and to enable them to have a larger impact on public issues” (Moiana et al. 2007:iv, authors' translation). To date, 41 CMCs are operating in Mozambique.

### 3.2 The RE-ACT project

RE-ACT is a joint research and cooperation initiative between INSTITUTION 1 and INSTITUTION 2. Over a three year period (2011-2014), RE-ACT aims to investigate the social meanings of CMCs, explore the conceptualisations among different social groups, and propose and implement specific 'improvement actions' for the ten CMCs included in the project.

RE-ACT addresses the need to consider local context in the design of ICT4D interventions. Context-based design is an oft-neglected aspect in ICT4D, and is regarded as one of the foremost constituents of project success or failure (Avgerou & Walsham 2000; Heeks 2002, 2008; Unwin 2009). Within this discourse, RE-ACT locates the design of its improvement actions in the study of social representations.

Social representations are systems of values, beliefs, and practices that are shared among a given social group, and that permit the members of the group to interpret their world and to communicate among each other (Moscovici 1961).

RE-ACT studies the social representations of both local stakeholders (staff members, users, and non-users of CMCs) and initiating agency representatives (UNESCO and the Ministry of Science and Technologies of Mozambique). In this way, the project attempts to incorporate both social (meaning, context) and design (logistical, technical) considerations: factors of equal significance in the sustainability of ICT4D interventions (see Heeks 2008). Conflicting or aligned representations of CMCs may in fact influence broader decision-making and policy (Rega 2010).

However, social representations are not the only 'instrument of agency' to be included in the project. Local stakeholders have also been involved in a series of collaborative design sessions, aiming to define, plan, and implement improvement actions. The validation for these sessions is underpinned by participatory theory: context-based, collaborative design guarantees better outcomes than sheer technology transfer from North to South (Brunello 2010; Kleine & Unwin 2009; Sassen 2012; Tedre, Sutinen, Kähkönen & Kommers 2006).

In the effort to concretise this participatory undertaking, we explore the possibility for a design-based research (DBR) methodology in RE-ACT. DBR is an adaptable and flexible methodology, capable of meeting the diverse needs of social populations in various conditions. DBR is an emerging perspective, and has not found its distinct position within the communication and social sciences, much less in ICT4D (Clarke & Dede 2009; Van Zyl forthcoming). It does yet offer important advantages, mostly in stimulating processes of public access, participant engagement, self-directed learning, and iterative design.

## 4. Research design

Unfamiliarity with contextual dynamics is one of the foremost contributors to failure in ICT4D projects (Heeks 2008). The RE-ACT project considered the study of social representations as a nuanced theoretical framework, and DBR as a localised methodology. These approaches specifically elicit contextual understanding and the involvement of local stakeholders.

### 4.1 The study of social representations

The theory of social representations (Moscovici 1961) investigates how individuals 'meaningfully understand' their world in relation to their everyday lives. Social representations of a particular social object are (i) systems of values, ideas and practices a given social group attributes to it (Breakwell 1993; Duveen & Lloyd 1993); (ii) both the process and product of social construction and negotiation; and (iii) "embedded in historical, cultural and macro social conditions" (Wagner et al. 1999:25). Whilst not tied to any particular methodology of investigation, social representations can be studied in different ways, and may benefit from the use of mixed methodologies (Duveen & Lloyd 1993).

The study of social representations within RE-ACT was conducted using qualitative semi-structured interviews, photo elicitation, and questionnaires:

- 1) Semi-structured interviews were conducted with: representatives of initiating agencies (one from UNESCO, and one from the Ministry of Science and Technology of Mozambique); local staff members; users of both components of CMCs (radio and telecentre); individuals from the community who used the community radio but not the telecentre; and pure non-users, i.e. individuals who did not use any CMC facility. Interviews, conducted in 10 CMC locations throughout the country and in Maputo, were meant to prompt those "values, ideas, and practices" (Moscovici 1961) that respondents attribute to CMCs. Questions were grouped along four main themes: (i) demographics of interviewees; (ii) the identity they attributed to CMCs; (iii) the relationship between the CMC and the community; and (iv) interviewees' perceptions of CMCs and ICTs.
- 2) Through a participant-driven photo-elicitation technique (Rose 2007), staff members and users of both the components of CMCs were also prompted to take photos and explain them. This aimed to generate wider and different insights into the study of local perceptions of CMCs: scholars agree that photos can be used to gain further evidence to triangulate data, and to uncover elements otherwise not accessible by researchers, often from different contexts and backgrounds (Bignante 2010; Collier 1967; Rose 2007). Also, photo-elicitation was useful to educe reflection among participants (Miles & Kaplan 2005) and to empower them, especially within an oral cultural context (Young & Barrett 2001; Dodman 2003).
- 3) Questionnaires were addressed to users of only the radio component in the communities of the 10 selected CMCs. Their aim was to investigate perceptions and motivations for non-use of the telecentre component. Telecentres, in fact, were identified as the most critical part of CMCs, so questionnaires were thought to address related concerns.

