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CV

Software Engineer with 9 years of experience in the area of analysis and development of software in general, Farzana Akther started her academic research as doctoral candidate in Human Centered Communication and Informatics at E-Learning Lab. Center for User driven Innovation, Learning and Design, Department of Communication and Psychology, Aalborg University. She received her Master in Physics from Dhaka University in 1998 and began her career in software development. She has gained extensive knowledge and experience in software development with various technologies such as J2EE/J2ME, .Net and Databases as Oracle and SQL Server. During her doctoral research training, she has gained academic experience from working as a teaching assistant and visiting scholar in the computer Science department at the Asian University for Women (AUW) in Bangladesh.

Her doctoral thesis examines the ICT appropriation in a community development context in rural Bangladesh, where she has brought the collective resource approach (Participatory Design) of Scandinavia in a developing context and develops an integrated design and analysis methodology based on the combination of Learning and knowledge creation theory. Her research interest includes the field of participatory design, computer supported collaborative learning, human-computer interaction, and design and development of ICT based learning tools.

ENGLISH SUMMARY

This thesis investigates information and communication tools (ICTs) as instruments of community development processes in the context of a case study conducted in collaboration with a community empowerment program (CEP) of the non-government organization (NGO) Bangladesh Rural Advancement Committee (BRAC) in Bangladesh. I have taken on the challenge of conceptualizing a learning theory-based model for ICT appropriation at the local, intra-personal level to inform NGOs and regional political strategies

The CEP uses an intermediation approach to address the information needs of marginalized people. Specifically, it helps marginalized people access basic livelihood information and cultivate their skills to avail information from governmental and non-governmental services. The program also seeks to enable dialogue and participation among the different levels of stakeholders involved in community empowerment processes that are geographically distributed across rural areas.

My point of departure for this work in rural Bangladesh is that computer literacy must be locally contextualized in order for digital means to become appropriated. My approach to conducting the fieldwork is inspired by the collective resource approach of the Scandinavian participatory design tradition. The overall goal of the research is to support knowledge creation from 'the bottom of the pyramid', with a specific focus on the capabilities of rural, less privileged communities in the context of ICT practice.

The theoretical basis of my research is Activity Theory, as developed by the Finnish psychologist Engeström on the basis of the Russian development psychologists Vygotsky's and Leontjev's research. This learning approach I have combined with Nonaka and Takeuchi's theory of the dynamics of knowledge creation in organizations.

The primary objective of this research is to understand the conditions of ICT appropriation as a collective knowledge creation process within rural community development projects—and, thus, to provide tools for perceiving and constructing local ICT development. I chose the participants' prevailing obstacles and the ICT-related contradictions and obstacles as springboards for ICT capacity building and for constructing the development of participants' everyday practice. My goal is that the insights I have analysed from my micro-level data can inform decision-makers at the macro level and thus, at best, return as improvements at the micro-level. As a basis for the analysis, I have supplemented with Wertsch's interpretation of Bakhtin's theory of appropriation.

Empirically, I collected my data during interactions with field facilitators and while conducting digital literacy workshop sessions in rural Bangladesh. I employed techniques of reflective mutual learning and 'photo-voice', by means of which I helped participants to articulate their experiences and capabilities. In so doing, I found that the participants' articulations could be integrated into a wider community development process. The mutual learning I staged in the digital literacy workshops made the participants feel more capable by giving them instant ownership of the ICT transformations of their work. Thus, this study identified strategies for making participatory design approaches work in a developing country context.

This thesis argues that ICT appropriation is a process through which participants can transcend the boundaries of the old and move into the new if they work through a mutual negotiation and learning process to acquire new knowledge.

This research also argues that ICT capacity building through a collective resource approach may sustain a knowledge-creation process based on hands-on participation and interaction among individuals, communities, and the sharing of artifacts. This study seeks to inform meso- and macro-level organizations about the importance of the knowledge creation hub that I, through my analysis, have found at the micro level.

Finally this study offers an *ICT appropriation model* by reflecting on the contributions of the thesis. It is my hope that the *ICT appropriation model* will be useful as a thinking tool for future research in the context of ICT for development (ICT4D) by addressing the relations between rural community capacity building and ICT as practices and values.

DANSK RESUME

Denne afhandling er skrevet inden for rammen af forskning i anvendelse af digitale informations- og kommunikationsværktøjer (IKT) som instrumenter for forbedring, ikke blot IKT kundskaber, men af IKT som led i den almindelige kundskabsudvikling om det at være borger i et moderne samfund. Dette forskningsfelt betegner sig som ICT4D, og jeg præsenterer dets resultater i afhandlingen. I mit tilfælde har jeg udnyttet min fordel af at være født og opvokset i Bangladesh og tale sproget til at bringe indsigter frem, som ellers let drukner i vanskeligheder med at oversætte konkrete lokale Bangladesh indsigter til vestlig akademisk diskurs. Staten i Bangladesh og ligeledes mange ikke-statlige organisatironer arbejder på at løfte uddannelsesniveauet og herunder brugen af IKT i hele Bangladesh og man er opmærksom på at der kræves en særlig indsats blandt landbefolkningen. Dette er mit forskningsmæssige udgangspunkt. Der er tale om et single-case studie i kontekst af et såkaldt "empowerment" program, CEP, finansieret af Bangladesh Rural Advancement Committee (BRAC), en ikke-statslig organisation (NGO) i Bangladesh. CEP-programmets tilgang til at løse informationsbehov for marginaliserede borgere, som folk på landet ofte er, handler om at yde hjælp til, at borgerne forstår og kan modtage hjælp fra såvel statslige som ikke-statslige programmer og -ydelser. CEP-programmet forsøger endvidere at skabe dialog og deltagelse mellem de forskellige niveauer af aktører, der er involveret i lokalsamfundets "empowerment" processer, som er præget af stor geografisk og kulturel diversitet.

Det teoretiske grundlag for min forskning er Virksomhedsteorien, som den er udviklet af den finske psykolog Engeström på basis af de russiske udviklingspsykologer Vygotskys og Leontjevs forskning. Denne læringstilgang har jeg kombineret med Nonaka's teori om dynamikker i vidensdeling i organisationer. Min praktiske tilgang har været at tage ud i landsbyer og møde de lokale facilitatorer og de lokale beboere og gennemføre IKT-undervisning "i øjenhøjde," tilpasset de konkrete lokale forhold. Mit mål er at de indsigter jeg har fremanalyseret af mine mikro-niveau data kan informere beslutningstagere på makro-niveau og dermed i bedste fald vende tilbage som forbedringer på mikro-niveau. Som grundlag for analysen har jeg suppleret med Wertsch's videre-tolkning af Bakhtin's teori om appropiering.

Inspireret af den kollektive ressource tilgang i den skandinaviske deltager-orienterede design tradition tog jeg i mit empiriske arbejde udgangspunkt i deltagernes konkrete vanskeligheder både med at få og forstå information og med at få adgang til og forståelse af IKT. Mine data stammer fra min interaktion i disse konkrete sammenhænge, hvor jeg først observerede og interviewede, og dernæst gennemførte en række workshops, designet med udgangspunkt i min forståelse af

de konkrete behov. Overordnet set har min ledetråd været ”gensidig læring”: jeg har lært om de konkrete vanskeligheder, og deltagerne har lært om IKT som led i at lære om deres konkrete informationsmuligheder. Hele vejen har jeg fokuseret på at få deltagerne til at reflektere, noget de ikke er vant til. Her har teknikken ”photo-voice” vist sig som et nyttigt instrument, hvad jeg beskriver detaljeret i afhandlingen. Gennem brugen af ”photo-voice” blev deltagerne opmærksomme på deres egne ressourcer og erfaringer, som gav grobund for italesættelse af problemstillinger, således at disse kunne bringes ind i den bredere udviklingspraksis i Bangladesh. Et nøgleord i denne proces har været ”ejerskab” – at deltagerne oplevede af det var *deres* problemer, *deres* sprog, *deres* konkrete muligheder for at bruge IKT, det handlede om.

Gennem mine dataanalyser er jeg således i stand til at gøre deltager-engagerende strategier relevante for i-brugtagning af IKT i udviklingslande. I forhold til den videnskabelige debat i ICT4D kan jeg med resultaterne af analyserne af mit casestudie argumentere for, at IKT kapacitetsopbygning fremmes gennem en kollektiv ressource tilgang, og at det fører til videnskabelse i bred forstand, hvor deltagerne i højere grad samtidigt bliver selv-ledende.

Denne afhandling argumenterer for, at appropriering af IKT er en proces, som indebærer at deltagerne overskrider grænserne for det velkendte og bevæger sig nye veje, gennem fælles forhandling, således at det er gennem forhandling i fællesskab at de tilegner sig ny viden, overskrider grænserne for det, de kender i forvejen.

Gennem min forskning når jeg frem til at hævde, IKT-relateret videns-skabelse baseret på direkte deltagelse og interaktion mellem enkeltpersoner, den såkaldte kollektive ressource-tilgang, fører til spredning videre ud i samfundet, som det har været mit mål at finde veje til at informere meso- og makro-niveau organisationer om hvorledes betingelserne for kapacitets-opbygning er på mikro-niveau.

Endelig tilbyder dette studie en model for IKT appropriering, som bygger på mine refleksioner over, hvad der udgør afhandlingens bidrag til ICT4D. Det er mit håb, at IKT-approprierings-modellen kan hjælpe aktører til at adressere forholdet mellem udvikling på landet og udvikling i byer hvad angår IKT-relateret praksis og værdier.

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Mette, Sandra and Per Mouritzen for their encouragement and support while I was writing this thesis. I also appreciate all administrative staffs, especially Aase Andersen**,** Hanne Porsborg Clausen who always have been very kind and helpful. I would like to thank to Maria Friis for being with me from the beginning of journey of PhD, she took care of my son when I was alone with my elder son.This thesis would not have been possible without the practical support from all of my dear colleagues in Department of Communication.

During my doctoral research training, I had the opportunity to serve as a visiting lecturer/scholar in the computer science department at Asian University for Women (AUW) for two semesters. During my teaching time, I had the opportunity to deliver knowledge, experience, and mentorship to students from 12 South Asia, Southeast Asia, and Middle East nations. I had opportunities to share my research and teaching knowledge and experiences by surrounding myself with professors from various nations, including the United States, Canada, Australia, Europe, India, and Bangladesh. I am truly grateful to all of these people for providing me such an international and intellectual environment where I could develop my teaching skill. A special thank to Faheem Hussain who helped me academically and practically while I was staying in AUW.

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I dedicate this thesis to
my beloved sons Ayman and Ayan
for their patience and unconditional love.
I love you dearly.

