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ICTs and Informal Learning in Developing Countries

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ICTs and Informal Learning in the Developing Countries

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Abstract

This paper presents an approach to understanding information and communication technology-for-development (ICT4D) interventions based around informal learning, where the ongoing process of using ICTs – rather than informational products – is seen as the principal development driver.

A conceptual model of informal learning in ICT4D is constructed. This model moves beyond the treatment of informal learning as a single unproblematic concept, to illustrate that there is a landscape of contrasting modes of informal learning and subsequent development outcomes that can occur within the processes of ICT4D projects.

We use this model to provide guidelines that will help practitioners to understand *ICT process* within their projects and how they might 'design' projects around informal learning; through linking actions and ICT use to desired development outcomes.

This study is supported by a review of the literature; in particular using case studies from India and Brazil to illustrate how informal learning can become the principal focus of an intervention, and potentially provide more appropriate ways to understand empowerment, social change and participatory production within ICT4D.

Introduction

Understanding of information and communication technology (ICT) use in developing countries tends to focus on the informational power of ICTs. Benefit comes from the *product*, the output of the ICTs, so success often depends on information being accurate and locally appropriate (Heeks 2002).

However, outcomes from informational projects in developing countries are much critiqued. Projects often encounter problems of scale-up and sustainability, with little conclusive proof of wider economic benefit (Batchelor et al. 2003; Benjamin 1999; Kenny 2006). With a lack of economic outcomes, projects often defer to notions drawn from social development such as empowerment, social change and rights.

We adopt a critical position, seeing social development outcomes as rarely achieved solely from informational aspects of information and communication technology-for-development (ICT4D) projects. We do not wish to completely dismiss informational approaches, but use this rationale to examine an alternative explanation, which seems to offer a better understanding of potential impact and social development.

In an *informal learning* approach, outcomes come through the ongoing *process* of ICT use rather than from the *product* of ICTs. All ICT4D projects will have a process of some form, yet there has been little work which examines process in ICT4D, which is often assumed to be equivalent across all projects. In contrast, we construct a model which illustrates a landscape, of modes of informal learning and subsequent development outcomes, which can occur within the processes of ICT4D projects.

For practitioners, we draw on example case studies to illustrate how to better understand the role of process in ICT4D. Using the constructed model, we argue that process can be more explicitly 'designed' or 'shaped' through understanding informal learning which links between actions and ICT use, and informal learning outcomes.

This paper is organised as follows. In section A, we review the ICT4D literature, showing that there are a number of examples in developing countries where informal learning processes through ICTs can be argued to be the main source of development success within projects. In section B, we draw on theoretical work from development studies, pedagogy and the social sciences to construct a 'three directions' model of informal learning. This model outlines three different approaches that ICT learning projects can take, which will result in different social development outcomes.

Section C analyses the ICT-mediated group processes of radio production at the Namma Dhwani (Our Voices) community radio station in rural India, and cultural production and sharing using ICTs in Pontos de Cultura (Cultural Hotspots) in Brazil, to illustrate how the informal learning models can provide a useful analytical frame to understand ICT4D projects. In Section D, we discuss how informal learning models can be used by practitioners. The paper ends by drawing conclusions and pointing to future research directions.

A. Informal Learning in the Literature

A.1. ICTs and Informal Learning in Developing Countries

In this section, we adopt a wide definition of ICTs to include radio, audiovisual media and TV as well as mobile phones and computers, arguing that the presence of older technologies can still be significant in developing countries (Edgerton 2007). Within such older technologies, we illustrate a number of examples where incremental and informal learning is connected to ICT use. Historically, for example, the use of cassette tapes – a cheap participatory ICT – resulted in production of significant local content. This is illustrated in the growth of indigenous music connected to cassette production in Northern India and importance of religious cassettes in Iran, where long running processes of learning with ICTs resulted in long term positive social effects (Manuel 1993; Sreberny-Mohammadi 1990). Similarly in video technologies, learning processes of small-scale video producers, using cheap technology, were key in the early growth of the Indian and Nigerian film production and distribution industries (Larkin 2004; Sundaram 2005). In some senses, this informal learning and creativity with ICTs resembles Northern discussions of economies built on 'creative industries'. They argue that given appropriate resources and an enabling environment, creative economic development can emerge from small scale entrepreneurs using ICTs, which become influential in the wider economy (Castells 2000; Caves 2000; Florida 2002).

Where ICTs have been used within interventions, there is also evidence of the importance of informal learning. For example, community radio has been used as an activist ICT in developing countries and has been embraced as a model for community development (Asthana 2006; Buckley 2005; O'Connor 2004). Evidence suggests that the greatest positive effects of such projects come from those chosen as programme makers due to the immersive learning process associated with group content production, rather than the listeners of the radio (e.g. Slater & Tacchi 2004). However, there are often only a small number of producers. Additionally, external demands on community radio can orientate stations away from participative learning (for example in India, community radio policy requires a rather narrow 'developmental' focus limiting the true participative potential) (Nair et al. 2006; Slater & Tacchi 2004; Venniyoor 2006).

In order to go beyond the limits outlined in the case of community radio, some recent projects have focussed exclusively on group participation processes using ICTs. For example, UNESCO's Community Media Centres are ICT centres which take a pragmatic approach to participation and ICT, integrating new technologies within existing local 'communicative ecologies' such as social networks, newspapers and oral forms (Tacchi et al. 2003). The resulting projects have been able to achieve change and high levels of sustainability, and it is notable that these projects have placed a strong focus on learning through their focus on empowerment of local people, providing them with skills to produce local content (Creech 2005; Nair et al. 2006; Tacchi 2005; Tshering & Martin 2007).

Emerging projects involving digital media production in developing countries also connect closely into this more participative direction in ICT4D projects. Learning through digital video and audio production has been used in projects to allow local communities to make their voice heard and gain self-understanding by documenting aspects of their lives (Asthana 2006; Gandhi et al. 2007; Swamy 2007). With the growth of lightweight digital technologies, and the centrality of participation in such work, cutting-edge examples are emerging of portable 'media hubs' that can be taken and used for creative production within a community to enhance participation, hence moving away from dominant 'media centre' models. For example, a 'digital trash-bin' for radio production in Jamaica or a digitally equipped 'tuktuk' in Sri Lanka (Container Project n.d.; Tacchi & Grubb 2007).

Moving outside small communities, ICT projects in developing countries often need to deal with increasing heterogeneity of needs and goals of their participants. Group production of a small number of media products does not necessarily fit with this heterogeneity. Participatory ICT projects are emerging which try to balance between individual goals and group ICT use, as well as to consider increasing technologically connected spaces. For example, in Brazil, the spread of creative community media centres emerged from the grassroots through activist networks (Grassmuck 2005). Open methodologies of learning have been at the heart of this network, both locally within centres through appropriation of open-source software, and through network sharing between like-minded practitioners and producers (Fonseca 2008a). These activist network models influenced the government to create a project called Pontos de Cultura (Cultural Hotspots), in order to support these ideas of interconnected cultural production and sharing throughout Brazil (Freire et al. 2005).

In terms of technology and informal learning, there has been a focus on designing technologies which can stimulate informal learning for users to quickly gain computing skills. The One Laptop per Child (OLPC) and the Hole-in-the-Wall are examples of high profile projects which attempt to open up space to allow children to learn to use computers through playing and creating with them (Mitra 2003; 2005; OLPC n.d.).

Such technology-focused projects which have tried to stimulate informal learning have been critiqued as often too techno-centric, ignoring the crucial local contexts which shape the roles and position of ICTs. We identify some ICT projects that have used ICTs in similar playful approaches, but in more contextual ways. For example, in the Cybermuhollah project, working with youth in slum areas in Delhi, learning comes through sharing and group dissemination of their work in innovative ways, using ICTs in a range of media productions (Srivastava 2007). Similarly, in the Zexe project, an activist art project, high-end mobile phones were given to low-paid workers in developing countries to document their lives (Bar 2007a; 2007b; Zexe n.d.). Such processes of contextualised informal learning might connect into the building of communities in the long run. For example, we interpret a study of the 'Persian blogosphere', as outlining processes of informal learning that bloggers undertake through documenting their lives. This work highlights the increasing

patterns of linking of blogs and discussion which we argue can be seen as emergent communities in which peer learning is integral (Kelly & Etling 2008).

In sum, the examples suggest that in developing countries there are many different modes of informal learning occurring within the processes of ICT use, both within ICT4D projects and in wider contexts. Categorising these contrasting modes is crucial in providing a more coherent way to understand and use informal learning in ICT4D.

A.2. Theoretical Approaches

As can be seen from the preceding examples, informal learning is often a crucial component of an ICT4D project, yet the significant role of informal learning processes is rarely acknowledged in the literature, neither within specific examples, nor within wider ICT4D frameworks. This results in practitioners simply viewing their work through analysis of *product* where information needs and requirements are the principal lens of understanding, and where softer *process and informal learning* concepts are underplayed or only referred to peripherally. Consequently, we have little understanding of process in ICT4D, or the best practices in informal learning, even though this is often a key component of development success.