## 4.2 Co-design sessions

Social representations are not the only ‘instrument of agency’ to be included in this project. Directors of those CMCs working with RE-ACT have also been involved in a series of collaborative design (co-design) sessions (in two separate workshops, over a number of days). These aimed to define, plan, and implement improvement actions for their respective centres.

Co-designed sessions drew on the pool of social representation data thus far discussed. These sessions were to reflect on local needs, perspectives and ideals in terms of the voiced representations. This process included local perspectives in two ways: first, by considering the voices of all local stakeholders through their representations; and second, by including directors of CMCs in decision-making and design, one year after the data collection process (during a workshop in Maputo). A brainstorming session and group formulations on possible improvement actions were facilitated during this latter session.

Imagined improvement actions had to address the needs of specific local groups, who would constitute the main beneficiaries of these actions. The exercise aimed to illuminate local, contextual realities. It did not seek to offer pre-conceived plans on behalf of the RE-ACT team nor elicit answers which “please the researchers” (see Haig 2004). At the end of the brainstorming phase, each director was asked to choose one action to be implemented in his centre among the list of their own suggestions, according to the needs of their community. This participatory methodology was unusual for some directors, who did not seem to acknowledge the freedom to design any improvement action. Rather, they were seemingly aware of being ‘researched’ and this conditioning was evident in their final choices (i.e. they opted for actions that may have been “expected” by the research team) (see Salomão, Vannini, Rega, & Cantoni 2013). This is perhaps indicative of a Hawthorne Effect: practical studies in real-world settings may be particularly vulnerable to unintended effects on intervention outcomes (Fernald et al. 2012; Van Zyl forthcoming).

A second co-design workshop was held in each of the partner CMCs, and involved the RE-ACT team, CMC staff members, and representatives of the local community (as intended beneficiaries). The goals of these sessions were: (i) to understand whether community members were interested in the idea of improving their CMC; (ii) to include communities’ insights on its improvement; (iii) to co-plan respective actions; and (iv) to define milestones and evaluation criteria together with all involved staff members.

## 5. Design-based findings

### 5.1 Social representations of CMCs: studying local voices

RE-ACT made use of different methods, heeding the recommendations of both social representation and DBR scholars (Bauer & Gaskell 1999; McKenney & Akker 2005). Data collection generated a large pool of data that was analysed both inductively and deductively. Firstly, the research team performed computer-aided content analysis on the corpus of interview transcriptions. This aimed to identify specific vocabularies enacted by the speakers in their discourses (Reinert 1983). The analysis identified six thematic clusters as the foremost constituents of social representations (see Rega, Vannini, Fino & Cantoni forthcoming). Not all of these were shared among the social groups considered.

Two of the six clusters referred to the community radio component of CMCs. One cluster underlined radios' socio-political role as means for local underserved communities to access information and to participate. The other cluster focuses on their educational and entertainment (edutainment) characteristics. The telecentre component of CMCs emerged in two other clusters. These describe the telecentre as a computer training venue on the one hand, and as a place to fulfil practical everyday computing needs: making photocopies, typing hand-written documents, and the like. The telecentre, then, was not predominantly referenced as a place to obtain information and knowledge for development – the community radio was. Of the last two clusters, one included discourses on the internet and its benefits, remaining somewhat detached from the team's first-hand experience at local CMCs. The other presented those bureaucratic aspects connected to the model and implementation of CMCs.

A few noteworthy 'misalignments' between the representations of different social groups surfaced from this analysis. The discourses of agency representatives seemed to centre on the bureaucratic and administrative issues of the CMC model, and on the socio-political benefits of community radios. For these respondents, community radios were regarded as being more important than telecentres. Representatives insisted telecentres were instrumental for the financial sustainability of CMCs, as opposed to their transformative (developmental and educational) potential. Finally, even if the radio is extensively present in their representations, agents over-emphasise its socio-political capacity.