Acronyms

CBO	Community-based Organizations
CEP	Community Empowerment Program
DLW	Digital Literacy Workshop
FF	Field Facilitator
HCI	Human Computer Interaction
ICT	Information and Communication Technology
IS	Information System
LGR	Local Government Representative
NGO	Non-Governmental Organization
PD	Participatory Design
RI	Rural Institution
SICTC	Shared Information and Communication Technology (ICT) Centers
SICTCE	Shared ICT Center Entrepreneur
UISC	Union based Information and Service Center

Glossary

Field Facilitator	Field level facilitator of CEP at sub-district level or at district level
Polli Shomaj	Ward level federation of Less-privileged women
Rural Institution	Less-privileged women federation, namely the PS (Polli Shomaj) and US (Union Shomaj)
Union	Lowest administrative unit of the government
Union Shomaj	Union level federation of Less-privileged women
Ward	Lowest electoral unit of the local government

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CHAPTER 1. POSITIONING THE RESEARCH CASE EMPIRICALLY AND THEORETICALLY

My research journey as a PhD student has taken me from my original field of work in computer science into the terrain of human informatics, and from the academic world of Bangladesh to that of a Scandinavian university. My aim throughout this journey has been to seek ways in which people in rural Bangladesh can benefit from the use of ICTs. Soon after beginning my PhD study at Aalborg University in Denmark, I was introduced to activity theory, a theory I describe more fully in Chapter 3, since it ultimately became the theoretical foundation for my research. In this thesis, I deal with ICT only with respect to its role in mediating people's conscious, goal-directed action. Whether people's dealings with ICT also result in their making ICT or digital information and communication tools part of their own action is my specific focus. This is the underlying question throughout my research: *Why is there a relationship between ICT appropriation and rural community development, in particularly developing country context like Bangladesh?*

The research environment that I encountered at the eLearningLab of Aalborg University has played an important role in both formulating my aim clearly with regard to others and myself and in making me focus on learning. At first, given that the business world is part of my professional background, I focused on 'knowledge creation' the way I had read about it in Nonaka and Takeuchi's (1995) numerous articles and books. However, when I read Engeström's (1987) discussion of the differences between Nonaka and Takeuchi's (1995) take on knowledge creation and his concept of 'expansive learning' (Engeström, 1987, 2001), I found that the expansive learning approach was a better fit for the reality I know from rural Bangladesh. However, in my analysis, I have kept in mind Nonaka and Takeuchi's (1995) focus on the role of middle management, and I also find their concept of the knowledge creation context or space 'Ba' (Nonaka & Konno, 1998) useful in developing an understanding of my case. I will come back to these issues in later chapters. Today, globally, human activities are rapidly changing, causing accelerated paradigm shifts. Digital technologies pervade networking and collaboration beyond cultural and organizational frontiers. Rural communities are less privileged than urban areas, due primarily to simple, practical issues of wide distances and scattered and poor infrastructure. We see a strong global tendency for the young and most able to migrate towards urban areas. This drift results in a need for community development for people still living in rural areas. Going to one of these areas and meeting with field facilitators (FFs) of Community Empowerment Program (CEP) of Bangladesh Rural Advancement Committee (BRAC), or so-

called 'field workers,' encouraged me to make these people the anchor of my research. Their performance presents to me a case of 'Middle Management,' representative of the characteristics of Ba (a claim I will justify later), and I find that their form of management and the situations I will characterize as Ba form the contours of a paradigm for rural communities, with ICT as a means to the end of development.

The People's Republic of Bangladesh, founded in 1971, is a low-income developing country with a GDP growth rate of 6.4% (2014) and the world's eighth largest population (ADB, 2015). Given its moderate GDP growth rate, the country is still known worldwide as a country of poverty and illiteracy. The economy of Bangladesh is based on agriculture, and 67% of the population lives in rural areas (World Bank, 2015). According to the United Nations (UN) 2014 report on human development and vulnerability, communities and regions are vulnerable to conflict and civil unrest when conditions are characterized by low social cohesion, unresponsive institutions, and poor governance (UNDP, 2014). Bangladesh has such traits; however, the conditions are being addressed in many ways and at many levels by both governmental and non-government organization (NGO) initiatives. Bangladesh has a very extensive network of NGOs and community-based organizations (CBOs) working towards bettering the living conditions of the country's less privileged people. NGOs/CBOs are generally involved in and envisioned as an approach to non-formal learning/informal learning and community development (Gutterman et al., 2009; Islam 2009; Latchem & Walker, 2001). Such initiatives have been implemented since the birth of this country.

Only 11.7% of Bangladesh's national budget (FY: 2014-15) is allocated to the education sector (CPD 2014). Many supporting initiatives also come from foreign aid, which makes it important to look for ways to build educational aspects into these initiatives. This thesis springs from one such initiative, a community empowerment program (CEP) undertaken by the non-government organization Bangladesh Rural Advancement Committee (BRAC). According to the BRAC, the mission of the CEP is to contribute to achieving the socio-political empowerment of the rural poor in Bangladesh, particularly women, by enabling them to improve their wellbeing, exercise their rights, take advantage of new opportunities, and play a more active role in public life (BRAC, 2009; BRAC CEP, 2014).

It is recognized that learning needs to exist in several 'moods,' including formal, informal, and non-formal, to empower marginalized rural groups (Gutterman et al., 2009). Lack of information and access to information about inoculation campaigns, changes in the regulation of social services/benefits, formal requirements for enrolment in human skill development activities, etc. are urgent and acute obstacles to improving living conditions and counteracting vulnerability in rural Bangladesh. Lack of information and access to information have become problems for people who are otherwise disadvantaged (Access to Information, 2009; Ashraf et al.,

2009). It is not a lack of information in general that is the issue, at least not for the less privileged; rather, it is a lack of information that is vital to people's livelihoods and everyday lives in different domains, such as education, agriculture, health, etc. Recently, the notion of poverty has been redefined to describe and social deprivation, but also a lack of information and/or access to governmental or non-governmental information (Heeks, 2003; Sein et al., 2008; United Nations, 2004; UNDP Bangladesh, 2011; WSIS, 2003). The primary instrument of the CEP to achieve improvement is to cater to the information needs of less privileged people in matters of basic livelihood information, which stems from governmental and non-governmental organizations. This strategy of the BRAC has a double purpose: to fill an information gap and cultivate rural people's skills in availing information from governmental and non-governmental services, and to help such people learn to take advantage of existing initiatives as intended. BRAC initiatives are also meant to spark a broad community empowerment process by improving the dialogue and participation of different levels of stakeholders who are geographically distributed in rural areas.

Internet and digital communication tools are, of course, unavoidable aspects of developmental policy discussions at the strategic level when improvement efforts are planned. The BRAC's strategy has hitherto been to avoid leaning significantly on ICTs as instruments for improvement, for many good reasons, including limited access. With two-thirds of the Bangladesh population living in rural areas, access is both a threat (if not addressed) and a springboard (if supply solutions are provided) to prosperity. Both good and bad experiences gained in Bangladesh carry important lessons for policies in developing countries worldwide. This means that the insights from my research, which I present in this thesis, have the potential to inform both the research field of ICT4D (Heeks, 2006, 2009; Hilbert, 2012; Walsham, 2013) and the practical formulation of rural community empowerment policies.

UNICEF (United Nations Children's Fund) reports an adult literacy rate of 57.7 percent in Bangladesh in the period between 2008 and 2012 (UNICEF, 2013). However, despite severe poverty and literacy issues, Bangladesh is progressing in developing its ICT and Internet technologies. The ICT sector is currently the fastest growing sector in Bangladesh. The infrastructural development in the sector of telecommunication in the last five years has helped deliver Internet throughout the country—and, as a result, most of the country is covered by Internet networks (Hussain, 2011). Although high-speed broadband Internet is not available in rural areas, the use of mobile Internet is particularly popular, even in such spaces.

In 2014, Bangladesh had around 17 million Internet users, equivalent to 11% of the total population (primarily using mobile Internet), and around 121 million active mobile subscriber (PEW Research, 2015). The number of mobile phones reflects the status of the economy, literacy, and the availability of electricity and Internet access in the country in general. In rural areas, however, a vicious circle of

illiteracy, unemployment, poverty, and a lack of access to information characterizes the living conditions, which is what motivated the BRAC's CEP program (BRAC, 2009; BRAC CEP, 2014),

Among other actions taken, in 2008, the government declared a national ICT policy, with the aim of creating a 'Digital Bangladesh' (Access to Information, 2009). The Bangladesh government prioritizes the policy of pursuing ICT4D, which is focused on such issues as access, improved delivery of government services to citizens, and citizen empowerment through access to information.

The Bangladesh government has formulated the so-called 'Vision 2021'[1] and one aspect of Vision 2021 is 'Digital Bangladesh' as part of its response to the country's situation (Planning Commission, 2012). The strategy focuses on the following issues:

i) Access to and better delivery of government services to citizens

ii) Citizen empowerment through access to information

iii) Infrastructure, education, and skills development

This strategic concept is based on the assumption that the success of the 'Digital Bangladesh' lies in mainstreaming the marginalized population towards current development goals, with ICT as an enabling tool. This vision of the government is the driving force behind the establishment of 4,501 union-based information and service centers (UISCs) in every 'Union Parishad' (the last tier of the administrative unit) to serve its rural citizens. By bringing these ICT-enhanced services to the doorsteps of poor and marginalized people, UISCs will play a vital role in increasing the transparency and accountability of the local government and in trying to ensure access to livelihood information through ICTs (UNDP Bangladesh, 2011). As such, the Bangladesh government prioritizes the policy of pursuing ICT4D, which is focused on such issues as access to and the better delivery of government services to citizens and citizen empowerment through access to information.

Hence, initially, when I began my research, I perceived that it must be possible to kill three birds with one stone: deliver information about concrete campaigns to the target populations in rural Bangladesh while simultaneously improving people's general information understanding in relation to governance and ICT skills *and* using ICT as an instrument for both. However, as always happens when entering the field, ideas conceived at a desk become less clear when confronted with

[1] 'Vision 2021' adopted by the government of Bangladesh in 2008 as a political manifesto to improve the quality of life and quality of governance, and achieve mid-income country status by the year 2021, on the golden jubilee of the nation. One aspect of Vision 2021 is Digital Bangladesh, a pledge to use modern technology to impact every aspect of public and private life by 2021 (Access to Information, 2009).

practice: It was discovered that the BRAC's CEP's favorite instruments, the field facilitators (FFs), had quite limited ICT skills. They were not able to take on the role I had imagined for them, as enablers of both information and computer literacy in the process of helping rural people getting to understand governmental and non-governmental human skill development initiatives. Before I could set up workshops with local community members, I had to work with the FFs on developing their ICT skills, and since the project resources available to me were scarce, my empirical data collection for this research ultimately had to be modified to the scope of explorative digital literacy workshop (DLW) series, supplied in an ethnographic fieldwork through participatory observations and interviews. Still, it is my hope that my research can inform both research in ICT4D and the practical, strategic initiatives taking shape in Bangladesh.