Madon's (2007) analysis of telecentres through the lens of contested 'social space' is an exception, and suggests that learning might be connected to giving social groups the ability to contest local issues. Work on ICT in education in developing countries also provides insight. Pawar & Toyama's (2005) review of the ICT for education (ICT4E) literature results in a tentative taxonomy of ICT4E projects. This work supports our study, that in teaching and learning there is a wide range of different approaches, which could be usefully brought together in a model. However, Pawar & Toyama's work is not sufficient, providing little in the way of theoretical reasoning or practical understanding as related to their model. Additionally Leach's (2006) research on ICTs for teacher education in Africa discusses how formal education can often benefit by integrating informal group structures present in society into its work. Like Pawar & Toyama, Leach's focus is on using such ideas in formal education spaces. We argue that from our discussion of learning in ICT4D projects, such ideas can have a wider relevance and be more appropriate outside the formal space of the school. But, again, there is a lack of clear theorisation pointing a way forward.

Theoretical work on technology appropriation in developing countries can also be equated to learning processes which lead to ownership, empowerment and wider use of technology (Ali & Bailur 2007; Bar et al. 2007; Chipchase & Tulusan 2007; Edgerton 2007; Heeks 2002). However, there has been little work to understand the conditions that enable such processes of appropriation to occur. In sum, the theoretical literature provides a number of potential directions, but no work offers a complete answer to account for the wide diversity of examples that we highlighted in the previous sub-section.

B. The 'Three Directions' Model of Informal Learning

We build a theoretic model as a way to understand informal learning in ICT4D. We do this in three stages;

1. Firstly, we conceptualise general development outcomes that we see coming from informal learning projects.
2. Drawing on our study of ICT4D and informal learning projects, we identify three specific directions of development outcome that emerge from informal learning projects.
3. We identify different approaches to facilitating informal learning, which will lead to these three directions of development outcome.

B.1. A Critique of Development as Empowerment

Many projects within ICT4D focus towards social development outcomes of their work, often through connection to giving 'empowerment' or 'voice' to local citizens (Hughes & Pringle 2005; Kanungo 2004; Tacchi 2005). As aptly put by Cornwall in her analysis of development buzzwords, empowerment has "gained the most semantic range of all, with meanings pouring into development from … feminist scholarship, the Christian right, New-Age self-help manuals and business management" (Cornwall & Brock 2005, p.1046). One needs to be wary of how such a word becomes used; often simply to "lend the legitimacy that development actors need to justify their interventions" (Cornwall & Brock 2005, p.1045). In this section, we draw on more detailed studies of empowerment as a start point to move beyond these buzzwords.

There are a number of different views in development to understanding empowerment. In this section we follow work from gender studies on empowerment, arguing that its conclusions have a wider applicability beyond gender analysis.

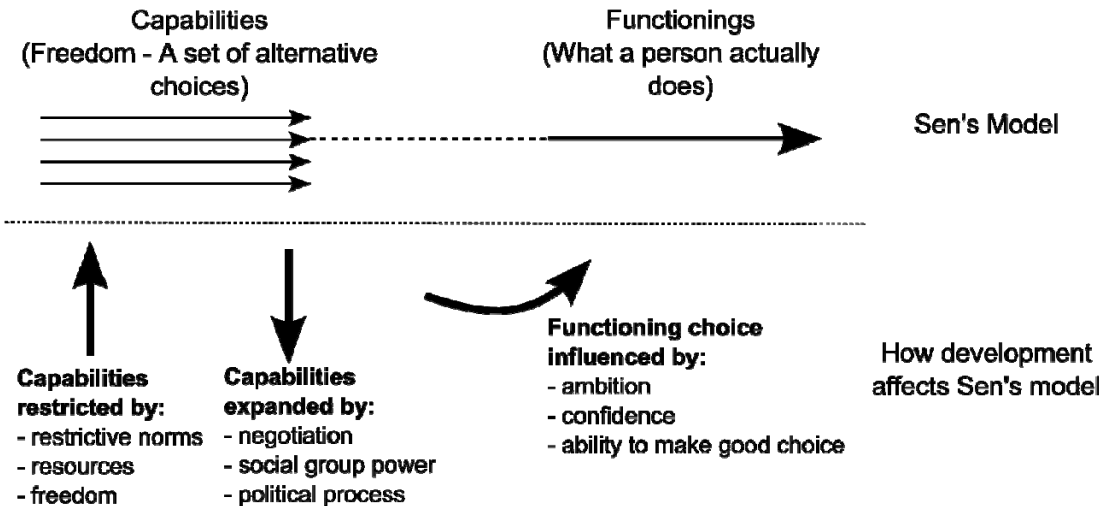
Kabeer's (1999) study of empowerment rejects the view that empowerment can be understood either as a simple package of rights and status variables (such as the millennium goals) or solely through economic understanding of earnings and assets. Taking a gender approach, empowerment also needs to deal with power and structural issues that disempower women in society, which can exist even when economic or population variables seem positive. Rowlands' (1997) study of power and women's empowerment extends this social view of empowerment. She argues that empowerment is often equated with cases of *power over* or *power to* where one takes or has power but at another's expense. Development projects should look towards the more positive notions of *power with* where it is group power that provides empowerment.

These gender studies approaches to empowerment illustrate two connecting points. Firstly, disempowerment of individuals is related not only to the self, but to the inhibiting structures in society. Secondly, empowerment in the more positive case comes through social processes of *power with* rather than simply through the individual. This conclusion is supported by social studies of poverty. Mosse (2007), for example, argues that it is the socio-political and cultural structures that reinforce exploitation in society whilst Bebbington (2006) has illustrated the importance of group action by way of social movements as an approach to bring about poverty alleviation.

We do not reject the importance of increased individual confidence and ambitions that come from empowerment: Rowlands describes it as 'the core'. However, we critique the idea that empowerment on its own can be development. We see development as "a combination of actions on different fronts, at different scales, and addressing different dimensions on powerlessness and poverty" (Mosse 2007, p.32). In this sense, the notion of empowerment, as it is predominantly used to refer to the individual, cannot adequately model social development. Instead, we orientate towards the capability framework as providing a framework for a *multi-level process* of development.

Amartya Sen's (1999) capabilities and functionings framework suggests that individuals possess a certain number of possible life choices (capabilities), which through choice will result in realised functionings as shown in Figure 1. Sen states that "Poverty must be seen as capability deprivation" (Sen 1999, p.87). Social development in this model is connected with the expansion of capabilities, or the improved ability to choose the appropriate functioning as shown in the bottom segment of Figure 1.

Figure 1: Sen's capability approach



Adapted from (Sen 1999)

As illustrated in the figure, the capabilities approach can provide a more coherent model of social development. One which is continually being contested, and only maintained through ongoing actions at multiple levels of the individual and group. The capabilities approach, as a model of social development, also critiques 'one-shot' and individualistic ideas of empowerment that are often articulated as development.

This wider development model fits in well with understandings of informal learning, which focus on an ongoing *process*, which whilst empowering to an individual, also connects into building group power or challenging restraining societal norms at a wider level.

B.2. Three Informal Learning Outcomes Beyond Empowerment

The review of ICT4D projects highlighted a range of development outcomes that can emerge from projects which embed informal learning. Individual empowerment provides a crucial part of these outcomes, but beyond this, it is possible to pinpoint three wider directions of development outcome.

Direction I – 'Traditional' Group Mobilisation

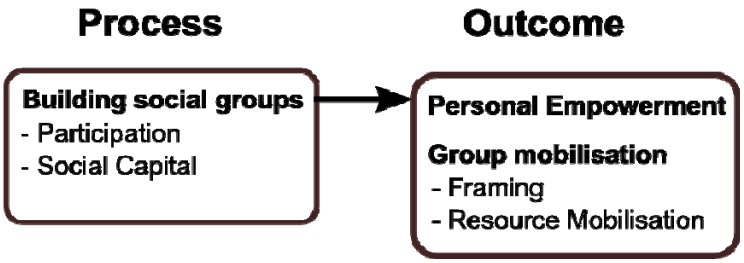
Participatory group processes have become integrated into many development interventions and are closely related to informal learning. Participative methodologies such as Participatory Rural Appraisal (PRA) use local artefacts such as stones and leaves, and the sharing of local knowledge to build a collective understanding of a local community (Chambers 1997). Such models reject the idea of the objective *outsider* in favour of a locally integrated *insider*, with understanding of local reality. Such action will engage in more appropriate 'bottom-up' approaches to development through working and learning together with the group (ibid).

Closely connected to this, learning approaches can also be understood within the realm of social capital. Putnam (1993) argues that social capital, the intangible structures and networks of trust, are what separates different levels in society. To bring about development one needs to build such connections, particularly within poorer communities and groups. Community-driven projects which plug poor groups into wider society are one approach to build such social capital (Mosse 2007). Hence, participation, group learning and shared understanding leads to transformative group processes, through the improved *power with* of the group, whether that be through project ownership or improved social capital.