Furthermore, the analysis highlighted misalignments in terms of the sex, age, and education level of interviewees. Males consider community radios as a means of socio-political participation. Female representations consider telecentres as places of learning, and express the benefits and opportunities of internet access. Social representations of youth groups seem more focused on the edutainment function of the radio than on its potential for community participation. This tendency reverts for older community members. The socio-political benefits of community radios are frequently associated either with the lowest educational level, or with the highest, corresponding mostly to agency representatives and older social actors. The edutainment value of radios is frequent among all educational levels, but is accentuated among least educated members. Not surprisingly, this latter group does not consider CMCs as places to be trained on basic computer skills as much as other respondents do.

The analysis of photo-elicited representations brought to light users' and staff members' ideas, values and practices in terms of CMCs (see Vannini, Aguirre, Rega, & Cantoni 2013). Staff members concentrated more on community radios, while most of the references about telecentres belong to users. Staff members' discourses about radios are significantly related to the themes of their own working experience, personal satisfaction, and prestige. The impact they can have on local communities, giving "voice to the voiceless", is personally rewarding and a matter of social status for them. These themes act as drivers for their work at CMCs. Telecentres are portrayed by users, once more, as learning places, and partially as an asset for the local community. For these users, telecentres are beneficial because they facilitate access to ICTs (including photocopy machines and printers), which was not possible before. Learning basic computer skills at the CMCs is particularly valued and considered to have an impact on job-related issues. Figures 1 and 2 present two pictures taken by staff members: they portray colleagues in service at the CMC.





*Figure 1 and Figure 2: Photos taken by the interviewees during participant-driven photo-elicitation in the locations of Xinavane and Morrumbene. Figure 1 portrays a member of the staff during broadcasting. Figure 2 pictures the telecentre during a computer class.*

A vast number of references – by both staff members and users – allude to the general infrastructure of CMCs. Respondents particularly emphasise the importance of physical appearance: CMCs have not only to be functional and rectify technical failures and maintenance problems (see figure 3), but they should also look good. Disorder is perceived as a problem: CMCs are important community venues; they should work in line with the local development agenda which they propagate in the first place. This should take place before worrying about the conditions of their technologies, or the development of new services. Staff members remark that poor infrastructure or unused space is both a bad example and a missed opportunity (figure 4). Ultimately, staff members envision CMCs to being a bridge between the community and the government – a bridge that, once more, is facilitated mostly by the community radio component.





and Figure 3 portray missed opportunities in terms of deficient infrastructure and unused space in the locations of Ilha de Moçambique and Morrumbene.

The aforementioned results indicate the extensive value of community radios as a means for education or development, entertainment, and public participation. Telecentres, however, are often reduced to their function of computer literacy enablers. Their supposed potential for access to development-related information is almost completely ignored/unexpressed. Because of this, the research team also studied the motivations for non-use of telecentres. This included opinions about *perceived* contributors to non-use (among staff members and users of the venues) and *actual* contributors (among non-users). Four main clusters of reasons for non-use were depicted: (i) time and space constraints (distance, or lack of time and money); (ii) relevance of the services offered for users (value, need); (iii) CMCs' lack of competitiveness compared to other strategies to access ICTs and the internet; and (iv) their limited services or poor service quality, including a lack of communication and promotion within the community.

Some demographic characteristics of non-users were also outlined, indicating how they might belong to two diverging segments of the population. Concerning the first segment, non-users are part of the less advantaged sector of the community, with less income and a lower education level. These users might not be able to afford the services of telecentres, or may not possess the skills and literacies to benefit from such offerings. In terms of the other segment, non-users belong to the most privileged sector of the population, made up of individuals with a higher level of education and income. This group has the resources to access ICTs elsewhere (at home or at work), and has sufficient computer literacy skills. Seemingly, CMCs would require a diversification of services to attract such members.

## 5.2 Implemented 'improvement actions'

The chosen actions for improvement focused on different priorities, not all of which are commonly considered as pertaining to traditional areas of (ICTs for) development. Three such actions concerned **education**, and were to be integrated with the telecentre component of CMCs. These actions targeted young people (students and orphans in the region) and aimed to develop computer literacy courses that also included the use of the Internet for their studies. Two other improvement actions included **maintenance training**

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and capacity building for staff members. The first of these was directed at the maintenance of the telecentre equipment. The possibility was here foreseen that the CMC could become a technical support hub to whoever experienced similar problems in the community or its vicinity. The second maintenance action was directed at radio equipment.