Thus, coming to this field has led me somewhat away from my initial research question, which reflected the theoretical and empirical motivations behind my study, and which I had formulated rather broadly as: *Why is there a relationship between ICT appropriation and rural community development, in particularly developing country context like Bangladesh?* I had to limit myself to asking, within this overall research question, how my analysis of data from the ethnographic field observations and explorative perticipatory design participatory desing DLWs I conducted could inform community empowerment processes among different levels of stakeholders who were geographically distributed in rural areas.

My analysis and on-going reflection have made me realize that, instead of seeing ICT as an instrument for the immediate improvement of the knowledge level among the rural population, I must, instead, see it as one instrument among several others, the web of which will improve living conditions when, and only when, ICT is appropriated in the sense formulated by Wertsch (1998) with regard to ownership in both words and tools. I have come to realize that capacity building is a process through which information from the government and knowledge about ICT are amalgamated, thanks to the FFs. In this process, it is crucial that the FFs become confident in using ICT as one of their own instruments. This is the brief story of my thesis work as a research journey. In my case, I have moved from thinking of ICT as an 'innocent' instrument for development—a rather clear means to a rather clear end—to thinking of ICT as a factor that disturbs a cultural balance. The outcome of such a disturbance cannot be controlled in the way that one can control a computer program. The outcomes will be different in too many ways, depending on the actor, the time, and the place.

This is an insight that raises the question: Is it impossible to plan to use ICT as an enabler of improvement in human living, since no one can predict actual outcomes? This, I have learned, has been a question within the professional field of human computer interaction (HCI) in Scandinavia since the famous computer scientist Kristen Nygaard, co-inventor of SIMULA67, the first running object-oriented

programming language, took the initiative to try to empower blue collar workers with computer literacy in the 1970s (Nygaard, 1980), and since Lucy Suchman published her work on users' usage of a Xerox machine, addressing the relationship between planning and situated action (Suchman, 1987). The answer to this question, with which I have become familiar with during my work as a PhD student at the eLearningLab at Aalborg University, and which fits my own research experience, is that all a change agent can do is focus on the direction and value of the actual process being conducted. We can in no way be sure that the goal we set out to fulfill is the goal we want to achieve further down the road. In this way, my work is inspired by the Scandinavian participatory design tradition (Bjerknes, Ehn, & Kyng, 1987; Greenbaum & Kyng, 1991a; Schuler & Namioka, 1993), and I have attempted to bring its collective resource approach to bear on my study in a developing country context. Allow me now, in this introduction, to zoom in on the case study from which I collected my empirical data and drew my empirical analysis.

THE SCOPE OF STUDY: THE INTERPLAY OF FFS PRACTICE, COMMUNITY SHARED ICT CENTER ACTIVITIES AND THE COMMUNITY EMPOWERMENT PROGRAM (CEP)

Forty years after the liberation of Bangladesh, the country continues to face rural community development challenges. To meet these challenges, CBOs are working in parallel with the government. The government seeks to give priority to activities that support the implementation of ICT in rural areas in order to make ICT-based governmental and non-governmental information services work nationwide. These initiatives, when carried out, inevitably break with previous practices of informing, and a transformation of this magnitude cannot be considered to be the plain and simple transmission of a governmental information service to rural areas via ICT. People in rural areas are not empty bowls to be filled by way of intervention. Such transformation comprises changes in traditional practices and values, routed in ancient cultural habituation. Those introducing these changes must identify and seek to understand existing practices of knowledge acquisition, as well as the tensions that will inevitably arise when traditional patterns are challenged by new methods, new technologies, and new forms of knowledge creation practices. This is the scope of my research. Whereas others have explored economic changes, which may have equally profound implications, these are kept in the background in my study. Through my focus on learning and knowledge creation, I have found that a number of studies indicate that the development of rural communities depends on local people's heavy involvement in some form of appropriation (Chapman & Slaymaker, 2002; Puri et al., 2005; Puri & Sahay, 2007). I use the term 'appropriation' here in the meaning defined by Wertsch (1998): that is, as a gradual integration that moves from anticipation to initial familiarity, to the development of repertoires of routines, to the development of new forms of use. Many researchers have looked for models for ICT implementation in rural areas that people can

manage without changing their existing [non-ICT mediated] practices of dealing with governmental and non-governmental information (Dada, 2006; Heeks, 2010; Heeks & Bailur, 2007; Sein, Ahmad, & Harindranath, 2008). There is, however, no 'one size fits all' solution: People's learning needs, interests, and potentials are diverse and heterogeneous. Despite some evidence that the appropriate application of ICT, coupled with suitable strategies, may stimulate development (Heeks, 2002a, 2006, 2008), it is a huge challenge to shape the possible affordances of ICT tools to the diverse and, in many cases, also underprivileged groups of a rural community. A report from the ESCAP (Economic and Social Commission for Asia and the Pacific) outlines the characteristics necessarily to reach the action lines and goals of the UN World Summit regarding the information society, describing a number of challenges in reaching these goals, including (United Nations ESCAP, 2010):

i) Economic issues. There is insufficient investment aimed at expanding ICT to rural areas.

ii) Technological issues. Governments need to undertake suitable measures to foster regional cooperation for the adoption of new technologies, particularly for rural connectivity.

iii) Social and cultural challenges in implementing ICT. The availability of ICT services in the local language must be ensured for all demographic levels of society.

These issues are also relevant to the development of ICT in rural community capacity building processes. In this study, I have zoomed in on the FFs, who are the human intermediaries in community capacity building programs.

I see this capacity building in much the same way as the United Nations (UN), as follows:

> *Capacity is defined as 'the ability of people, organizations and society as a whole to manage their affairs successfully' and capacity development is understood as 'the process whereby people, organizations and society as a whole unleash, strengthen, create, adapt and maintain capacity over time.* (United Nations, 2009)

Furthermore, this UN document states that capacity is interdependent across three levels: individual, organizational and enabling environment (United Nations, 2009). I find this to be true for the development of rural communities, as well. Through working with and studying the community FFs' engagement, skills, and knowledge of community development practices, I came to see them as key factors in the successful implementation of ICT support programs. FFs worked in rural areas prior to the ICT initiatives; however, before the initiatives, they did not use

computers extensively for their activities. I came to investigate their work in relation to communities' shared ICT centers (SICTCs) and their interplay with shared tools in order to understand how the affordances of ICT could be utilized in ways that facilitate appropriation among the diverse groups in rural communities.

THE RELEVANCE OF MY STUDY

As I grew to understand the interplay of FFs' practices, I began to see community SICTC activities and the CEP is relevant, as I see it, both at the local person-to-person level, in relation to theorganizations planning new programs and to the governmental initiatives. If only I could make my study known and convincing, it may open the eyes of decision makers at all levels to the importance of the human factor in ICT implementation—and, more specifically, to the importance of human capacity building factors in ICT implementation. On a smaller scale, it may give the FFs' practice a profile, so that they can become more aware of the importance of their work, as well as of the potential of ICT, which may help them formulate more precise plans for improvement.

Academically, in the field of ICT4D, it is my hope that my study can convincingly illustrate that analyses of current practice are relevant to the planning of future ICT implementations and that the tensions in the relationships between field facilitator practices, SICTC activities, and the CEP are relevant units of analysis for this purpose. To achieve my analysis, I have developed a model for mutual learning among FFs and local SICTCs. The model is supplied by a plan for accommodating FFs' actual needs and providing tools for dealing with change processes in local community in relation to governmental and non-governmental bodies. The data from my ethnographic study are organized and analyzed to explain how and why expansive learning is important.

Research on social transformation through technology argues for the significance of contradictions in technology innovation (i.e., as compared to overlooking the aggravation of contradictions between exchange value and use value) (Engeström & Sannino, 2010). Change to any component of an activity requires a learning or knowledge creation effort, in which the subject/community of activity begins to find new solutions and seek new practices by understanding the existing work processes in which knowledge grows (Engeström, 1987, 2001). In an organizational setting, Nonaka and Takeuchi (1995) also explained the knowledge creation metaphor for more concrete product development purposes. The knowledge creation metaphor is not an independent stressful intervention in the way that experimental toolkits, which produce knowledge for the new way of work; rather, this process of the transformation of change is always a unique local and historical process (Engeström, 1987). The transformation or change process in an expansive learning cycle initiates a renewal of the existing activity system by solving the existing tensions or contradictions and developing new knowledge and new

contradictions. On the same grounds, Nonaka and Takeuchi (1995) emphasize that knowledge and capability are considered to be the most important resources for sustainable organizational change development today.

I arrive at the explanation by means of three concepts, which I borrow from Engeström's (1987) cultural-historical theory of learning as expansion: the concept of 'tension-as-contradiction,' the concept of 'intermediary actions and tools,' and the concept of 'setting' of Nonaka and Takeuchi (1995). Taken together, these concepts form my micro-theory of how new knowledge may be created through the practical actions of problem solving: The overall goal organizes the actions that take place in an intermediation setting and motivates funding, legitimacy, etc. Together, these three concepts help me to articulate an explanatory and analytical instrument to study the FFs' intermediation, the ICT introduction process, and the tensions inherent in this process. The concepts also facilitate an examination of the relationships among different aspects of knowledge creation and ICT, specifically: *What would drive knowledge creation in relation to ICT, what would constrain knowledge creation in relation to ICT, and how would knowledge creation in relation to ICT unfold in terms of human action and tool?* I find the answers to these questions in my empirical data by means of the theoretical lens, which I describe in Chapter 3.

ICT knowledge is produced through the events and activities of the actors who are unfolding the initiatives *in situ*. What I have observed is not a straight goal-activity-outcome way of working, but a way-faring one (Ingold, 2011)—to use a term coined by the Scottish anthropologist Tim Ingold—which involves many digresses and failed attempts, etc. However, when I apply the concepts of tension-as-contradiction and intermediary tools and actions in my analysis, it is possible to show that these digresses and failed attempts, which are not understandable as being goal-directed in themselves, together serve as vehicles for expansive knowledge creation, while ICT is appropriated in community development practices by FFs and people in the villages.

The concept of 'appropriation' is the key concept in my explanatory model, offering hypotheses for how and why new technologies, languages, and habits come to shape practice. New knowledge is knowledge not only about how to use ICT at the operational level, but also about how to appropriate ICT in an expansive edition of everyday practice. The point of departure is that personal knowledge—in this case, of ICT—is developed first through a collective act of communication, then through individual digestion and contestation, then through the process of giving knowledge back to some community in the form of explicit rules and narrations of experience. For a deeper understanding of the initial collective act of communication, I rely, as already mentioned, on Wertsch's (1998) definition of 'appropriation.' Given my understanding of how appropriation unfolds, I present Engeström's (1987) theory of expansive learning, which helps me position the

concept of appropriation in a socio-cultural organizational context. Finally, in order to adopt the insights gained from my 'on the ground' study to the macro level (i.e., the organizational level of the context of the rural community development of Bangladesh), I find a parallel between what Nonaka and Takeuchi (1995) see as the crucial rule in the knowledge creation of companies' middle management and the role I see the FFs fulfilling in my study. This theoretically combined 'germ cell model' helped me to conduct an analysis of ICT change. The 'germ cell model' is "means constructing an explicit, simplified model of the new idea, a germ cell that explains the problematic situation and offers a perspective for resolving and transforming it" (Engeström, Nummijoki & Sannino, 2012, p.3).