Crossley's (2002) work connects such group processes with rational actor models. In such models, all sides of a contestation are modelled as rational, responding to each other and changes in the environment (ibid). Rational actor models illustrate the outcome of group learning processes through reference to *framing*, and *resource mobilisation* (as summarised in Figure 2). Framing is the ability to give meaning to a certain state of affairs, for example to attach an emancipatory understanding to events

that take place in a community (ibid). Resource mobilisation is the ability for members to mobilise, through organisations, structures or resources (Tilly 1985). Coherent communities which have developed shared beliefs and understanding through learning are more likely to respond to framing by leaders. They are also more likely to be able to mobilise resources better and connect into wider social and political issues (Bebbington 2006; Hickey & Mohan 2005).

Figure 2: 'Traditional' group mobilisation



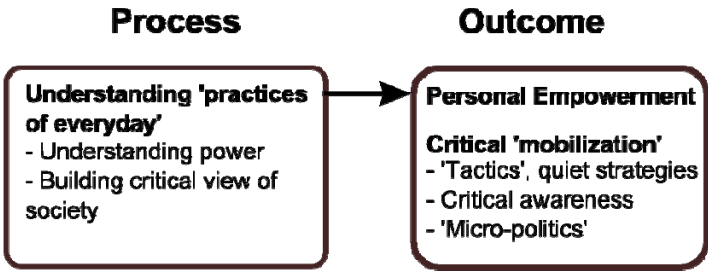
Participatory video and community radio projects, outlined previously, are ICT4D projects that have adopted such goals, of giving groups improved confidence, social capital and coherency through the group learning processes involving ICTs. This provides coherency and shared understanding in order to allow groups to better influence and mobilise their community over time (for wider examples see Gumucio Dagron 2001).

Direction II – Critical 'Mobilisation'

A starting point for this second direction – summarised in Figure 3 – is a critique of direction I. This critique questions the possibility of genuine participation and equitable relations in development. In reality participatory approaches are often co-opted or used as a technocratic tool by practitioners, losing their radical power for change 'from below' (Cooke & Kothari 2001; Escobar 1995; Hickey & Mohan 2004). Equally, ideas of social capital are seen as naïve: having connections into society does not solve unequal relations and exploitation of the poor (Mansuri & Rao 2004).

For example, built upon notions of *social space*, Madon (2007) argues that telecentres should be seen as spaces of contestation of power. Cultural capital and power are subtly embedded within everyday artefacts, practices and connections and it is these that reinforce the dominance of certain groups over others through the norms of behaviour (Bourdieu 1990). From this critical standpoint, learning process are related to understanding the 'invisible' cultures and practices which enforce the uneven power relations in society. For example, in the Cybermuhollah project in Delhi, young people – through ethnographic observations, discussions and ICT production – moved towards sense making, and interpretation of *social space* within their local environment (Sengupta 2004).

Figure 3: Critical 'mobilisation'

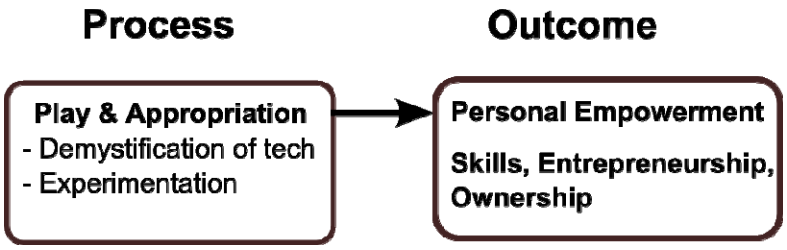


In this more critical view of groups in society, we can use the work of de Certeau (1998) to understand the outcome of this process. De Certeau discusses the everyday contestation between social forms of oppression and power in society, and the everyday acts that can be taken to resist these forms of power. He differentiates between a *strategy*, a 'traditional' group mobilisation that requires will and power, and a *tactic*, a ruse or action which "has at its disposal no base where it can capitalise on its advantages" (de Certeau et al. 1998, p.xix). Tactics relate to quiet strategies of resistance by individuals or small groups. On the surface these might not seem to be powerful, but the literature suggests that whilst individually insignificant, when combined together these can result in wider outcomes in society (Bayat 2000; Escobar 1992; Rakodi & Leduka 2003). For example, Tripp (2002) documents the influence of such behaviour within the informal sector in Tanzania which has influenced wider changes. Benjamin's (1991; 2000; 2001 (with Bhuvaneswari); 2007) grounded studies illustrate the power of such micro-political acts in aiding the poor in resisting powerful political forces in India.

Direction III – Appropriation of ICTs

An alternative view of learning – summarised in Figure 4 – comes from examining ICT use. Questioning the idea that technology is neutral, social-shaping theories embed technologies as artefacts, which through their design, construction or marketing, perpetuate certain cultural or social norms (Castells 2004; Deibert 1997). However, it is possible that one can use these artefacts outside their intended function or modify them to be more appropriate.

Figure 4: Appropriation of ICTs



Learning is connected to the processes of exploring, bricolage (tinkering) and appropriation (Ali & Bailur 2007). Within developing countries, we see a number of examples that illustrate how appropriation can allow technology to become acceptable to groups, and spur local innovation through new forms and uses. For example, Horst and Miller (2006) describe the constant play and performance of Jamaicans with mobile phones which leads to the maximum use of many seemingly redundant features for wider benefits. This can lead towards improved entrepreneurial opportunities, creativity and improved ownership of processes (Bar et al. 2007; Chipchase & Tulusan 2007; Donner 2005).

B.3. Pedagogical Approach within the 'Three Directions' of Informal Learning

We have focussed on three different learning processes (group mobilisation, critical group understanding, appropriation). In this section we argue that these three different directions of informal learning can be connected with different pedagogies (strategic approaches to learning and action).

Direction I - Social Constructivist Learning Leads to Group Mobilisation

Drawing on Freirian foundations (Freire 1972), *social constructivist* models of learning are based around the notion that knowledge exists within the social, and the idea of "learning as social participation" (Wenger 1999, p.4). Wenger described the centre of such a social view of learning to be the 'community of practice'. This is a group defined by persistent interaction, shared understanding and accountability between individuals (say a women's group, a certain clique of youth, a set of

neighbours). Within a community of practice, individuals are not necessarily in harmony, nor are they equal, but they are bound together by shared meanings, history, practice and accountabilities (Brown & Duguid 2002). Within a social constructivist view, knowledge and learning relate to the local artefacts (reifications) and the actions and norms (participations) within a specific community of practice (Wenger 1999).

A specific community of practice may be connected to other communities of practice through common themes (shared objects) or people (brokers), and it is this loose 'constellation' of communities of practice as grounded in a locality that is conventionally referred to as 'the community' (ibid). For Vygotsky, a key influence on social constructivist learning, conscientisation is the goal of such learning. Whilst learning may be effected by locally situated norms and social construction of knowledge "the development of intellect and rationality beyond situations is the central aim of education" (Liu & Matthews 2005, p.392).

In projects where social constructivist approaches are observable, the process of learning is likely to follow the group mobilisation model we outlined. For example, in the UNESCO Community Media Centre projects, there is a focus on understanding existing local practices as part of local project design. This is very much connected to social constructivist ideas of understanding and integrating projects into existing communities of practice. Such projects use learning processes to strengthen local communities of practice, working in real spaces with ICTs, which result in better coherency of such groups (Slater et al. 2002; Slater & Tacchi 2004)

Direction II – Connectivist Learning Leads to Critical Understandings

Connectivist learning approaches have developed from an understanding of the contemporary world where information is readily available but often fragmentary and contradictory: "learning is a process that occurs within nebulous environments of shifting core elements - not entirely under the control of the individual" (Siemens 2005). Connectivist learning is about instilling the skills to evaluate this wealth of information and make connections between many sources. At a wider level it relates to network theory and how one can aid learners in connecting and using such information (Downes 2007; Marcum 2006; Siemens 2005; Siemens 2006). We can see elements of such approaches in developing country ICT cases. For example, in the Iranian blogging community, bloggers through their linking to other articles, begin to build connections of knowledge and critical understandings. These self organising 'learning' communities are likely to result in a rich cross-pollination of ideas and coherency, whilst allowing individuals a unique learning experience (Kelly & Etling 2008).

The 'critical view' of groups built around power, culture and competing groups, can be related to connectivist pedagogies. Learners are guided to develop a nuanced understanding of the multiple sources of information and connections beyond their locality. In Brazil, the work of activist groups using ICTs occurs in complex ecologies and shifting networks of members. Often the work is related not only to producing

culture, but can be seen as an evolving 'tactical' attempt to understand and challenge the dominant structures of society (Caetano 2006).

Direction III – Constructionist Learning Leads to Appropriation

Constructionist pedagogy adopts a more individualised notion of learning and knowledge, albeit still situated within the social. It differs from a social constructivist approach in that it "adds the idea that this [learning] happens especially felicitously in a context where the learner is consciously engaged in constructing a public entity" (Papert 1991, p.3). Whilst crudely defined as 'learning by making', its philosophy is focussed on the individual where knowledge is "individually and idiosyncratically constructed or discovered" (Liu & Matthews 2005, p.387). In contrast to social constructivist ideas, there is no attempt to instil wider understandings to this learning. Constructionist ideas are "more situated and more pragmatic" (Ackermann 2001, p.5) and in terms of approach "'diving into' situations rather than looking at them from a distance" (Ackermann 2001, p.8).