Surprisingly (and excitingly), two other actions focused on **tourism**: again, one targeted the telecentre, and the other the radio. The first aimed to implement an online platform to promote the work of a local association of micro entrepreneurs. This would be intended for the development of tourism in Ilha de Moçambique, the town where the CMC is located, which is listed as a UNESCO World Heritage Site. It is, incidentally, the only such site in Mozambique. The second action intended to produce a radio program for the local population. The action was specifically aimed for the town of Cuamba, located on a national railway-corridor, and which hosts a branch of the Catholic University of Mozambique. This town is a critical nexus point for transiting people and goods, and accommodates a number of former migrants.

Two more actions addressed the community need for **entertainment** (or edutainment) activities. They both envisaged the creation of a community cinema, intending to leverage on the possible synergies between both components of the CMC (the telecentre and radio). The original CMC model did not foresee the need for a cinema and this suggestion indicated an appropriation of CMC technology to local requirements.

The last action for improvement drafted the creation of an online platform. This aimed to collect useful community-based **information** and to re-broadcast the community radio via digital technology, thus distributing it to a potentially larger audience. This action seems to utilise the telecentre as an effective information means – a function that is currently limited to the community radio.

## 6. Discussion and Lessons Learnt

RE-ACT leveraged on several characteristics of DBR. Some aspects, however, were applied only partially along the three-year project. This was due to funding and timeframe limitations, which prevented full iteration and formative evaluations.

In terms of a design-based approach, RE-ACT dealt with **real-world contexts**, allowing the team to interact with multiple stakeholders from diverse backgrounds. This permitted the research team to focus on persistent and common challenges from the field, and consider these in a sustainable intervention (via improvement actions). Examples of field-based challenges have included logistical and bureaucratic problems in financial management; different levels of engagement by CMC coordinators (lack of interest; challenges in authority; trust issues); and high staff turnover at CMCs, resulting in miscommunication and –direction. These dynamics are ultimately given ‘local relevance’ in the context of DBR, despite their potential to disrupt the design process (McKenney & Akker 2005). In this way, RE-ACT is conducted in naturally occurring environments, which lends an authentic design setting and locates interventions within the micro-social structures of community multimedia engagement.

The application of an overarching theoretical perspective (social representations) and **mixed methods** served as a depth exploration of context. Through this approach, the

team endeavoured (insofar possible!) to avoid the disparity between design and reality (Heeks 2002), and to include the voices of all stakeholders. As shown by RE-ACT findings (see Section 5), the choice of mixed methods has proven relevant to grasp real-life environments and the complexity of rural and evolving realities. For instance, photo-elicitation clearly depicted the influence of the CMC premises' appearance, which did not surface in other methods used. Interviews, on their hand, unveiled the importance of an "edutainment" dimension of the radio for the population. Also, the focus on socially embedded dynamics (i.e. social representations; photo elicitation) present a more defined picture of a reality that is very different from that of the research team, to offer a way to triangulate data, and to unveil unexpected findings.

Starting from the assumption that communities are well equipped to determine how to improve their environments, DBR is interactive in nature, and focuses on collaboration among researchers and participants (mentors, learners, practitioners) (McKenney & Akker 2005). RE-ACT included CMC directors, staff members and users as research-**collaborators** and local experts. Collaboration is a fundamental element in studies that leverage on North-South partnerships (KFPE 2012). Collaboration may benefit participants in many ways: from capacity building, to personal interest in pursuing intervention activities. In the long term, local involvement could be a valid instrument for keeping facilitators up-to-date with novelties in the field (Bakah et al. 2012).

Despite being mostly employed in educational settings, DBR is a methodology that has only partially found a concrete position within the ICT4D domain. Here, **education/capacity building** issues are key considerations in development, if not the primary constituents of interventions. Focusing on the role of equitable access to ICTs, RE-ACT improvement actions included an important dimension of education and training. This not only pertained to the three projects directly connected to computer literacy, but also to other, more leisure-oriented, actions. For example, the two established community cinemas were meant to both entertain and broadcast educational messages to the local population. Similarly, the radio tourism action aimed to inform the local population about touristic experiences whilst broadcasting educational information. RE-ACT, however, advocates a broader employment of DBR in the context of ICT4D, given its embrace of authentic contexts, mixed methodology, and participatory action.