I have developed the concept of "tension-as-contradiction" in my analysis of the challenges related to the different kinds of tasks and work situations, where the FFs feel stress and lack the means or lack ICT competence to complete their work properly. I apply this concept when I analyze how the FFs deal with difficulties in their daily work, as well as what role the community-based organizations play in overcoming these difficulties and how—in the course of this overcoming—new knowledge emerges among FFs and their community groups.

I apply the concept of 'intermediary tools and actions' to organize and analyze my data, denoting the actions of the community-based organizations that enable flows of information and knowledge within networks of people. Intermediary tools may include meetings, workshops, popular theater, and training materials. These may not necessarily be employed in a direct or rational manner; however, they may still serve their intended purposes. Facilitating such flows contributes to the sharing of experiences and knowledge and the creation of communities of practice[2] through the addressing of similar issues in different contexts, such as in different governmental and non-governmental bodies acting in rural community contexts. Thus, this key concept concerns the conceptualization of the intermediary actions and tools around the FFs' work, as well as around the participatory design DLWs. Importantly, this study points out that such a locally and historically disadvantaged background not only creates challenges for ICT introduction efforts, but also develops potentialities (e.g., the network of knowledge brokering around shared ICT resources).

[2] The concept of the Community of Practice (CoP) was first presented in 1991 (Lave & Wenger, 1991). Etienne Wenger (1998) later developed the concept further as part of his social learning theory and used the concept to describe and analyse what connects a group of people through collaborative activity within specific domains of practice. This social learning theory seems a very useful way to understand what goes on in rural areas where FFs share experiences and knowledge within an area of joint interest and practice; however, this research will not address this particular theoretical view.

This term 'setting,' at the concrete level, represents the characteristics of any situation: the place, the time, the people, what they do, and how they do it. I apply the concept of 'setting' in order to analyze the dominant environment in which intermediation practice exists. The analysis of the concept of 'setting' is my key to understanding the course that appropriation processes take on the ground. Thus, this study presents the situation in which ICT appropriation takes place as a learning situation and grasps the situation of ICT appropriation through Engeström's (1987) terms 'tension' and 'intermediary action and tools' and Nonaka and Takeuche's (1995) knowledge creation term 'setting.'

My hypothesis is that 'tension' is the social dynamo in the flow of actions including the involvement of tools, while the *knowledge creation setting* (Nonaka & Takeuchi, 1995) concerns the intermediary work as a knowledge creation hub to encourage the growth of ICT knowledge among different levels of stakeholders in capacity building practices. Hence, intermediary actions and the involvement of tools both mediate and are mediated by tensions and knowledge creation settings. These dynamic relationships are identified and exemplified in this research work.

In sum, it is my hope that this research work can serve as a useful theoretical and analytical tool in future studies of ICT implementation in developing country contexts.

RESEARCH APPROACH AND STRUCTURE OF THE THEISIS

Research questions are usually divided into primary questions and secondary questions (Creswell, 2009). The primary question frames the research and is necessarily broad, while the secondary questions guide the selection of explanatory theory and frame the focus of the data collection and analysis. I have already presented my broad overall research question:

"Why is there a relationship between ICT appropriation and rural community development, in particularly developing country context like Bangladesh?

The secondary questions derived from this overall question are

- What learning process enables ICT knowledge expansion in community development processes? How does such expansion happen?
- How does participants' ICT capacity building contribute to the building of new theories related to ICT appropriation?

Here, the politics of ICT appropriation and a deeper understanding of ICT knowledge creation are my research motives. Now, I will present the reasons I decided to conduct my data collection as a sequence of workshops, where I would help FFs to appropriate digital technologies. To me, it makes sense to categorize

empirical studies within the research field of ICT4D by the levels of policy that they aim to inform. In Chapter 2, I introduce ICT4D research. The most common studies are 'macro studies,' which are studies that aim to inform strategy formulation at the governmental level. I have, however, also included 'micro studies,' which are studies that aim to inform ways to ensure development at a person-to-person level, as in pedagogy. Studies at the 'meso level' are few within the field of ICT4D. It is my ambition to position this study as orthogonal to the micro-meso-macro level categorization. I start with micro studies of how the work of FFs is unfolding, and then allows the micro-level analysis to inform the formulation of FFs' potential roles as middle managers of knowledge creation in villages. I then move up to the meso level, ultimately building on this analysis to formulate macro-level strategies for rural development practices. My point of departure, hence, is data collection at the micro level. My method of accomplishing this was inspired by the techniques I have seen in my studies in Scandinavia in the field of participatory design (Greenbaum & Kyng, 1991a; Gregory, 2003: Schuler & Namioka, 1993; Simonsen & Robertson, 2012). Participatory design methods help to gain insights as well as help to explore the goals and artifacts and tools for engaging in the field. Technology design development is closely related to the emerging design field of design anthropology (Barnard, 2000; Ingold, 2001). From the design anthropology perspective, this artifact or tool is not simply a mechanical coupling. It needs attentive and serious engagement on the part of the practitioner (Ingold, 2001). Tim Ingold argues the importance of skill in order to foster participants' engagement with the materials or process: 'The nature of skill consists not in acquired mental representations or cognitive model but in developmentally embodied capacity of attention and response' (Ingold, 2001, p. 30).

User participation is recognized as the process of acquiring more knowledge about work and improving understandings of the quality of applications and services. Participation in ICT design takes place from a variety of political perspectives (Ehn, 1993; Greenbaum & Kyng, 1991a). For ICT design to prioritize and take its point of departure from practitioners' and stakeholders' experiences and reflective interaction, it is necessary for those with on-the-ground-knowledge to contribute to the development process by formulating and communicating knowledge and negotiating their positions regarding ICT applicability and ICT-enabled services (Suchman, 1998).

From the participatory design perspective, it is also important to understand the research participants' work cultures, which means that the researcher must spend time understanding the local culture and practices (Blomberg et al., 1993). In particular, ethnographically oriented methods (Blomberg et al., 1993; Hammersley & Atkinson, 2007), observations, and interviews have been used to develop an understanding of the richness of everyday work practices in the initial phase of work.

STRUCTURE OF THE THESIS

In Chapter 2, I review the ICT4D literature to position my research and findings in the context of ICT4D and community development paradigms. The chapter draws a picture of the landscape in which my research and insights should be situated.

In Chapter 3, I explain how I have combined Nonaka and Takeuchi's (1995) model of knowledge creation with Engeström' (1987) theory of expansive learning, how I have merged these concepts, and how I have applied them to my data in order to answer the question of how to identify direction and value in an intervention like the perticipatory design DLWs I planned and carried out. I created a conceptual framework as an explanatory apparatus in order to answer my research questions.

In Chapter 4, I present my research approach: The principles behind how I, inspired by the Scandinavian approach to systems development, the so-called 'collective resource approach,' (Ehn & Kyng, 1987). have designed an explorative workshop with an ethnographic approach to gain context information inspired by the PhD course 'Design Anthropology,' which I took with Tim Ingold and which presented topics quite new to me then. This chapter also describes the context of the data, which I analyze.

In Chapter 5, I describe the FFs' work situation, doing my best to do so from their point of view. In this chapter, I also present the tensions as contradictions that I have found in my data at the micro level of everyday intermediary action by applying the analytical model I developed from Engeström's (1987) theory on expansive learning (presented in Chapters 3 and 4). This enables me to describe my findings of the mechanisms through which tensions as contradictions becomes facilitation of learning.

In Chapter 6, I move one step forward in abstraction and analyze the FFs' process of expansive learning and the conceptual framework of the DLWs. This chapter shows how mutual learning is forced by contradictions and how attempts to overcome these contradictions become springboards for the further facilitation of learning. In this chapter, I answer the question of how to improve the FFs' digital competences by showing how they move *from* rejecting the appropriation of ICT (because the adoption of a new technology is too difficult in their pressed situation, given their lack of equipment, time, space, and confidence) *to* a state in which they begin to see ICT as a potential source of help. I show that this movement is caused by the DLWs' activities, through which they—despite all objections and obstacles—begin to see the shared ICT center entrepreneurs (SICTEs) as their more capable peers. This is a role they also begin to see for themselves with regard to ICT, and they envision how they can become mediators of expansive learning.

In Chapter 7, I move up yet another step in abstraction. Still building on Engeström's (1987) theory of expansive learning, I investigate DLW-related mutual learning in its developmental organizational context. I borrow Nonaka and Konno's (1998) knowledge creation concept of 'Ba' and Nonaka and Tacheuchi's (1995) concept of 'middle-up-down management' to explain the relationships between individuals and their social and physical environments. The purpose of this analysis is to be able, in my concluding chapter eight, to inform the field of participatory design in the context of ICT4D. Through this chapter, I seek to inform meso- and macro-level organizations about the importance of the knowledge creation hub that I, through my analysis, have found at the micro level.

In Chapter 8, I reflect on the potential impact on the macro level in a discussion of the depth and breadth of my conclusion, as seen from an academic validity point of view. This chapter reflects on the contributions of the thesis and offers a thinking tool regarding research work in the context of ICT4D. Here, I look back on my research journey and reflect upon what I have achieved. Finally, I summarize the insights my study contributes to the research field of ICT4D, to the field of PD, and to role of ICT in the strategic planning of empowering the rural people of Bangladesh, from a capacity-building point of view.

CHAPTER 2. TRENDS IN ICT4D

Information and communication technology for development (ICT4D) is a diverse field encompassing different domains, as illustrated in Figure 2.1 (Hilbert, 2012).

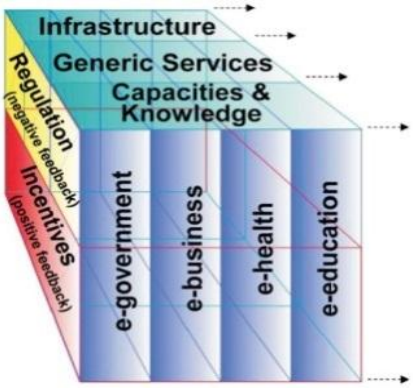


Figure 2-1 The ICT4D cube:an interplay between technology, society and policy (adopted from Hilbert, 2012)

To contextualize my research contributions to the field of ICT4D, I review the field from the macro level (political and strategic planning for the deployment of ICT) to the micro level (the community and ICT beneficiaries), moving from general to more specific issues related to this research context. The key inspiration is the desire to investigate the possible contributions of ICT to rural community capacity building and the appropriation of ICT in development and to establish the possible empirical relevance of this theoretical work to the enormous ICT challenges in the development of rural Bangladesh.