Although this difference may seem subtle, the outcome in terms of approach can be quite different. For example, community video production is grounded in social constructivist approaches, and ICTs are used to allow communities to build wider understandings of their situation (Swamy 2007). For a constructionist projects such as the OLPC, the focus is on learning by doing, where individuals practically experiment and create through its learning software (OLPC n.d.)[1].

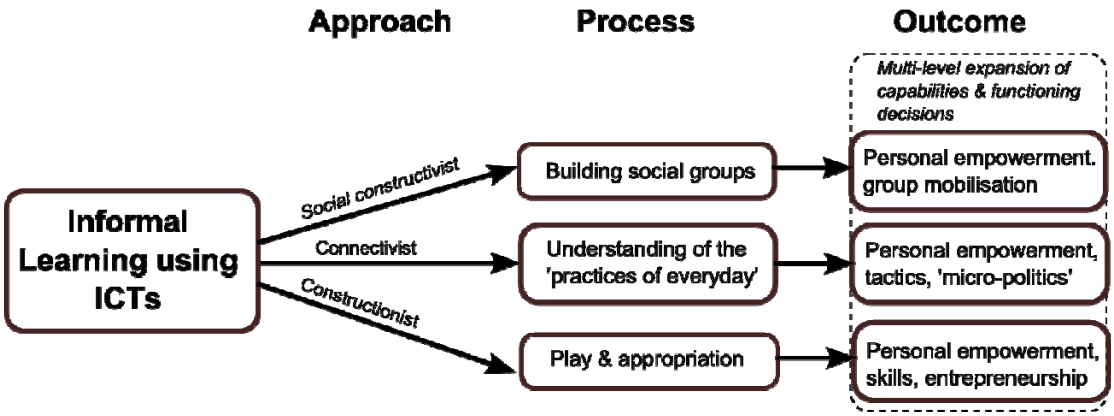
Constructionist pedagogies can be seen within the processes of technology appropriation. For example, mobile phone appropriation is often connected to constructionist play and exploration of a phone's use and limits. This leads to individual appropriation strategies appropriate to the local situation, which may then be shared with others (Bar et al. 2007; Horst & Miller 2006; Tall 2004).

1 Although this is less so now that OLPC has reoriented itself to focus on PC distribution rather than solely being a 'learning project'

B.4. Summary – A Model for Informal Learning in ICT4D

We combine our previous analysis to form a model, shown in Figure 5. We use Sen's capability approach to understand the underlying development outcome of ICT learning projects, as expansion of capabilities and functioning decisions at multiple levels. Examples orientate us toward personal empowerment (individual confidence, belonging) but beyond this 'core' outcome, wider social outcomes will vary dependent on the pedagogic approach, and process taken.

Figure 5: Three directions of the learning approach



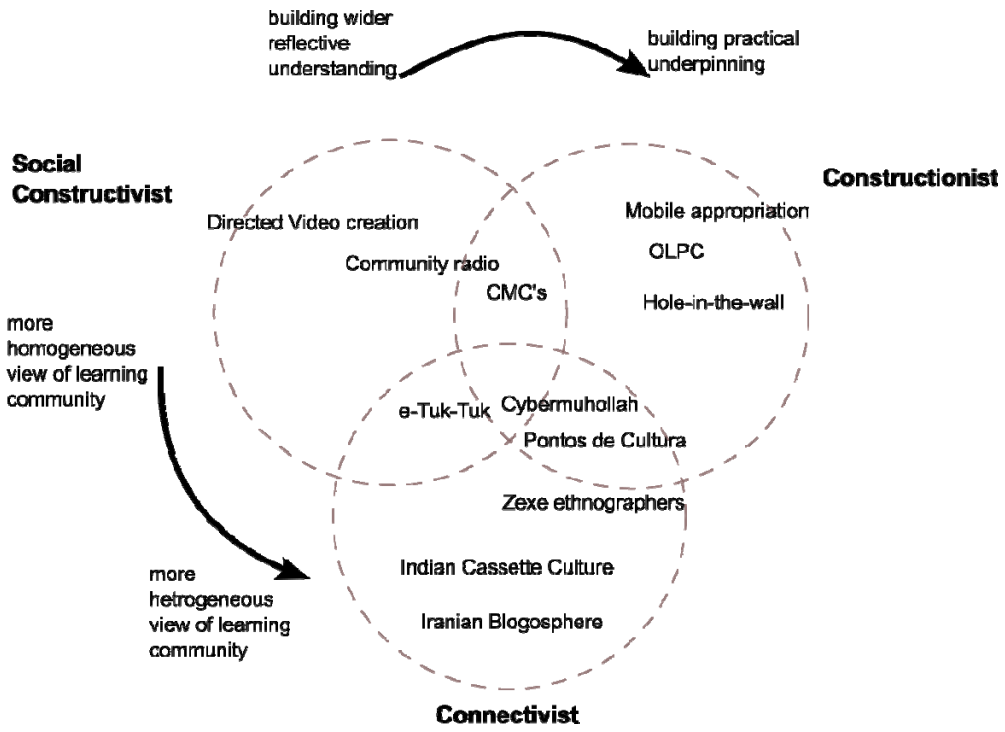
To summarise:

- For *social constructivist approaches* we refer to pedagogies of social learning, as a way to build wider group conscientisation within learners. This leads to the strengthening of social structures as a basis of group mobilisation.
- In *connectivist approaches*, we linked to more contested models of social space and practice. This leads to building an understanding and ability to evaluate the environment, that gives individuals the ability to adopt tactics to resist the many forms of dominance in society.
- *Constructionist approaches* are more pragmatic 'learning by making' approaches. Process is centred around play and exploration which will lead to appropriation of technology, new skills and possibly entrepreneurial opportunities.

B.5. Locating ICT4D Projects in the Three Directions Model

In the review of ICT and informal learning, we observe that projects are likely not to solely follow one direction, but to be a mix of the three directions. To illustrate this, we tentatively position[2] the various ICT4D examples cited above within the framework as illustrated in Figure 6.

Figure 6: Positioning ICT learning examples in the model



Moving from social constructivist to connectivist learning, we observe approaches that begin to consider a greater heterogeneity and contestation of power as related to the community and its goals. Moving from social constructivist to constructionist pedagogies, we observe projects that begin to display practically-grounded rather than reflective learning.

2 Foster (2008) discusses how we decided to position each project within the framework.

C. Applying the 'Three Directions' Model

In this section, we use two case studies to illustrate in detail how an informal learning approach can be used to analyse and potentially improve development interventions. Namma Dhwani is a rural community media centre in India which generally follows the social constructivist direction whilst the Pontos de Cultura project in Brazil displays aspects of both constructionist and connectivist elements of the three directions model.

C.1. Learning and Radio in India

The Namma Dhwani (Our Voices) media centre and radio station is located in Budikote, a rural town in Karnataka, India. Namma Dhwani includes an audio production studio which produces radio shows and a media centre with computers.

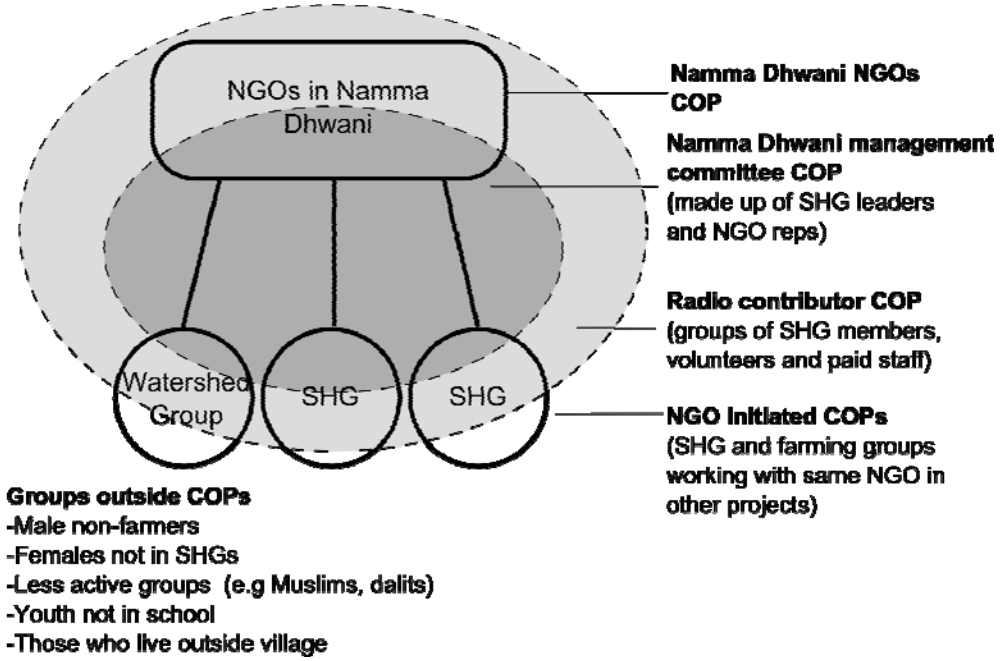
We examine the period from 1999 to 2007. The project has been maintained for these eight years, guided by two NGOs; MYRADA, who have been instrumental in developing local self-help groups (SHGs) in the region and VOICES, an NGO working in communications for social change. In 1999, these NGOs carried out a needs assessment and concluded that there was a severe information deficiency within the locality (Pringle & Subramanian 2004).