The project, however, was not able to adopt the strategy of **iterative cycles** of actions, followed by **formative evaluations**. According to McKenney & Akker (2005), "Continuous analysis [...] of risks and benefits should be conducted in the light of the target setting, with design and development decisions being taken accordingly". Even if RE-ACT dealt with many unexpected issues and was **flexible** enough to adjust to unforeseen events, the authors deem that iterative cycles of events could have addressed unpredictable needs. Figure 5 indicates how RE-ACT was designed in terms of DBR.

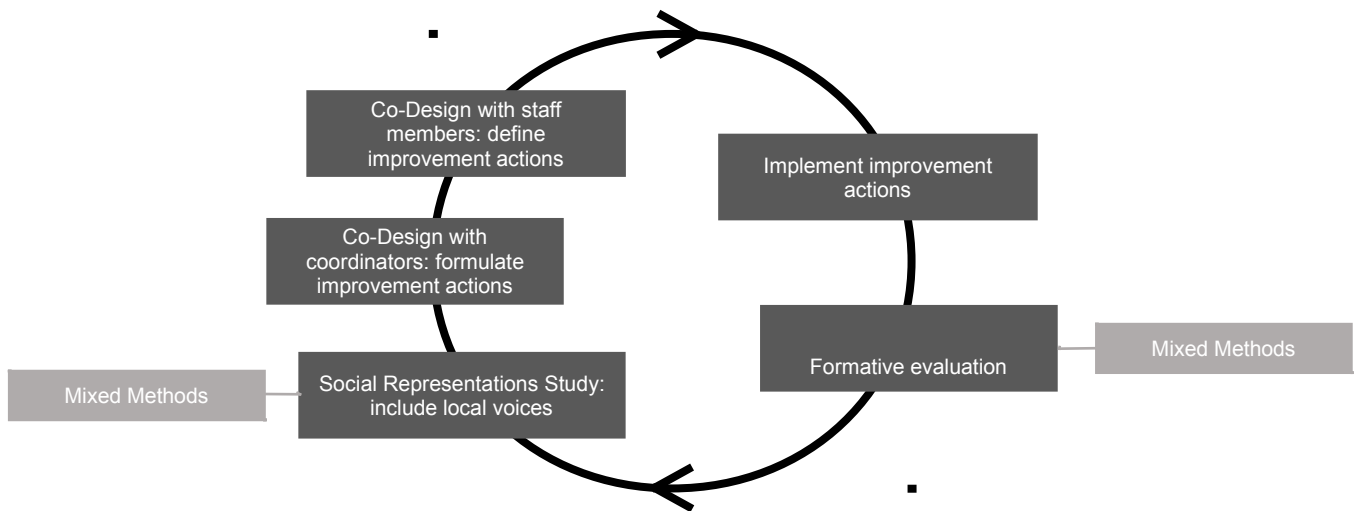


Figure 4: RE-ACT's adoption of DBR.

RE-ACT did include a final evaluation of the designed improvement actions. We envision that multiple reiterative evaluations could have permitted the design of different, adjusted actions. At the same time, evaluation could have been performed by the researchers on their own use of data collection and analysis methods employed. This reflection might have been significantly advantageous, especially for a methodology like photo-elicitation, which is still not widely used in ICT4D or in the study of social representations. However, we find it improbable that implementing several iterative cycles within these actions would have been possible with the time and resource constraints given by the project.

Ultimately, the collaborative, real-world basis of DBR is also regarded as a participatory strategy – co-determined capacity building of local groups is considered a key component for long-term and sustainable actions (Heeks 2008). Yet, participation is itself conceptually ambiguous and has long been viewed as a critical paradox (see Cleaver 1999). As such, calls for local participation often veil deeper social and cultural subjectivities that mediate the local development narrative (Van Zyl forthcoming). For ICT4D, there is a risk that developers pay lip service to participation, thus punctuating “multiple divides between designers and users” (Heeks 2008:30). Participatory endeavours underpin the DBR methodology, but are partly succeeded by what is known as ‘per-poor’ efforts (ibid.). These represent pure ‘bottom-up’ development, intended for communities, and driven from within communities. For Heeks, much per-poor activity goes unnoticed, partly due to the absence of development practitioners (Van Zyl forthcoming).