ICT IN DEVELOPMENT

ICT IN SUSTAINABLE DEVELOPMENT FROM THE MACRO PERSPECTIVE

ICT is considered a catalyst for development and a tool that allows faster information exchange and transmission, reducing the costs of information and communication processing. The United Nations (UN), International Telecommunication Union (ITU), and World Bank all stress ICT interventions as a means to develop Third World countries (United Nations, 2004; World Bank, 2003; WSIS, 2003, 2014). Academics and development agencies define poverty not only by economic and social deprivation indicators but also by the lack of information

and access to information (Heeks, 2003; Sein et al., 2008; UNDP Bangladesh, 2011). ICT is regarded to have extremely high potential to enable sustainable development in developing countries, especially for social and economic development (Bailur, 2006; Duncombe & Heeks, 2002). This challenge is the primary focus of the research field of ICT4D (Heeks, 2002a, 2002b, 2010).

ICT4D Discourse: Access to Information

The idea for the Access to Information (A2I) is based on the notion of access to information technology, as suggested by many development researchers (Access to Information, 2009; World Bank, 2003; WSIS, 2003, 2014; UNDP Bangladesh, 2011). Discussions about the relations among information, knowledge, and the economy have given rise to terms and concepts such as the information economy, information capitalism, knowledge economy, and socio-economy. Shared by all these ideas is an interest in opportunities to generate information and knowledge (e.g., Castells, 1998). Researchers also argue that the inclusion of people, societies, and nations in the new economy depends on their ability to connect with information processes and compete in local and global contexts (Beck, Madon, & Sahay, 2004). Access to information is one type of community development initiatives. ICT tools are widely known to have the capabilities to facilitate access to information, whereas the lack of these opportunities leads to exclusion, as illustrated by Heeks (2002a). In a recent article, Heeks (2009) points out the need for a different approach to ICT in rural areas of developing countries. He poses the question, "Why invest in digital technologies rather than, say, a tube well to allow access to water?" He responds that "we need to invest in both," arguing that development requires water and information and that ICT can improve the planning and management of tube well projects (Heeks, 2009, p.2).

ICT4D Discourse: Telecenters as Major Catalysts for Information Access and Rural Development in Developing Regions

To support developing countries' active participation in the information society, donor agencies initially attempted to close the digital divide by facilitating the development of telecommunications infrastructure and affordable Internet access through the creation of telecenters (public access points), where these facilities were unavailable or sparsely distributed. The idea of shared computer technology facilities emerged in the 1980s, particularly with the introduction of the telecottage in Scandinavia (Crellin, 1994). The initial aim of telecottages was to introduce rural people to the new tools of the emerging information society and to fight against the marginalization of remote areas. At the beginning of the evolution of the Internet in the 1990s, this new type of public access points spread, such as telehouses in Hungary supported by the U.S. Agency for International Development (USAID). The purpose of these initiatives was to spur social and economic development

through the provision of shared computers and Internet access to local communities. These initiatives enabled the vital movement of telecommunication facilities and continued to spread to the southern hemisphere. Different types of shared and community-based ICT facilities include telecenters organized by a government body or non-government organization (NGO) and cyber café, commercial Internet access points (Colle, 2000; Colle, 2004; Roman & Colle, 2003) . Telecenters exist in different forms and are called by a variety of names, such as community multimedia centers, cyber-centers, youth community multimedia centers, and community technology centers (Gurstein, 2003; Gomez, Ambikar, & Coward, 2009). Despite the different models and names, telecenters share a common definition: "a physical space that provides public space and public access to ICT for educational, personal, social and economic development" (Gomez, Hunt, & Lamoureaux, 1999, p. 17).

The majority of people in developing countries, especially in Asia, live in rural areas; therefore, providing ICT-enabled learning in rural areas is a huge challenge. Most rural residents in developing countries are unlikely to ever own a personal computer or a handheld device. International aid agencies, NGOs, and governments have already undertaken initiatives to promote community-based technology facilities such as telecenters for rural development. Telecenters are considered as major catalysts for the exchange of information and knowledge that can stimulate development opportunities and services in rural areas. Under certain conditions, telecenters can help rural livelihoods through sustainable strategies (United Nations, 2004). They also bring the benefits of new communication technologies to rural people who do not have access to technology at their home, workplace, or educational institution. These centers could play a role in encouraging younger generations to stay in rural areas and, furthermore, act as learning centers, thereby helping generate rural development (Gurstein, 2003). ICT4D activities across the developing world are based on three assumptions: i) the development potential of ICT; ii) the role of ICT in rural development and poverty alleviation; and iii) shared ICT facilities' capability to achieve universal ICT access throughout the world (World Bank, 2006).

SUSTAINABILITY OF ICT4D PROJECTS AS A SUBTLE ISSUE

The digital divide is considered a major issue in the penetration of the information society into rural areas of developing regions. It is claimed that the divide is increasing between those who can benefit from access to information technology and those who are deprived of both access and the ability to benefit due to cultural biases in the applications and contents of technology, gaps in education, personal handicaps, poor digital infrastructure, or the lack of appropriate computer equipment (James, 2004, 2005; Warschauer, 2002, 2003). To support the goal of socio-economic development, donor agencies have launched many efforts to close the digital divide by increasing the accessibility and affordability of the Internet in

the developing world through telecommunications services and public access points, such as telecenters.

The literature presents both optimistic and pessimistic views of the potential of ICT4D projects (Avgerou, 2010; Heeks, 2005; Heeks, 2008; James, 2005; Kumar & Best, 2006; Harris et al., 2003). Optimistically, ICT is considered a catalyst of development and a tool allowing the faster exchange and transmission of information, which reduces the costs of information and communication processing. Pessimistic views question the viability and sustainability of ICT4D projects. Researchers have identified deep-seated issues, such as poverty, illiteracy, and a lack of ICT skills and ICT investment, in developing countries (Heeks, 2003, 2008; Kumar & Best, 2006; Mukerji, 2008; Sein et al., 2008). Regarding ICT in public education, e-government, and social development, major problems with the long-term viability and sustainability of ICT infrastructures have been found (Heeks, 2002b; Heeks, 2008). The direct transfer of First World technology has been unsuccessful because of the mismatch between the intended environment for which the technology was designed and the reality on the ground where the technology was deployed (Rothenberg-Aalami & Pal, 2005). The sustainability of donor-funded ICT projects in developing countries has been a major concern as most projects are terminated when funding runs out. Donor agencies, consequently, want to identify the causes of the non-sustainability of ICT4D projects in developing countries (Rothenberg-Aalami & Pal, 2005).

Based on the experience of projects in various countries, researchers have identified some challenges to ICT-enhanced, rural, community-development initiatives.

i) Development goals in specific contexts should be studied in conjunction with a profound investigation of the historical processes of development and governance that have advanched over time in that context (Madon, 2009; Walsham, 2013).

ii) The policies of government and funding organizations affect the lifespan of community ICT innitiatives (Avgerou, 2010; Akther, 2012; Heeks, 2005; Heeks, 2010).

iii) Local innovators are needed to ensure local community participation (Rogers, 1995).

iv) Interconnection with different information domain organizations is needed (Heeks, 2005).

v) Context-neutral application is needed for ICT4D projects: Sein et al. (2008) give a good example of this problem: “One of the health tips on GPCIC (GrameenPhone Community Information Center) sites tells

people to have parsley every day, which is good for health. To the overwhelming majority of the people in Bangladesh, parsley is an unknown word. This is an example of context-neutral application of ICT, i.e., the absence of an ensemble view" (p. 21).

Micro-level ICT4D Discourse: The ICT Appropriation for Rural Community Perspective

The reality of using ICT as a driver of development in rural areas in developing countries is quite challenging, and sometimes, it is difficult to understand the relation between rural community development and community technology development (James, 2005; Heeks, 2008, 2011; Sein et al., 2008). Some researchers emphasize the importance of a deep understanding of the conditions of rural development: "While it is important to understand the complexity of the rural development context, and that ICT is no 'magic bullet', it is equally important to appreciate the flexibility of some of these technologies to accommodate the specific demands of developing countries. This is only be done by combining an in-depth understanding of rural development issues with improved understanding of the capabilities of ICT" (Chapman & Slaymaker, 2002, p. 3). Heeks (2008), a British professor of development informatics who has done substantial research on ICT implementation in developing regions, reflects on the same tensions: The "use of information and communication technologies for international development is moving to its next phase. This will require new technologies, new approaches to innovation, new intellectual integration, and, above all, a new view of the world's poor" (p. 17). Although it is obvious that ICT plays a strong role in international development, little research has investigated how technology needs in poor communities differ from those in well-developed or industrialized countries (Brewer et al., 2005). It is also argued that the literature on ICT for international development has paid little attention to the participants from poor communities, posing an "empirical vacuum" (Keniston, 2002, p.1) in ICT4D impact research areas (Keniston, 2002; Huerta & Sandoval-Almazan, 2007).

Recent literature on ICT4D emphasizes the need to focus on the relationship between ICT and development and to identify ways in which ICT opens possibilities for enhancing the development process (Avgerou, 2010). This knowledge is relevant not only for development and aid work but also for ICT4D research in general. However, as pointed out by Sahay and Avgerou (2002), a problem remains regarding the ways in which researchers can draw theories or frameworks from other disciplines into the field of ICT4D and still take into account local contexts and issues. Focusing on the social appropriation of ICTs for e-governance in rural communities of India, Madon argues that the linkage between e-governance and development needs to be redefined. E-governance is considered a

developmental tool that aids good governance. Madon (2009) finds that many projects are not classified as e-governance projects but are considered e-service or e-administration projects, even though they share the same objective of development as e-governance projects do. Madon (2009) argues that the success of any ICT intervention in rural areas requires understanding of the formal intervention, its informal environments, and the negotiating parties who act as an interface between the formal ICT rules and the informal community. "Local administrative, political and social 'intermediaries' provide an interface between the formal and informal governance structure to bring about development benefits for communities" (Madon, 2009, p. 53).

Micro-level ICT4D Discourse: Resource Typology and Capability Approach for Socially Inclusive ICT

In general, populations in rural areas through the developing world face significant socioeconomic challenges. Within the past two decades, many governments have formulated responses to these challenges and tried to emphasize sustainability in community development. The issue of sustainability has been a focus of development research for quite some time.