Growth has been a gradual process, starting from a small project producing content for the local SHGs, evolving over time into a fully-equipped digital media centre. In the key period of growth, the centre was supported by UNESCO's Community Media Centre and ICT for Poverty Reduction projects. This enabled the project to purchase equipment, improve infrastructure and finance the presence of a local researcher.

This project can be considered as successful in many ways. It is close to being a sustainable media centre in a rural area, supporting itself through a combination of SHG subscriptions, training courses and selling its radio programmes (Balakrishnan 2007). The volume of local content produced is likely unsurpassed by many other rural communities in India, producing a total of over 800 programmes. At a wider level Namma Dhwani has been crucial example in supporting advocacy for changing India's community radio policy (Buckley 2005).

Using the Social Constructivist Direction to Analyse Group Learning Processes
As shown in Figure 7 we consider that there are a number of communities of practice within Namma Dhwani[3]. We also point out those who are less likely to be within Namma Dhwani's communities of practice.

Figure 7: Communities of practice (COP) within Namma Dhwani



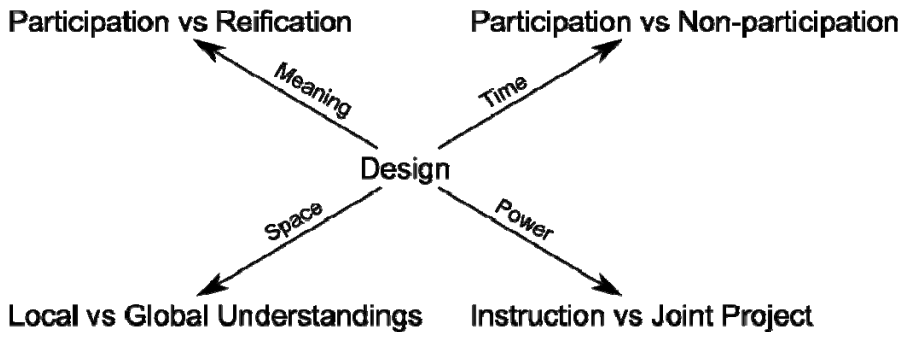
We focus on the radio contributors as the crucial community of practice gaining through informal learning related to ICT use. This COP consists of a number of paid staff, SHG members and volunteers who will work together to make a radio show. This is an informal group, who take the role of contributors, presenters and producers of the radio shows in Namma Dhwani (we will refer to them collectively as 'producers').

3 Based upon the definition of a community of practice as a persistent interaction, shared understanding and accountability between individuals (Wenger 1999).

Analysing Inter-Communities of Practice

Wenger (1999) argues one can analyse existing communities of practice, and potentially improve their functioning through reference to four tensions outlined in Figure 8: *meaning*, *space*, *time* and *power*. We apply this to the producers' community of practice

Figure 8: Four tensions in design for learning



Adapted from (Wenger 1999; Wenger 2001, pp.43-46; Lave & Wenger 1991)

i) Space – Local vs Global Understandings - Namma Dhwani is transmitted through *coherent, sequential media*. ICTs used are radio, TV, cassettes and videos, all of which provide content to the audience in the form of a coherent narrative, where the aim is to explain a specific issue (for programme list see Pavarala & Malik 2007:175). Radio show production is complex and requires a number of people to produce the content. Thus, not only is there a need for coherent presentation of issues, but also a coherency between the producers in the community of practice to allow them to work together to produce the content.

Thus, the broadcast form successfully directs the producers' community of practice to constantly seek to communicate issues beyond a narrow local understanding toward examining issues in a wider way. The form of broadcast ICTs thus allows the communities of practice to effectively balance competing spatial pressures. Working in the community of practice means a common local understanding needs to be agreed in order to produce content, and the notion of a radio 'audience' directs producers to modulate local understanding within wider contexts for the audience.

ii) Meaning – Participation vs Reification - Documents (audio archives) are an important reification in the producers' community of practice, as they build a history and meaning into group practice which will encourage consistency, and simplify practice. However, this has to be balanced with the need for practice not to become stale, so it is able to adapt to the changing world and technologies.

In Namma Dhwani, the use of a content management system to archive radio shows is likely to reify practices of production (Slater & Tacchi 2004) and the similar origin of

radio producers means there are likely to be common practices already, allowing the producers to work together. However, the open participation of radio production and the way producers who go out into the locality collect stories and conduct interviews ensures that the producers' community of practice is loose enough to absorb new influences, and this will aid the evolution of their practices over time (Pavarala & Malik 2007, p.171).

iii) Time – Participation vs Non-participation **-** We use the notion of *legitimate peripheral participation* (LPP) to understand this tension (Lave & Wenger 1991). In a *peripheral position* within a community of practice, members can contribute less whilst still a part of the community of practice.

For newcomers this provides the ability to absorb group practices peripherally without being a 'core' member of the community of practice. Additionally time is at a premium for those who live close to poverty in rural settings and for the Namma Dhwani radio producers, time demands are also high. Production is difficult and time consuming for inexperienced ICT users, and this has resulted in shows often being created by only the most experienced (Nair et al. 2006, p.19).

There may be a need to redesign production processes for more delegation, or design specific simple jobs in the content production chain to allow LPP, with lower and more flexible participation amongst time-constrained locals.

Communities of practice are already well established and it is questionable if newcomers will be able to integrate within the existing structures. The SHGs which form the core of the participative individuals in Namma Dhwani are "based on affinity among members" (MYRADA 2008, p.1). This indicates a potential problem in the desire of Namma Dhwani to grow outside its locality, as additional groups may not be able to integrate within the existing communities of practice outlined previously in Figure 7.

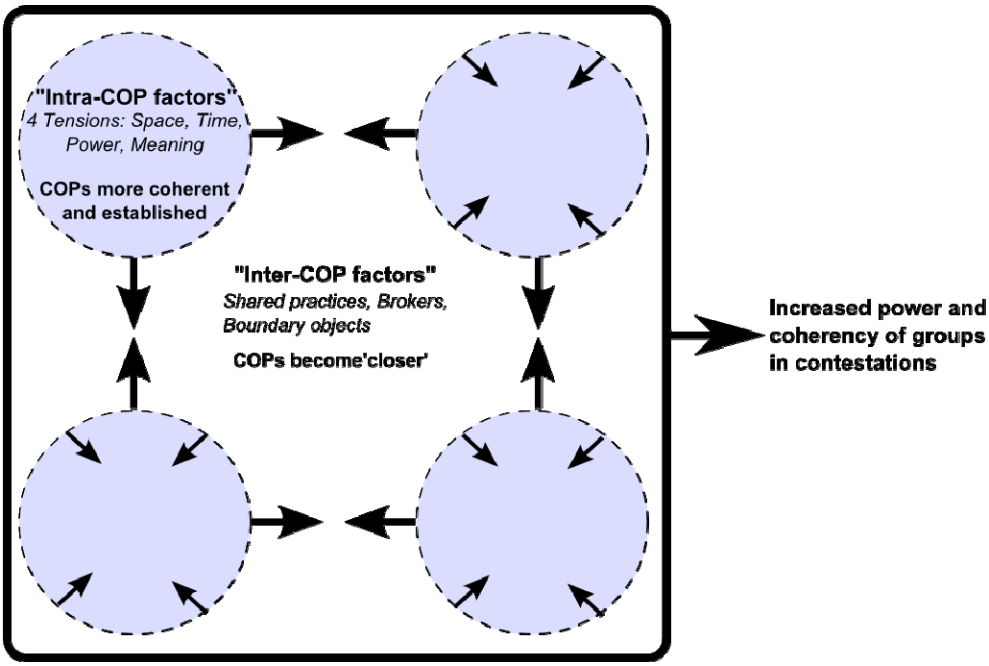
iv) Power – Instruction vs Joint Project **-** There are tensions between local ownership and need for the NGOs to achieve 'developmental' outcomes in Namma Dhwani as discussed at length by Bailur (2007). Nair et al. note that "since June 2004 women from the management committee have not convened a meeting owing to pressure such as lack of time" (Nair et al. 2006, p.26), and "volunteers occasionally pitch their ideas although when they participate the paid Community Resource Person invariably guides them" (ibid, p.18). These statements together suggest that over the project's life, the centre's operation is becoming less of a joint project, moving towards instruction guided by remunerated volunteers and staff.

Whilst the content of programmes is articulated as meeting community needs, there are a number of influences that push the producers' community of practice in specific 'developmental' directions. This may be problematic as it restricts participation in this COP. Power to define direction is crucial to communities of practice to allow members to derive meaning from their work and evolve (Wenger 1999).

Analysing Inter-Communities of Practice

To connect between multiple communities of practice, Wenger discusses the importance of shared connectors, practices and objects which will make a number of communities of practice more coherent. We identify that Namma Dhwani's presence has resulted in increased *shared practices* between communities of practices in the locality, through interactions and in the shared practices of radio production and listening. There are increasing numbers of *boundary objects*, particularly in shared representation placed on ICT objects and the media centre itself. There are also increasing number of *brokers*, members who connect multiple communities of practice together: the radio producers, NGO workers and others who visit the project (Slater & Tacchi 2004). Hence Namma Dhwani can be seen as central to strengthening relations between local communities of practice and evidence suggests that certain groups (women, youth) have been able to mobilise more readily due to the media centre (ibid).