In light of this, it is not clear to what extent design-based activities essentially translate into impactful, tangible development (or, improvement). In our view, this is a broader problem evident in design-based actions. More specifically, are participants provided the forum to reject interventions? We have thus far argued that, by including participants (respondents, users, communities) into the design process, they will “learn more, and care more”. Their needs have been considered and integrated within the greater intervention (via a set of improvement actions). This, we hold, improves the quality of learning and strengthens the feasibility of the intervention. Yet, these ‘benefits by default’ are not directly akin to sustaining CMCs as community-curated flagships, capable of distributing information and facilitating learning at the uninhibited prerogative of local groups (Van Zyl forthcoming).



How do local Mozambicans become the “duty-free” facilitators of their own actions without intellectual and economic dependency created by externally funded (and motivated!) design research (ibid.)?

The notions of participation, iteration, flexibility, real-world contexts and collaboration are seemingly progressive practices that build, in the context of RE-ACT, toward a nuanced understanding of ‘development realities’. We are aware, however, that these can be superficial appropriations in a hyper-complex environment. The study of social representations, then, can serve as a complementary perspective in which ‘endogenized meaning frameworks’ are given impetus (see Sassen 2012). Ultimately, as an amalgamation of ‘meaning and design’, DBR espouses the foundations of social constructivism, and places design emphasis around the flow of micro social representation. This is hoped to extend the methodology beyond superficial implementations.

## Concluding thoughts

This paper has discussed some of the methodological considerations in an ICT4D project, active in Mozambique. We have appropriated design-based research as a methodology that could indeed be useful for ICT4D (and development-oriented) studies. This involves the combined use of meaning-centred elicitation and contextual, participatory intervention. There is a risk that these notions are applied superficially, and that design researchers pay lip service to participatory interventions. In this study, we have attempted to move beyond these pretences, and build toward per-poor undertakings in which ‘development beneficiaries’ become internally dependent practitioners.

We acknowledge that this is in no way a simple process, precisely due to the unpredictability of real-world environments. This also necessitates a stronger relationship between ICT4D projects and their funders. Volatility and instability of context are natural constituents of any development undertaking – this has to be acknowledged in funding programmes. National and international agencies will need to support ‘emerging projects’ in which the areas of development are not pre-conceived. This especially pertains to collaborative projects, in which co-determination (internal ownership) is the primary outcome. These types of projects also function within the time relations of local communities and cannot abide by structured timelines. Ultimately, we encourage the use of DBR methodology, but only if this is attached to a critical component (e.g. meta-reflection, meaning elicitation, co-determination).

## 7. References

- Avgerou, C., & Walsham, G. (2000). *Information Technology in Context: Studies from the Perspective of Developing Countries*. Ashgate Pub.
- Avgerou, C. (2010). Discourses on ICT and Development. *Information Technologies & International Development*, 6(3): 1–18.
- Bakah, M. A. B., Voogt, J. M., & Pieters, J. M. (2012). Updating Polytechnic Teachers' Knowledge and Skills through Teacher Design Teams in Ghana. *Professional Development in Education*, 38(1), 7–24.
- Bauer, M. W., & Gaskell, G. (1999). Towards a Paradigm for Research on Social Representations. *Journal for the Theory of Social Behaviour*, 29(2), 163–186.
- Bignante, E. (2010). The use of photo-elicitation in field research. *EchoGéo*, (Numéro 11). Retrieved 29 July 2013 from <http://echogeo.revues.org/11622>
- Breakwell, G. M. (1993). Integrating paradigms, methodological implications. *Integrating paradigms*, G. M. Breakwell, & D. V. Canter (Eds.), *Empirical approaches to social representations* (pp. 180–201). New York, NY, US: Clarendon Press/Oxford University Press.
- Brunello, P. (2010). ICT for education projects: a look from behind the scenes. *Information Technology for Development*, 16(3), 232–239.
- Clarke, J., & Dede, C. (2009). Design for Scalability: A Case Study of the River City Curriculum. *J Sci Educ Technol*, 18: 353 – 365.
- Cleaver, F., (1999). Paradoxes of Participation: Questioning Participatory Approaches to Development. *Journal of International Development*, 11: 597 – 612.
- Chepken, C., Mugwanya, R., Marsden, G., & Blake, E. (2012). *ICTD Interventions: Trends over the last decade*. ICTD2012, 12-15 July 2012, Atlanta, USA.
- Collier, J. (1967). *Visual anthropology: photography as a research method*. Holt, Rinehart and Winston.
- Design Based Research Collaborative. (2003). Design-Based Research: An Emerging Paradigm for Educational Inquiry. *Educational Researcher*, 32(1), 5-8.
- Dodman, D. R. (2003). Shooting in the city: an autophotographic exploration of the urban environment in Kingston, Jamaica. *Area*, 35(3), 293–304.
- Duveen, G., & Lloyd, B. (1993). An ethnographic approach to social representations. In G. M. Breakwell & D. V. Canter (Eds.), *Empirical approaches to social representations* (pp. 90–109). New York, NY, US: Clarendon Press/Oxford University Press.
- Steyn, J., Van der Vyver, A.G. (eds.). (2013). Public and private access to ICTs in developing regions. *Proceedings of the 7th International Development Informatics Association Conference*, held in Bangkok, Thailand. ISBN: 978-0-620-58040-3 Pages 206-223