Information and knowledge are considered key resources for rural community development. An information- and knowledge-based society depends on the constant transfer of and interactions with information. ICT-enhanced communication can significantly support rural development process by enabling the flow of information and knowledge between the rural communities and more developed regions of a developing country (Heeks 2010; Heeks & Bhatnagar, 1999). However, in developing countries, it has been quite difficult to understand the connection with the development of rural communities. Thus, researchers have adopted a new view of development approaches considering the conditions of developing country (Heeks, 2008; Heeks, 2005; Gigler, 2004). Heeks, in his work, gives much more focus to information instead of information-driven technologies (Heeks, 2005). He considers the technology to be a dead box if it does not support information processes. From the social resources perspective, Gigler (2004; 2011) outlined the important principle that technological factors, such as infrastructures, computer ownership, and access to technology, cannot solve the major challenges of ICT development in developing country. He considers the major challenge, rather, to be transforming data from the Internet or telecommunications into meaningful information and the availability of social resources to implement the information in the practices of communities. ICT motivation depends on information cultures and traditions, and social exclusion from ICT development is not only related to socio-economic inequalities but also to institutional arrangements and differences in traditional social norms (Trauth & Quesenberry, 2006).

Heeks' (2002a, 2005) information chain model provides a method for successful ICT implementation in developing countries. He stresses that technology must be understood in its context of economic, social, and action resources which can help transform the resources into information for achieving actual outcomes from ICT4D initiatives at the community level (Heeks, 2005). Heeks' (2005) information chain model (Fig. 2-2) illustrates how raw data needs to be *accessed*, *assessed*, and *applied* by users before *actions* can take place.

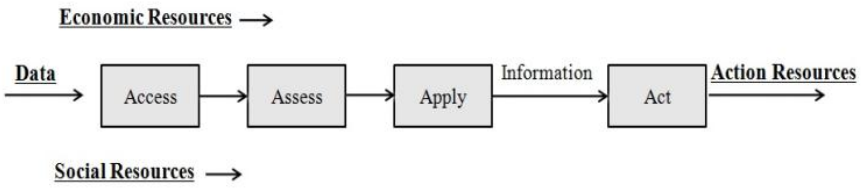


Figure 2-2 Information chain model (Heeks, 2005).

Additionally, the development process is dependent on what Heeks (2005) describes as four sets of *resources*: i) Data resources: There have to be relevant data available; ii) Economic resources: Economic, technological, and skills-related resources are needed to access data; iii) Social resources: Motivation to learn, confidence, and knowledge to access, assess, and apply the data are required; and iv) Actions resources: There have to be resources with which to act on decisions made based on the available data and information. The information chain identifies important factors in ICT-enabled development and knowledge creation to describe the integration work that an information seeker needs to do to turn information into usable knowledge.

Novel laureate Amartya Sen's (1989) capability approach provides a framework, with strong connections with Heeks' (2002a, 2005) resources sets, for the creation of access to ICT-enhanced information in rural contexts. Sen's (1989) capability approach can derive potential findings in relation to social inclusion (Zheng & Walsham, 2008) and can evaluate the developmental impact of specific ICT projects and applications. The link of Sen's capability approach to ICT has been synthesized, focusing on its non-economic variables in different work (Robeyns, 2005; Gigler, 2004, 2011), and the literature argue that the capability approach has the potential to deliver findings from the micro level on the non-economic variables of ICT development. According to Sen's (1989) capability approach method, development should be conceptualized in terms of i) people's capabilities to function; ii) effective opportunities to undertake action; iii) the activities in which they want to engage; and iv) the opportunity to be whom the people want to be. Clearly, this approach motivates researchers to focus on the issues of development and sustainability, which are dominant concerns in the current ICT4D discourses

(Avgerou, 2010; Heeks, 2008). Although operationalizing the capability approach and reaching any conclusive decision about the process of assessing an individual's capabilities or freedom are not trivial tasks, many researchers have called for more investigation to determine the relationship between ICT and the meaning of development.

Micro-level ICT4D Discourse: ICT Appropriation—Design and Reality Gaps at the Ground Level

ICT, while spreading to all areas of society globally, locally, and personally, frequently changes contexts of use, user goals, and appropriation of technology. ICT is pervasive and life changing, which inevitably leads to the critical questions of for whom the designers design and how and why. Many developing countries are dealing with common ICT4D issues, such as cost of ICT materials and tools, the lack of appropriate ICT products, operating skills, relevant content and a robust project monitoring framework for developing countries (Sein et al., 2008). The benefits of ICT have not been fully realized because many developing countries have inadequate infrastructure and human capacity to support ICT. Many reports on the failure of information technology development in developing countries have focused on the technology, design, local capacity and design approach in developing countries (Heeks & Bhatnagar, 1999; Heeks, 2002b). Regarding ICT in public education and government, there are major problems with the long-term viability and sustainability of ICT structures due to a complex set of interrelated factors (Heeks, 2002b; Heeks, 2010). Heeks describes failure of Information System (IS)/ Informaiton and Communication Technology (ICT) development in the context of developing countries as the result of a "design-actuality gap." (Heeks, 2002b, p.7) developed his design-actuality gap model based on an assessment of the match or mismatch between local actuality (where we are now) and system design (where the design wants to get us). The design-actuality gap model uses different components of ICT development to evaluate ICT or information system design in the developing country context: information, technology, processes, objectives and values, staffing and skills, management systems and structures, and other resources (e.g., time and money. Based on his analysis, Heeks (2002b) seems convinced that design and development need to be grounded in the context of use and that the capability for local improvisation in IS development can play a key role in closing this "design–reality gap" (Heeks, 2002b, p.7). The literature shows that the design-actuality framework has been used mostly to understand the success and failure of information systems in developing countries (Kumar & Best, 2008; Dada, 2006). In recent research on local improvisation, Heeks (2002b) gives a detailed analysis of why these gap-reducing activities are hard to achieve in developing countries. He points out that participative approaches and end-user involvement might support creative improvisation of information technologies throughout the life cycle of information technology implementation in developing countries. Heeks (2002b)

further suggests that *hybrid* understandings of various factors, such as technology, design, local capacity, and local improvisation approaches, can connect the contexts and assumptions held by designers and users, which is directly linked to reducing the design–reality gap. Among these four factors, local capacity and improvisation, as supporting approaches and techniques, seek to bridge the contextual gap between design and use (Heeks, 2002b). Technology and design factors must allow room for local improvisation, and local capacity is needed to implement these technologies in developing countries. Heeks (2002b, 2003) identifies three high risk archetypes that affect IS/ICT projects in developing countries: hard–soft gaps, private–public gaps, and country context gaps. The model explains the ways in which these design-reality gaps can be reduced through local improvisations in developing countries. The model, therefore, aims to provide guidance on general ways to increase the success rates of ICT projects in developing countries.

The model is summarized as follows:

• Hard–soft gaps: differences between the actual technology (hard) and the reality of the social context (e.g., people, culture, politics) in which the system operates (soft)

• Private–public gaps: differences between the private and public sectors so that a system that works in one sector often does not work in the other because of the gap between the system designed for the private sector and the reality of the public sector into which the system is transferred

• Country context gaps: differences when using e-government systems in developed and developing countries, which emerge when a system designed for one country is used in the reality of a developing country

METHODOLOGICAL UNDERPINNINGS OF ICT4D PERSPECTIVES

The purpose in this section is to review the landscape of current research on participatory design in developing countries, including both findings and research processes. This section focuses on perspectives on change, research methods, and directions for further application of participatory design in developing countries.

Over and over we see that ICT while is pervading all areas of society globally as well as locally and personally. ICT is a pervasive and life changing, which inevitably leads to critical questions as to whom are designers designing for, how and why? The participatory design approach was born in Scandinavian countries in the late 1970s and 1980s as one of several answers to these questions, emphasizing the collective resource approach (Ehn & Kyng, 1987; Kraft & Bansler, 1994) and opposing top-down blueprint approaches. During the last three decades,

participatory design research has achieved growing attention as a collaborative, democratized approach to research which addresses diverse trajectories of social contexts by addressing questions of democracy, power, and workplace democracy (Ehn, 1993). In particular, this field places strong emphasis on actively engagement of users in system design and the consideration of the real-life context by employing fieldwork and ethnographic methods (Bødker & Pedersen, 1991; Ehn & Kyng, 1987). Participatory design gives designers better way to gaining understanding of users' practices and to focus on the particular relations between technologies and human activities. The ethnographic methods help develop such understanding (Blomberg et al., 1993). Suchman (1998) describes the values of Scandinavian participatory design in computer science and systems development: "Designing computer artifacts is an inherently value-based activity, deeply implicated in longstanding political struggles of the wider society in which computer science is embedded" (p. 46).

Participatory design and the Scandinavian collective resource approach for designing ICT tools are not prominent in the ICT4D research, particularly regarding ICT development in developing countries. A few scholars have attempted to use participatory design methods for development in developing countries (Byrne & Sahay, 2007; Elovaara, Igira, & Mörtberg, 2006; Puri el at., 2004; Simonsen & Robertson, 2012; Winschiers-Theophilus et al., 2010a; Winschiers-Theophilus et al., 2010b). Before detailing the participatory design approach in the developing country context, it is necessary to review how the participatory approaches work as boundary objects in the arena of international developmental activities.

Participatory development approaches are not limited to the collective resource approach of Scandinavia design. Different forms of participation, such as rapid rural appraisal (RRA), participatory rural appraisal (PRA) (Chambers, 1994), participatory action and learning (PAL), and participatory poverty assessment (PPA), hold methodological legitimacy in international development and have become templates for participatory development (Green, 2010). Participatory development approaches play an emerging role in overcoming the shortcomings of the top-down development approach and can be considered a vehicle for bringing sustainable, empowerment and relevant development (Cooke & Kothari, 2001).

Participatory approaches in international development programs have largely been shaped as a set of acknowledged tools and techniques associated with participatory learning and action, most applied by development organizations such as NGOs and community-based organizations (Green, 2010).

APPLICATION OF PARTICIPATORY DESIGN IN DEVELOPING COUNTRIES

Human Capacity Building Takes a Logical Place in ICT4D Discourse

Research on participatory design in a developing country context has identified some challenges in application (Puri & Sahay, 2007).

i. Participation of non-users who are affected by ICT intervention
ii. Involvement of different levels of vertically distributed practitioners within organizations
iii. Capacity development of those who are users or are influenced by ICT interventions to take part in participatory approaches

Puri et al. (2004) present strong empirical justification for increasing the valuation of the contextual nature of participatory design by comparing three case studies of designing health information systems in South Africa, Mozambique and India. They found that "there is no single algorithmic best practice regarding participatory design in information systems which is applicable to all situations" (Puri et al., 2004, p.42)—likely true for any deployment of digital technologies. Puri et al. (2004) also observed that, in all three case studies, a viable, context-dependent implementation strategy, such as capacity development, is the first choice when actors seek to address these three challenges. It was also emphasized that, while designers' and users' socio-economic and knowledge systems differ drastically, mutual learning is a pre-requisite for ingenuous participatory actions. The user communities need to acquire sufficient technological knowledge in order to contribute to the design, while designers and researchers understand the domain and contextual perspectives. More precisely, more appropriate communication and participation methods and techniques need to be applied. In these case studies, Puri et al. (2004) illustrate that understanding the importance of culturally and technologically appropriateness and the nature of the particular context is necessary throughout the process of designing information technologies or systems.