Figure 9: Relating communities of practice to outcomes



Summary

Figure 9 brings together the social constructivist analysis, and illustrates how changes in communities of practice can lead to increased alignment within and between communities of practice. The case study supports the fact that development outcomes do not simply happen at one level, but at a number of different levels and degrees at the same time (Nair et al. 2006; UNESCO 2005). Rowlands' (1997) notions of *the core* of individual empowerment rings true, and this expands through social constructivist learning into wider coherent groups and contestations. ICTs have been a central part of a learning process, particularly for the producers and have guided group actions to become more coherent.

This view of success needs to be tempered by problems we have noted. Only a selective number of groups, the producers and SHG members, have been able to take full advantage of Namma Dhwani and grown through informal learning approaches involving ICT.

Additionally, as the project matures, we see a move toward more formally-designed programmes at all levels (Creech 2005, p.32). It may be problematic for the active communities of practice to remain relevant. In the region of Karnataka, wider developmental changes are taking place which are transforming rural society (Heitzman 2004). Most houses in Budikote now have cable television, and a mobile mast has been installed (Jones et al. 2008). Yet if the media centre moves towards formality and managerialism, communities of practice will become closed and less able to adapt through their practices to such changes.

C.2. Networked Cultural Learning in Brazil

Pontos de Cultura has been described as part of the third generation of Brazilian ICT projects (Grassmuck 2005). In the first generation, the goal was to provide subsidised computers and training. In the second generation, the focus was on access and 'digital inclusion' with a large number of telecentre schemes sponsored by the government, private companies and municipal funds (IBICT 2008; Souza 2007). We can see the wide implementation of the telecentres as a double-edged sword. Telecentre schemes have increased ICT users and understanding of ICTs within Brazil (Brunet 2005; Kugel 2006; Minuano 2008). On the other hand, telecentres have been increasingly critiqued as mirroring the neoliberal, consumptionist models of media in Brazilian society, a "mediatized society of a particular virulent nature in which vast swathes of the population were literally narcotized by Globo's [the dominant Brazilian media corporation] diet of soap operas" (Garcia 2004). In this light, telecentres are critiqued as mirroring the dominant mediascape "offering little other than access to the net. So what if it's all run on Linux if all that the visitors do is chat and go to Globo websites or the porno" (Garcia 2004).

Such critiques have provoked a number of activist projects and communities. Such projects work on a smaller scale but are often connected through gatherings and connection between groups. Projects often come together, obtaining small amounts of funding in a sporadic manner. Whilst many of the initiatives are only fleeting and disappear, they inevitable lead to lessons, new collaborations and further projects.

Pontos de Cultura emerged when the Brazilian government began to work with activist groups. The programme, financed by the Ministry of Culture, was inspired by activists in local media centres focusing on cultural production using ICTs. Pontos de Cultura envisions a wider roll-out of local centres by providing ICTs, training and finance to encourage them to begin to use digital media as a means of disseminating

and sharing content (Freire et al. 2005). The goal is of autonomous networks of local producers resilient to changes in policy or government (Balvedi 2006; Prado 2008).

We examine the period from 2004 to 2006, when the project financed 152 *Pontos*, working mostly in urban areas, with youth, the poor, slum dwellers, minority ethnicities, women, gay and lesbian groups (MinC 2006). Projects are mostly connected to existing local groups working in culture, often moving into the digital realm for the first time (ibid).

The Learning Approach Rationale

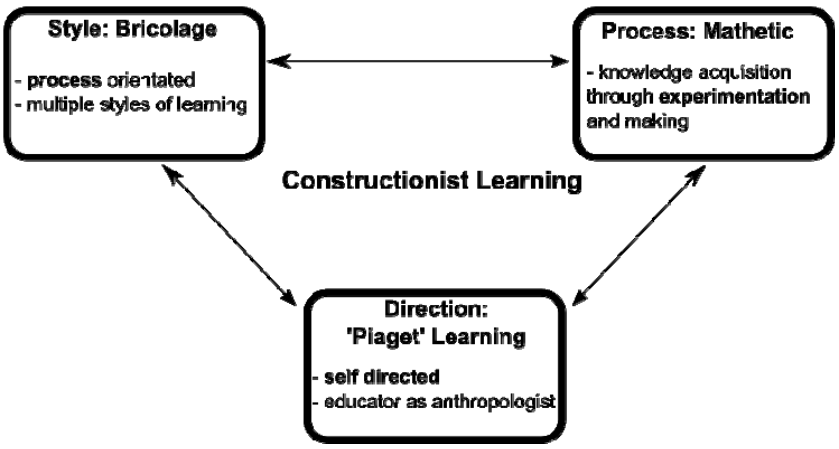
Given this unique project and its attempt to bring together broad partnerships, it is surprising to find little ICT4D literature critically examining this project and its wider relevance. We suggest that one of the reasons for this is the lack of theoretical understanding of Pontos de Cultura. The project has an increasingly heterogeneous understanding of its users, and this results in diverse actions and messages. Interpreting such outputs in terms of the dominant models of information value and noise/data/information/knowledge chains is problematic.

McLuhan (1967) argues that to fully understand the effects of media, one should not study its content, but rather the properties and the relationship between the users and the media itself. Thus, the informal learning approach allows us to step away from the increasingly complex, heterogeneous information and gain a perspective by looking at the ongoing relationships between ICTs and users.

Using Constructionist Models to Understand Technology Use and Appropriation

Seymour Papert's (1991; 1993; 2000) association with the OLPC, and his work with children and sciences, has resulted in his work being pigeon-holed far more narrowly than it deserves. In this section we discuss his theoretical models of constructionist learning, that ICTs can serve as fruitful learning environments for creative construction and exploration. Figure 10 summarises three aspects of constructionist learning that we will use to analyse the methodologies of Pontos de Cultura.

Figure 10: Outline of constructionist learning



Adapted from (Papert 1993)

i) Bricolage - Papert uses the notion of bricolage to understand the cognitive processes related to learning (Turkle & Papert 1992). Often one takes false paths during learning, and it is in the adjustment to mistakes and the understanding that comes out of these adjustments, that results in knowledge becoming absorbed by a learner (Papert 1993). In formal education, this style is often neglected in favour of notions of mastery through repetition (ibid). Papert rejects such approaches, instead looking to give learners space to follow their own styles of learning, grounded in bricolage (Turkle & Papert 1992).

It is no accident then, that ICT use in Pontos de Cultura builds upon the activist ideas of *meterecyclagem* (meta-recycling), learning through recycling of computers, the use of free and open source software (FOSS) and open licensing within cultural production (Freire et al. 2005). Beyond economic issues, FOSS can be seen as an environment that encourages *bricolage*, "the use of FOSS is active, and requires a learning approach, because it puts an end to the idea of a finished product." (Balvedi 2005). The Ministry of Culture also reflects on the importance of this type of pedagogic approach, "The development of collaborative work requires humility from both parties, to acknowledge the limitations of the educator and the learner as unfinished beings and imperfect" [translated] (MinC 2005, p.5).

ii) 'Piaget Learning' - Papert adopted several concepts of the educator Jean Piaget. Learning should not be connected to a curriculum of teaching. Constructionist models create *learning environments*, where complex real-world concepts are more easily explored through processes of bricolage.

For the educator there is a need to be "sensitive to what is happening in the surrounding culture and use dynamic cultural trends as a medium to carry their educational interventions" (Papert 1993, p.181). Our interpretation of Papert's work is of learning environments dependent on setting, where the 'educator as anthropologist' (ibid) uses ICTs to examine complexities of daily life as a 'learning environment'[4].

We thus position ICT-based cultural production as *a locally appropriate learning environment where learners construct and learn through bricolage.* In Figure 11 we illustrate this in more detail for Pontos de Cultura.