Fernald, D.H., Coombs, L., DeAlleaume, L., West, D., & Parnes, B. (2012). An Assessment of the Hawthorne Effect in Practice-based Research. *Journal of the American Board of Family Medicine*, 25(1): 83 – 86.

Fraser, C., & Restrepo Estrada, S. (2001). *Community Radio Handbook* (pp. 1–101). UNESCO. Retrieved 29 July 2013 from <http://bit.ly/TdthBr>

Gero, J.S. (2003). Situated computing: A new paradigm for design computing. In A Choutgrajank, E Charoenslip, K Keatruangkamala and W Nakapan (eds), CAADRIA03, Rangsit University, Bangkok, pp 579-587.

Gómez, R., Baron, L.F., & Fiore-Silfvast, B. 2012. The Changing Field of ICTD: Content analysis of research published in selected journals and conferences, 2000-2010. Proceedings of ICTD '12, 12 – 15 March, Atlanta.

Haig, E. (2004). Some Observations on the Critique of Critical Discourse Analysis. *Studies in Language and Culture*, 26(2): 127 – 150.

Harrison, S., Tatar, D., & Sengers, P. (2007). The three paradigms of HCI. In Proceedings of ACM CHI 2007: Conference on Human Factors in Computing Systems, New York, USA, 1-21.

Heeks, R. (2002). Information Systems and Developing Countries: Failure, Success, and Local Improvisations. *The Information Society*, 18(2), 101–112.

Heeks, R. (2008). ICT4D 2.0: The Next Phase of Applying ICT for International Development. *Computer – IEEE Computer Society*, 41(6): 26 – 33.

Kleine, D., & Unwin, T. (2009). Technological Revolution, Evolution and New Dependencies: what's new about ict4d? *Third World Quarterly*, 30(5), 1045–1067.

McKenney, S., & Akker, J. (2005). Computer-based support for curriculum designers: A case of developmental research. *Educational Technology Research and Development*.

Miles, S., & Kaplan, I. (2005). Using images to promote reflection: an action research study in Zambia and Tanzania. *Journal of Research in Special Educational Needs*, 5(2), 77–83.

Ministerio das Ciências e Tecnologias de Moçambique. (2008, June 13). Programa Nacional de Centros Multimedia Comunitários, Ver 4.5. MCT, Republica de Moçambique.

Moiana, C., Chicuecue, N., Sadique, F., & Ilal, A. (2007). Missão de Revisão Tripartida da Iniciativa de Expansão de Centros Multimédia Comunitários em Moçambique (pp. 1–57). MCT, SDC, UNESCO.

Moscovici, S. (1961). *La Psychanalyse, son image et son public*. Presses Universitaires de France – PUF.

Steyn, J., Van der Vyver, A.G. (eds.). (2013). Public and private access to ICTs in developing regions. Proceedings of the 7th International Development Informatics Association Conference, held in Bangkok, Thailand. ISBN: 978-0-620-58040-3 Pages 206-223