Braa et al. (2012) elaborate on the practical challenges and potentials of doing participatory design in the developing countries from a global development perspective. Enabling the development of local capacity to master new technologies is considered a challenge of participatory design in developing countries. Braa et al. (2012) also suggest that practical learning thorough hands-on participation can overcome users', researchers', and system designers' differences in understanding and knowledge and that participatory design might provide both the means and the ends to do so.

Braa et al. (2007) claim that developing IS/ICT for public organizations in developing countries is a thankless task requiring navigating a mystifying complex

tangle of local and national requirements amid the scarcity of ICT deployments. Braa et al. (2007) identify challenges in their practical research: i) poor infrastructure; ii) stifling bureaucratic inertia; and iii) a scarcity of resources or ICT capacity.

Emphasizing Community/Collective Rather Than Individual

Walker et al. (2008) emphasize the **community**, over the individual users, along with methods of diversification in a developing country context. There are very few examples of participatory design work in a community setting in developing countries outside the organizational work setting (Puri et al., 2004; Byrne, 2005; Braa et al., 2004). Given divergent interests, communities need to adopt a ***multi-level and multi-sector*** approach for identifying the role of players who affect the community development process. In a case study, Byrne and Sahay (2007) describe the necessity of multi-sector (e.g., health, education, welfare, local government) and multilevel (e.g., household, community, district) approaches to address the different levels of interdependencies in implementing and introducing information technologies.

In the participatory design of developing country contexts, tensions emerge in constructing the sense of self: individuality vs. community, technological skills vs. local situational knowledge (Winschiers-Theophilus et al., 2010a). Participatory design researchers, therefore, revise methods and concepts to make them appropriate for specific needs and contexts of development while attempting to create a common meaning of ICT4D. Winschiers-Theophilus et al. (2010a), for example, recognize that community meetings are a preferred method because they are close to natural communication and can engage villagers in a discussion based on their own knowledge systems. A number of implicit and explicit design ideas were developed from community meeting as they were observed. In an extensive review of different notions of community-based participatory design practices, Carl DiSalvo et al. (2012) explore two areas of participatory design:

i. Participation with and by community-based organizations
ii. Participatory design for community communications

The Role of Mediating Agencies/Intermediary

What might be more special to developing country contexts might be the point of need of a broker or facilitator (Puri et al., 2004). Puri et al. (2004) point out that the role of mediation is critical in creating an environment for learning by doing. The mediation role of academics and researchers can serve to bridge institutional bureaucracy and rural communities. The Mozambican case (Puri et al., 2004) points out to the role of mediating agencies such as NGOs in fostering participatory processes. Madon and Sahay (2002) claim that NGOs can function as effective

change agents by translating the interests and work style of the local government departments and realigning them with the need for more transparent, decentralized development and government services.

BRIDGING ICT4D AND DEVELOPMENT DISCOURSES: TOWARD SOCIALLY INCLUSIVE ICT INTRODUCTION

This section reviews the literature relevant to rural community development discourses and the socially inclusive ICT context.

INTERMEDIARY ACTIONS FOR SOCIALLY INCLUSIVE ICT

In developing countries, access to information and ICT by itself is not sufficient to ensure community development or individual capacity building because users often do not have the necessary skills and competence in using ICT to process available information. Heeks (2002a, 2005) describes *social*, *economic*, and *action* resources for information processing which users can use to transform information or data into applicable knowledge.

Community-based organizations and NGOs play a vital role in increasing peoples' capacity for creating a better livelihood through information mediation practices. NGO workers frequently are involved in the community development process as mediators who negotiate between government or non-government service providers and rural peoples and help residents access, assess, and apply information. Beck et al. (2004) describe different ways in which mediation has been used in literature:

i. Development contexts
ii. Public–private partnerships for service provision
iii. Advocacy work for civil rights
iv. Local appropriation of capital

The mediators themselves are identified as government agencies, NGOs, and international agencies. Beck et al. (2004) discuss mediators' role in the dynamics of marginalization in ICT-focused contexts. Mediators work against marginalization, defined as a complex state which should not to be seen as an end result or a static state but as a situated state or continuously unfolding process (Beck et al., 2004).

The model in Figure 2-3 illustrates the unfolding of marginality as a movement between the anchored and outcast and the mediator's support as a possible aid to maintain a sense of anchoring. Mediators or intermediates continuously attempt to change the impact of marginalization.

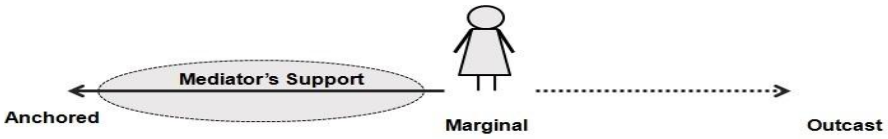


Figure 2-3 Mediation and processes of marginalization (adopted from Beck et al., 2004, p. 283).

Marginality depends on the actions of multiple parties: i) those who are marginalized; ii) those who willingly or unwillingly erect or strengthen the boundaries surrounding the dominant culture; and iii) those who seek to open those boundaries and facilitate transitions. Many commentators believe in taking a bottom-up approach to achieving sustainable rural community development (Mannion, 1996; Simpson et al., 2003). Mannion (1996) describes the advantages of a bottom-up approach: bottom-up locally based approaches permit policies to be more socially inclusive and help ensure the social stability and cohesion.

KNOWLEDGE SHARING AND KNOWLEDGE CREATION FACTORS IN ICT APPROPRIATION

The focus of developmental research has shifted away from the earlier discourse on the *information society* to that of the *knowledge society* (Castells, 1998). This change has affected how researchers and policymakers think about social and economic development. For years, the development sector has recognized knowledge sharing as a pillar of sustainable development (Bellanet, 2000). However, knowledge is linked to people's experiences, values, beliefs, and cultural practices, so it is not easily shared through access to information alone (Van der Velden, 2002). Van der Velden (2002) also argues that ICT can support the documentation and creation of knowledge, which goes beyond access to information: "Alternative approaches are required, that focus on the knower and on the context for creating and sharing knowledge. ICT tools need to support this approach, helping people develop appropriate or alternative scenarios and improving the accessibility of information and knowledge for people with different cultural, social, or educational backgrounds" (Van der Velden, 2002, p. 25).

In sum, although access to information can be provided fairly easily through the Internet, that alone is insufficient for knowledge creation to take place. Reviewing the literature on knowledge sharing and synthesizing the most prominent contributions, Huysman (2004, p. 198) identifies three conditions for knowledge sharing: i) structural opportunity; ii) cognitive ability; and iii) relationship-based motivation to share. Therefore, we need to analyze the existing social networks and corresponding ties (structural analysis); shared language, frames of meaning, and stories (cognitive analysis); and levels of trust and reciprocity (relational analysis).

Political and sociological researchers coined the term social capital, initially to criticize economic theories and thought which did not consider the social and human aspects of economic transactions (Huysman & Wulf, 2004). Coleman (1988) describes social capital as a specific type of resource available in individuals and embedded in interpersonal relations. Many researchers have found the benefit of ICT for creating and maintaining the social capital which enables individuals or organizations to gain access to information and economic means (Adam & Urquhart, 2009). Within ICT-related research, such as computer-supported cooperative work, the World Summit on the Information Society (WSIS) initiatives (WSIS, 2003), and ICT4D research, the concept of social capital has gained increasing interest among researchers concerned with knowledge sharing, community building, and learning communities (Huysman & Wulf, 2004).

With respect to knowledge sharing, the introduction of the concept of social capital precipitated a radical shift from considering individual human resources to social capital and from focusing on the exchange of knowledge between individuals to the motivation to share knowledge. In relation to the use of information technology, Quan-Haase and Wellman (2004) have found that the Internet influences civic engagement by adding to already-existing levels of social capital. Walsham (2010;2013) argued that many ICT for development initiatives have taken place in south asia over the last decade, "but the beneficiaries are almost never the poorest or most disadvantaged groups" (Walsham, 2013, p.49) For the less privileged, providing information access through access to information technology and the Internet alone is insufficient. Thus, the issue of how information technology might support and promote active knowledge sharing is an important question.

PARTICIPATION AS A BOUNDARY OBJECT IN INTERNATIONAL DEVELOPMENT

In participatory perspectives, the process of creating boundary objects is pertinent to the literature on participatory development and participatory approaches in rural development and, more broadly, in innovation and social learning (Blake & Garzon, 2012; Green, 2010). Specifically, participatory forms can act as boundary objects (Green, 2010) through which different interests and perspectives can engage in common activities (Star & Griesemer, 1989, p. 392; Wenger, 1998). In development perspectives, participatory approaches function as boundary objects between multiple actors: between international donors and national development communities, between global civil society and its local forms, and between national governments and local communities (Green, 2010).

Rural community developmental work involves multiple complexities, of which Mollinga (2010) identifies three types: ontological, societal, and analytical. Blake and Garzon (2012) have redefined these three types of development complexities for the field of ICT4D.

Ontological: Whenever ICT is conceived and implemented in the service of development goals, it involves multiple human, technical, and physical elements with diverse interrelationships in the social, economic, political, infrastructural, and ecological dimensions which evolve in non-linear, unpredictable ways.

Societal: Multiple actors and groups are involved in the contexts in which decisions about ICT and development are made. These actors often see development problems and goals differently and bring conflicting interests in ICT and development into the decision-making process.

Analytical: Data about the elements and their interrelationships are incomplete, and the mechanisms of interaction are often unknown. In addition, discipline-based approaches to dealing with problems often further fragments understanding.

To bridge theory and practice, Blake and Garzon (2012) also define some evolving boundary concepts, such as *participation*, *digital divide*, and *poverty*. Chambers (2010) describes the relationship between these ontological, social, and analytical complexities in participatory methodologies, especially considering efforts to alleviate poverty alleviation:

> Participatory Methodologies (PMs) are well suited to understanding and expressing the local, complex, diverse, dynamic, and uncontrollable and unpredictable (*lcdduu*) realities experienced by many poor people. These contrast with the controlled conditions and universalities sought in much high status professionalism. Pragmatically and practically, four domains have increasingly converged and cohere: PMs; poor people's *lcdduu* realities; technology; and complexity. (Chambers, 2010, p. 3)

He also mentions that concepts from the complexity sciences are especially useful because of their understanding of two domains of development.

i. The realities of marginalized and vulnerable peoples
ii. The misfit methodologies for complex conditions and processes (Chambers, 2010 p. 34).