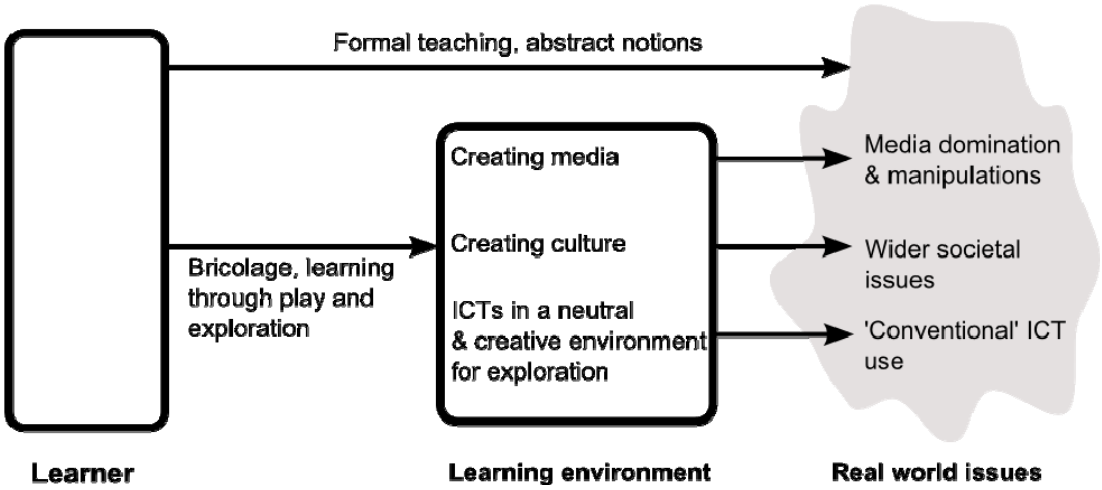
- **Creating media** - With the power of dominant media players in Brazil, critical media literacy is important. By using ICTs to produce, edit and disseminate media, learners begin to understand the techniques and manipulations of the media and look at it more critically (Goldman et al. 2007; Lessig 2004).
- **Creating Culture** - Cultural production (with the aid of ICTs) can be considered a learning environment to explore wider social issues (imperialism, neoliberalism, environment) in a more practical way. For example, musical

4 Ironically, given Papert's dynamic models of learning environment highly dependent on settings, he is often associated with the 'one size fits all' model of the OLPC.

lyrics play with ideas about society and oral stories might encapsulate wider debates regarding indigenous traditions.

- **Neutral ICTs** - ICTs in the project provide a learning environment for computer use and repair far removed from formal behaviours normally connected to ICTs. Often in workshops, computers are first taken apart with the internal parts shown; spaces used are not formal computer labs, but more neutral community centres and spaces (Fonseca 2008a; Fossa 2007)

Figure 11: Learning environments in Pontos de Cultura



Based on (Papert 1993)

iii) Mathetic Approach - The mathetic approach describes how constructionist learning results in knowledge in a learner "Make something new with it, play with it, build with it" (Papert 1993, p.120). This process ensures that the new knowledge is assimilated in a way that sits inside the existing worldview of a learner. Learning needs to come from within, fitting in with one's long-learned models rather than being imposed from the outside (Papert 1991).

In Pontos de Cultura, one common learning approach has been to relate computers to other art forms. For example, Fonseca (2008b) describes how in one centre, youth were allowed to decorate recycled computers with arts and graffiti. There are also descriptions of using computer components to produce sculptures and robots (Fossa 2007; Hemment 2008). In essence, mathetic learning is being invoked by relating it to playful realms that learners already know.

There are also problems related to the mathetic approach. In particular, Pontos refers to the notions of the 'kit', a standardised set of ICT tools which were distributed to local centres by the Ministry of Culture (Barretto et al. 2007; Fossa 2007; MinC 2005 p.11). This allowed local centres to get going, with integrated software, and Portuguese translations; a process that could not be done within the local centres themselves. However, in mathetic learning "knowledge is associated with a sense of

personal power, absent from the use of knowledge that is experienced as coming from the outside, having qualities ... I call dissociated and alienated." (Papert 2000, p.727). The open documentation of Pontos' work indicates that regional technical staff, already poorly resourced, spent much of their time making repairs or configuring systems for local centres (mapsys n.d.). Hence there was little time to ensure more equitable spreads of knowledge, or to develop better methodologies for sharing information.

iv) Summary - The analysis of Pontos de Cultura suggests that the methodologies adopted within the local centres, with respect to software use, demystification and production can bring a new view of computers and computer use to learners. ICTs can additionally provide a flexible and cheap environment in which cultural concepts can be explored. In its 2006 evaluation, whilst highlighting some problems, the predominant opinion was broadly in favour of the approach (MinC 2006).

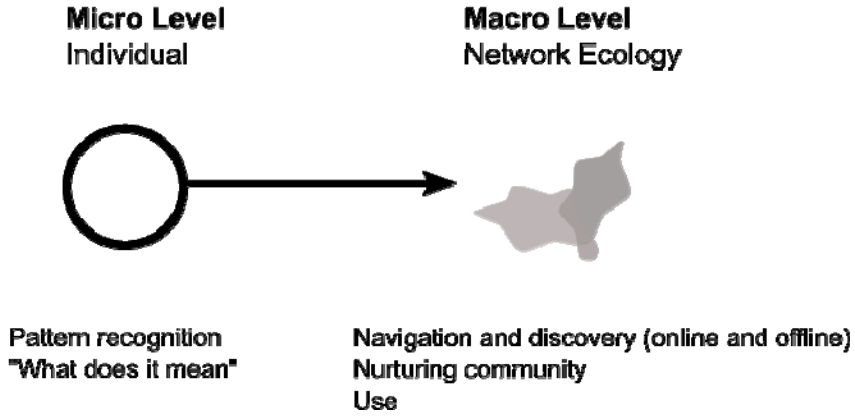
This shows the power of constructionist learning: even though ICTs and approaches have come from 'outside', through methodologies that encourage constructionist learning, they have been accepted and become embedded in local cultural production in many cases.

Using Connectivist Models of Learning to Understand Cultural Content Sharing

In addition to ICT use and appropriation, Pontos de Cultura revolved around network sharing between the local centres. This allowed users to collaborate over the network to make, share and modify content (MinC 2007). We orientate towards a critical view which questions the rhetoric of the network behaviours in Pontos de Cultura in comparison to reality. In our analysis we also critique the connectivist pedagogy. Unlike social constructivist and constructionist directions, we are unable to draw upon a well-established field of pedagogic research to understand this direction.

Siemens' (2005; 2006) view of connectivist learning is on two scales as shown in Figure 12. At the micro level, individuals need to be able to deal with the contrasting sources, and mass of incoming information, and at the macro level there is need to create and negotiate networks in an ever-changing ecology.

Figure 12: Siemens model of connectivist learning.



Adapted from (Siemens 2006, p.125)

We note several potential problems with this pedagogy in such a setting. Often this understanding falls into an individualist dichotomy of individual and their networks (e.g. Downes 2007a) neglecting the effects (both positive and negative) that locality has upon an individual's behaviour. The literature also often leans towards technocentric approaches with an assumption of neutral online networks and tools, and underplays the power of offline network ecologies.

Hence, we temper our understanding of connectivist learning through reference to Bourdieu (1990; 1984) who sees aspects of culture and practices (online and offline) as enforcing power and influencing societal divisions, and norms. Applying this view to connectivist practice, we posit that there are 'invisible' constraints on individuals and groups which can limit the potential of the network to be used to its maximum.

i) Constraints at the Micro-level - Colugnati (2007) provides a network analysis of one year of behaviour on the forums of the *converse* website, the social network for Pontos de Cultura. His analysis suggests that network behaviour is closely related to regional workshops. Following these workshops there is an increase in use of *converse*, but over time interactions start to reduce in size. In the case of Pontos de Cultura, the social connections formed through workshops and the network are, as yet, not enough to sustain a wider community.

Description of local workshops connected to Pontos de Cultura illustrate the work in trying to reveal imposed limits of learners through challenging long-held ideas. One trainer describes how:

> *"Our biggest problem in digital inclusion, is to disrupt a mentality that has continued for decades. It's the mentality of "just use". Anyone, who wants to work within digital inclusion, will struggle with this mentality." [translated] (Couto 2006)*

Getting beyond self-imposed limits is the central point of the local workshops rather than teaching specific skills, and this will be crucial in long-term autonomy of the networks (like *converse*). It confirms the methodologies of workshops and interactions as the key challenge for Pontos de Cultura to foster network use (Fonseca 2008a; Villela et al. 2008). This was a challenge taken up very much by the activist networks (ibid), but lack of resources indicates that it has been somewhat under-supported by the Ministry of Culture itself.

Elsewhere, research on ICT-mediated networks in developing countries suggests that even when network behaviour does become more embedded, it can be closely entwined with offline practices and cultures (Donner 2004; Horst & Miller 2006), and this is alluded to in early studies of the local networked behaviours in Pontos. However, we see that the Ministry of Culture uses the rhetoric of unproblematic 'network society' models espoused by the likes of Castells (2000) and Benkler (2006) when referring to the network sharing. There is a potential disjunction here, between the top-level rhetoric of Pontos de Cultura, and those who are using such networks. It is important that this disjunction is considered and care is taken when making assumptions or transferring models.

ii) Enabling the Macro Ecology - Siemens (2006) outlines elements of the network that can be designed to encourage connectivist network behaviour:

> *"[this] involves the design and fostering of ecologies and networks. The creation of an ecology permits a broad-scale implementation of differing knowledge and learning experiences, [so one can].....achieve knowledge-based needs in a multi-faceted manner" (Siemens 2006, p.132).*

In Pontos de Cultura, *EstudioLivre* (Free Studio) (estudiolivre n.d.) is an online community created for uploading productions to share, using open licensing. This is well maintained, and as of October 2008, there were an estimated 3800 pieces of content uploaded (ibid). According to the literature *Estudiolivre* is intended to be accompanied by *Converse* (Talk), a social space that allows community discussion, but this has been offline for a long period (Balvedi 2005).

The lack of this social community means that the online ecology is rather disjointed. There are a range of active sites, mailing lists and blogs related to Pontos on the internet, very similar to the 'network ecology' described by Siemens; however, without *converse* there is no way to tie these disparate resources together, and this often leaves Pontos seeming rather disjointed. A centralised social site is crucial to allow discovery, encourage community and use of the vibrant network components.