- Pal, J. (2007). Examining e-literacy using telecenters as public spending: The case of Akshaya. In *International Conference on Information and Communication Technologies and Development, 2007. ICTD 2007* (pp. 1–9). Presented at the International Conference on Information and Communication Technologies and Development, 2007. ICTD 2007.
- Parkinson, S., & Lauzon, A. C. (2008). The Impact of the Internet on Local Social Equity: A Study of a Telecenter in Aguablanca, Colombia. *Information Technologies & International Development*, 4(3), pp. 21–38.
- Penuel, W. R., Fishman, B. J., Cheng, B. H., & Sabelli, N. (2011). Organizing Research and Development at the Intersection of Learning, Implementation, and Design. *Educational Researcher*, 40(7), 331–337.
- Philip, K., Irani, L., & Dourish, P. (2012). Postcolonial computing: A tactical survey. *Science Technology Human Values*, 37(1), 3-29.
- Rega, I. (2010). What do local people think about telecentres? A key issue for sustainability (Doctoral dissertation). Università della Svizzera italiana - USI, Lugano, Switzerland. Retrieved 29 July 2013 from <http://amala.rero.ch/record/17990?ln=de>
- Rega, I., Vannini, S., Fino, E., Cantoni, L. (forthcoming). Exploring the Meanings of Community Multimedia Centers in Mozambique: A Social Representations Perspective. *Information Technology and International Development (ITID)*.
- Reinert, M. (1983). Une méthode de classification descendante hiérarchique : application à l'analyse lexicale par contexte. *Cahiers de l'analyse des données*, 8(2), 187–198.
- Reinert, M. (1993). Les “mondes lexicaux” et leur “logique” à travers l'analyse statistique d'un corpus de récits de cauchemars. *Langage et Société*, 66, 5–39.
- Rose, G. (2007). *Visual methodologies an introduction to the interpretation of visual materials*. Los Angeles; London; New Delhi [etc.]: Sage Publications.
- Salomão, D., Vannini, S., Rega, I., & Cantoni, L. (2013). Co-Designed Improvement Actions in Mozambican Community Multimedia Centres. In *Into the Future: Themes, insights and agendas for ICT4D research and practice - PhD Track* (pp. 1004–1017). Ocho Rios Jamaica. Retrieved 29 July 2013 from <http://bit.ly/15retYc>
- Sassen, S. (2012). Interactions of the Technical and the Social. *Information, Communication & Society*, 15(4), 455–478.
- Swiss Commission for Research Partnerships with Developing Countries (KFPE). (2012). *A Guide for Transboundary Research Partnerships: 11 Principles. 7 Questions*. Retrieved on 29 July 2013 from: [http://www.kfpe.ch/download/KFPEGuide\\_11P7Q\\_E.pdf](http://www.kfpe.ch/download/KFPEGuide_11P7Q_E.pdf)
- Tedre, M., Sutinen, E., Kähkönen, E., & Kommers, P. (2006). Ethnocomputing: ICT in cultural and social context. *Commun. ACM*, 49(1), 126–130.
- Steyn, J., Van der Vyver, A.G. (eds.). (2013). Public and private access to ICTs in developing regions. *Proceedings of the 7th International Development Informatics Association Conference*, held in Bangkok, Thailand. ISBN: 978-0-620-58040-3 Pages 206-223

UNESCO. (2004). Scale up Initiative for Community Multimedia Centres in Mozambique. UNESCO.

Unwin, T. (Ed.). (2009). ICT4D: Information and Communication Technology for Development (1st ed.). Cambridge University Press.

Van Zyl, I.J. (forthcoming) Technology encounters and the symbolic narrative. Localising the 'technology for development' experience in South African education settings. PhD Dissertation, Università della Svizzera italiana.

Vannini, S., Aguirre, L., Rega, I., & Cantoni, L. (2013). Images of Community Multimedia Centres in Mozambique: a participatory photo-elicitation study. In Social Implications of Computers in Developing Countries. Presented at the IFIP WG 9.4, Ocho Ríos, Jamaica. Retrieved 29 July 2013 from <http://bit.ly/1aS0r3X>

Wagner, W., Duveen, G., Farr, R., Jovchelovitch, S., Lorenzi-Cioldi, F., Marková, I., & Rose, D. (1999). Theory and Method of Social Representations. *Asian Journal of Social Psychology*, 2(1), 95–125.

Winschiers-Theophilus, H., Winschiers-Goagoses, N., Rodil, K., Blake, E., Zaman, T., Kapuire, G.K., & Kamukuenjandje, R. (2013). Moving away from Erindi-roukambe: Transferability of a rural community-based co-design. Proceedings of the 12th International Conference on Social Implications of Computers in Developing Countries, Ocho Rios, Jamaica, May 2013. pp. 363 – 374.

Young, L., & Barrett, H. (2001). Adapting visual methods: action research with Kampala street children. *Area*, 33(2), 141–152.