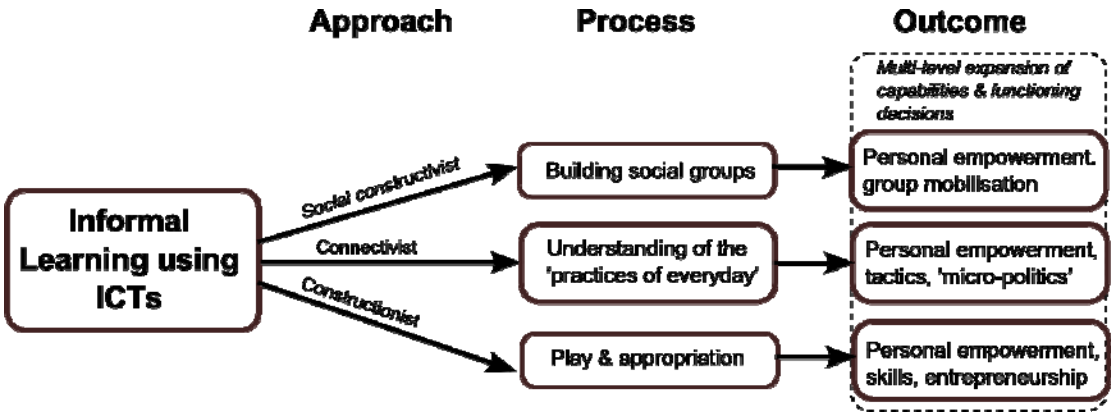
Summary - Connectivist or 'Well Connected' - The 2006 evaluation describes "The installation of Pontos de Cultura and dissemination of its activities are helping to strengthen existing partnerships, to create new relationships and give projects wider visibility" [translated] (MinC 2006, p.113), with 36% of Pontos carrying out joint activities with other Pontos, 15% carrying out joint training (ibid).

There is no doubt that Pontos de Cultura has encouraged joint actions, and network collaboration in patches, but Pontos is still far away from the rhetoric of evolving networks of mass collaboration and practice (MinC 2007). The question for the future is what one does to move from 'well connected' along the path to 'connectivist'.

D. Practitioner Advice on Use of Informal Learning Approaches

As we have shown in the previous section, using informal learning and the 'three directions' model (shown again in Figure 13), it is possible for practitioners to analyse projects in detail.

Figure 13: Three directions model of informal learning



In this section – see Table 1 – we summarise the main findings of these case studies as a guide to practitioners looking to use informal learning approaches.

In terms of development outcomes, we offer no preference to the relative importance the three directions, rather we argue they will each have value dependent on the situation. For example, social constructivist approaches with their coherent group outcomes, might be designed into a project to allow a previously fragmentary community to come together. There may be communities where ICTs have been disowned as worthless or 'for the elite'. In these cases constructionist learning approaches might be more useful, with their outcomes of improved technology ownership.

The case studies show that use of ICT varies within the three directions, as does the representation of leadership. Our analysis has also thrown up a number of key issues related to each of the directions; whilst not exhaustive, the list in Table 1 highlights important aspects that practitioners need to consider for ICT learning.

Table 1: Summary of three directions

	Development Outcomes	**ICT Use**	**Leaders**	**Key Issues**
Social Constructivist	Coherent outcome, group empowerment and increased mobilisations through 'power with' challenging wider societal issues	**ICT use focussing on shared practice between users in the real world. ICT design related to enabling these shared practices and collaboration.** Coherent, collaborative technologies or technology chains, that allow multiple users to engage together in real life practices through ICTs	**Participative Leadership** Balance between a directive approach for coherency and participative approach to consider group wishes. Literature suggests that this is a difficult balance to maintain	● Whose agenda are mobilisations serving? ● Group 'power with' is not a one-shot process but an ongoing process of competing rational actors. Hence sustainability analysis in such projects needs to include discussion of how to maintain this process ● Integration with existing communities of practice allows for improved outcomes, but these are often the less-marginal, already-organised groups ● Closed communities of practice are a key problem ● Approach may be less useful where one is dealing with diverse localities

	Development Outcomes	**ICT Use**	**Leaders**	**Key Issues**
Connectivist	Needs more research. Wider connections outside locality give local actions impetus Suggestions of tactical use of technology but only over time with mature and skilled users.	**ICTs as a platform for online collaboration and shared practices between a wider spread and diversity of people** Technologies and online software which encourage community building through online discovery, production and sharing	**Facilitator as barrier breaker/connector** To break learners' barriers to ICTs and what ICTs can be used for. Building real-life networks and relations, to support online ones	● Learners will often need to have a vision to go beyond their self- or community-imposed limits ● Heterogeneous view means that actions can be unorganised and chaotic, autonomy can easily become incoherent with lack of leadership ● The pedagogic model is not mature enough to provide a complete model of connectivist learning in developing countries as yet
Constructionist	Creative appropriation of ICTs is related to increased local ownership of technology with some sporadic indications of the beginnings of technology entrepreneurship Further research needed on the outcomes that come from wider constructionist learning using cultural forms (as outlined in Pontos de Cultura)	**ICTs as a learning environment for individual exploration. Making abstract concepts accessible to learning though exploration and production** Individual technologies that have been selected to have affordances and to allow appropriation relevant to local context	**Educator as anthropologist** Use ICTs to build culturally appropriate learning environments to allow exploration, play and demystification of more abstract or formal concepts	● Individualised models of constructionist learning need time and resources so that all learners get time to explore individually through bricolage ● Difficult for a leader to take the role of 'educator as anthropologist'

We suggest that projects that look to build hybrids of the three directions might achieve benefits over those that remain in one direction. For example, the Kothmale Community Media Centre project, a participatory community radio station, follows the *social constructivist* direction similar to the Namma Dhwani case study. However, a connected project was designed – the e-tuktuk; a portable 'studio' of digital technologies – which embraced *connectivist* ideas (Tacchi & Grubb 2007). This allows Kothmale to transcend the problems related to highly homogeneous and closed groups (of social constructivism) by supplementing this with the more open and expansive learning (of connectivism).

Thus, within projects that involve ICT learning, practitioners might look to solve issues in their projects by designing in aspects from another learning direction.

E. Conclusions

E.1. Informal Learning and ICT4D2.0

A number of recent works have conceptualised a new generation of approaches in ICT4D. We will see an increasing move away from *pro-poor* projects (projects for the poor) toward *para-poor* (projects working alongside poor) and *per-poor* (projects produced by the poor), where local people are more active in the production and dissemination of content using ICTs (Heeks 2008). In response to the emergence of these types of 'ICT4D2.0' projects, our work shows that there will also need to be a new generation of theoretical approaches that move beyond information systems. We argue that taking a learning approach is crucial to understanding such emergent para-poor and per-poor projects.

As we have shown in the analysis of Pontos de Cultura, within these new 'participatory ICT production' projects, it can be difficult to 'see development' when one solely uses informational models. Information can seem complex, sporadic or trivial. With the increasing needs for development interventions to be seen as 'productive', there is a risk that certain *per-poor* approaches might easily be dismissed as unproductive or 'not development' if one takes only an informational view of impact (see Donner 2009 for a similar discussion centring on mobiles for development).

Hence, informal learning invites practitioners to look again at ICTs in developing countries, particularly unfamiliar work built around *pro-poor* actions, and reconsider their potential as 'developmental' projects. In particular, informal learning questions the constant focus on information and connectivity in ICT4D by illustrating that innovative local use of ICTs with informal learning can still result in significant local development.

E.2. Future Work

We point out a number of future directions for further research:

- **Further primary research on the learning approach**, to provide a greater understanding and examine the informal learning model we have built.
- **Practitioners to frame their projects within models of informal learning to provide further understanding of best practices**. For this study we have come across a number of projects where informal learning is actually the key to a project. Yet this is rarely articulated or understood by practitioners.
- **Research on the tensions and trade offs between learning and informational approaches**. This work has focussed on informal learning, but study of the relative importance between learning and informational approaches is needed, including identification of when informational approaches are more appropriate.

- **Research on the 'seams' between the directions**, balancing the benefits and problems required of working in such spaces.
- **A call for pedagogic experts to involve themselves with informal learning in the** developing countries, with more research on informal learning with a particular focus on developing country settings.

E.3. Final Summary

By understanding a range of ICT4D projects using models of informal learning we have been able to understand more fully a number of case studies and usefully critique them.

We are able to see that different pedagogical approaches in informal learning, lead to varying development outcomes. We have illustrated some guidelines as to the role of leaders and ICTs within informal learning. Hence, we argue that it is possible to 'design' informal learning projects through ICT selection, pedagogic approach and leadership style.

We conclude that an informal learning approach is a useful lens from which one can view ICT4D projects. It has enabled us theoretically to link together a number of disparate cases and provide understanding. The 'three directions' model of informal learning constructed, and the discussion of its practical implications can benefit practitioners. As discussed in the previous section, given the future directions of ICT4D, we hope that informal learning approaches focussing on process will becoming an integral part of understanding and theorising ICT4D.

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