Participation in ICT or IS development is viewed as a social process which brings together people to understand different perspectives and share decision making with the purpose of designing culturally and locally specific sustainable systems. In the western experience, democratized workplaces, high literacy rates, and rational infrastructures are commonplace. However, researchers have cautioned that it as unrealistic to assume that all these infrastructures are available in developing country contexts (Blake & Garzon, 2012; Madon & Reinhard, 2009; Walsham, 2013).

Walsham (2013) argues in his recent research that ICTD is essentially an interdisciplinary space: "One way to bring together the ICT and D parts of our field is to engage in interdisciplinary work. Many disciplines have something to offer the ICTD field, including anthropology, sociology, development studies, computer science, information systems, and geography." (Walsham, 2013, p.50).

Considering the complexities in international development process, Mollinga (2010) offers a boundary work framework which proposes three types of work to deal with the complexities of interdisciplinary or transdisciplinary (interdisciplinary research with interest groups or stakeholders) research for development.

i. The development of suitable *boundary concepts* that permit thinking, that is conceptual communication

ii. The configuration of *boundary objects* as devices and methods that allow acting in situations of incomplete knowledge, nonlinearity, and divergent interests

iii. The shaping of favorable *boundary settings* in which these concepts, devices, and methods can be fruitfully developed and effectively put to work

CONCLUSION

Based on this review of the ICT4D literature, guidelines and principles for successful ICT initiatives and understanding ICT appropriation in rural community development practices can be formulated.

Heeks (2010) suggests that successful ICT4D applications or deployment must address three key domains: i) sufficiently alignment of design with local realities; ii) open governance which involves multiple stakeholders; and iii) economic and socio-political sustainability.

Mallalieu and Rocke (2007) argue that ICT4D work should follow two main principles: i) ICT interventions should be driven by national or provincial developmental objectives; and ii) these developmental objectives should be achieved through the parallel engagement of many sectors.

In recent work from the ICT4D perspective, Karanasios and Allen (2013) argue that the design and implementation of ICT interventions should be shaped by and aligned with the cultural-historical context. Karanasios and Allen (2013) contribute to the field of ICT4D an empirical case of an ICT intervention in a complex, rural setting in Ukraine and demonstrate a theoretical foundation for understanding

ICT4D interventions. They argue that activity theory provides a theoretical basis for understanding the emergence of activities and conceptualizing the impact of ICT4D projects (Karanasios & Allen, (2013).

In recent work on e-governance, Madon (2009) argues that it is important to understand the role of local and social intermediaries, such as local administrators, local governments, and NGOs, who are acting as interfaces between the formal ICT interventions and the informal rural governance community in order to realize development benefits for communities. Puri et al. (2004) and Madon and Sahay (2002) call for understanding that NGOs function as effective agents of change which can bridge development and ICT with less-privileged, rural communities.

Theoretical contributions to the field of ICT4D remain weak and face challenges:

i. A lack of articulation of theory and research approaches for addressing the interrelationship of ICT within the cognitive and socio-political context (Avgerou, 2010). In an influential work, Avgerou (2010) sets out two key challenges of the ICT4D research domain: The first is related to the issue of the socio-political and cognitive context of development ICT4D "studies need to develop theory capable of addressing the interrelationship of ICT innovation with its cognitive and socio-political context. Theory is needed to identify what is relevant context for each case of ICT innovation, and how it matters" (Avgerou, 2010, p. 14). The second theoretical challenge is the socio-economic context of ICT4D, or the need to 'strengthen the field's capacity to associate ICT innovation with socio-economic development" (Avgerou, 2010, p. 14). In the same vein Heeks (2010) argues that 'need to strengthen the ICT4D field's capacity to produce socio-economic development in order to create more persuasive arguments for the role of ICT in development (Heeks, 2010)

ii. A lack of articulated fundamental research problems and research methods (Best, 2010)

iii. Dominance by macro-analysis and quantitative studies in ICT4D research, with few micro-level and qualitative research contributions (Karanasios & Allen, 2013). Avgerou (2010) argues that qualitative researchers have ample opportunities for insightful ICTD research.

It has been recognized that ICT appropriation in rural community development practices goes beyond the simple technological and human factors and extends to the social and political factors. Consequently, it is assumed that this literature review draws a picture of the landscape in which my research and insights are situated. Keeping in mind the present challenges and guidelines in the ICT4D field, this literature review helps locate my research contribution in the field of ICT4D.

CHAPTER 3. THE THEORETICAL FOUNDATION FOR THIS STUDY

As mentioned in Chapter 1, my research was first led by the search for knowledge creation methods, as described in Nonaka and Takeuchi's (1995) work. However, after encountering Engeström's (1987) expansive learning approach, I found that it better fit the reality I know in rural Bangladesh, both for interpreting my field data and explaining my interpretations. However, in my analysis, I have kept in mind Nonaka and Takeuch's (1995) focus on the role of middle management, and I have found their concept of Ba helpful in understanding, interpreting, and explaining my field data.

In my PhD studies, the theoretical journey has been the hardest to undergo. In coming from a pure science background to the humanities and trying to understand how bottom-up interpretation can meet top-down theoretical deduction, I have had many opportunities to talk with colleagues and ask—I am sure—often very naïve questions. Now, in wrapping up my thesis work and moving to the analytical output (presented in chapters 5, 6, and 7), I feel inclined to account for my theoretical position in how to understand and explain the appropriation of new technology in the work of field facilitators (FFs) and in the everyday life of less privileged people in the rural villages of Bangladesh.

In empirical work, there are so many stories to tell from so many issues and angles that it is necessary to make hard choices and to find where the research questions require digging deeper. I have sought germ cell (I have defined this Chapter 1 how I have this term), something, that if I understand it well, then I can explain much of what I see in my data: Could this germ cell explanation be the sociological role of FFs seen as change agents? Or could it be access to ICT? Initially, I looked for solutions and fixes, that might solve the problem and make it easy on the ground to identify poor, low-educated people in communities with unstable power supply and low literacy rates have difficulty benefitting from initiatives launched by governments and NGOs in far-away cities, where the situation is the opposite: there are computers, power supply, literacy, and education in abundance. Gradually, seeing that, in the field, every situation was unique in many respects, I realized that improving life was at first about the process of understanding before starting looking for solutions. Hence my first practical goal became to give the rural people in my study the opportunity to get together, talk, and share doubts and hopes while being introduced to and seeing the relevance of ICT in their world.

I collected data while interviewing, observing and designing and conducting Digital Literacy Workshops (DLWs), all of which I describe in Chapter 4. Coming to the analysis phase, I looked through the data materials in my effort to understand, and get on to explain the patterns I saw. Here, though, I present the theoretical foundation which I find suite my purpose of explaining patterns before I present the actual case study and the method I applied in designing and conducting and analyzing the case. However, it must be noted, that as I explained in my introductory chapter, I studied theoretically as I conducted the field study, and my reflections grew accordingly. Therefore, all that I write in chapters 4, 5, and 6 is influenced by the theoretical position that I developed along the way. In this chapter, I present and explain theories in order to explain the successes I see in some data in a way that supports the conclusions argued in Chapter 8.

The first theoretical germ cell is the idea that changes in ways of living happen in communities as an interchange between participants and then later in the individual. This claim is supported by activity theory and, especially, Engeström's (1987) theory of expansive learning. I elaborate on activity theory and the theory of expansive learning in the following sections. The triangle model shown in Fig. 3.1 helped me figuratively operationalize my thinking.

The second theoretical germ cell is the idea that changes in ways of living happen in situations which can be characterized with Nonaka and Tacheuchi's (1995) model of knowledge creation. This model consists of three elements which interact in a process they call SECI whereby tacit knowledge become explicit knowledge in a shared setting called Ba. Facilitators provided the materials and staging of this process. I present this model at the end of this chapter, along with my explanation for how the triangular model of expansive learning and the SECI model are related.

However, before I account for the germ-cell theories of learning and knowledge creation, I explain the theoretical underpinnings of how I conceptualize my research aim: the appropriation of ICT on the ground in rural Bangladesh.

ICT APPROPRIATION

I use the term appropriation as Wertsch (1998) defines it: "the process of taking something that belongs to others and mak[ing] it one's own" (p. 53). Wertsch (1998) describes segmentation of appropriation through (1) anticipation, (2) initial familiarity, (3) development of repertoires of routines and the (4) development of new forms of use. Wertsch (1998) argues that appropriation is not linear and easy because it always involves tension between the tool and its usage in a particular context which often results in resistance. A community like the one where I have worked and intervened does not include ICT in its practices. It needs to know how ICT can be used to serve the rural community and what tensions it might cause. Therefore, appropriation and resistance are key components for understanding the

potentials of ICT in my particular context. ICT appropriation reflects the relationships among the FFs, ICT, and rural community practices. I try to understand how the community FFs perceives the potential of ICT in their development activities in which many stakeholders and beneficiaries are involved in achieving each objective. The field of rural community development has complex issues, as described in the Chapter 2 "Trends in ICT4D". The transformation of community development practices (i.e., the transformation of FFs' practices) is always the result of a previous experience with ICT; technologies are not built in or consumed in voids free of a history of experiences experiences (Ramırez (2007). As mentioned, my study seeks to determine the ways in which ICT might contribute to the improvement of community capacity building practices in rural areas. For this purpose, it is essential to understand the relationship between rural community capacity building and ICT through a study of the contributions of the different subject-object-tools and the other social and cultural mediation which operate between them. Therefore, this study uses the notion of the ICT appropriation, which implies the potentials ICT offers.

As discussed in Chapter 2, ICT4D research shows that we are still far from understanding the ICT appropriation process in which ICT development initiatives can flourish and be sustained in unfavorable rural areas in developing country contexts. However, I find that the cycle of expansive learning (Engeström, 1987, 2000) and the knowledge creation theory of Nonaka and Takeuchi (1995), considering their complementary role in knowledge creation metaphor (Engeström, 1999b; Paavola et al., 2004, Paavola & Hakkarainen, 2005), form a reasonable foundation for hypothesizing about learning in the ICT4D context. Instead of considering all aspects of these theories, I emphasize only those that shed light on the interrelation between knowledge creation and ICT appropriation.

ACTIVITY THEORY

Through historical analyses and empirical experiments, Vygotsky, a scholar of developmental psychology, (1978) showed how practice shapes and is shaped by cognitive functioning in a dialectical process going out of the individual to the environment (social and physical) and back into the individual (experiential learning), and then out again at a higher, more complex level integrating tools and language from the environment (development). Vygotsky emphasized that the fundamental unit of analysis in understanding learning and development is the relationship between subject and object, a relationship which, he emphasizes, is never direct, but always mediated by tools and language. His theory helps me explain the interactions between humans and the material world. Later, Engeström (1987) produced a triangular diagram underlying Vygotsky's theory as the dynamics of contradictions in the relationships between the subject and mediating environment (enriched with Leontiev's (1978) overall motivating conceptualization

he calls activity) and between the mediating environment and the object intended to be realized (Fig. 3-1).

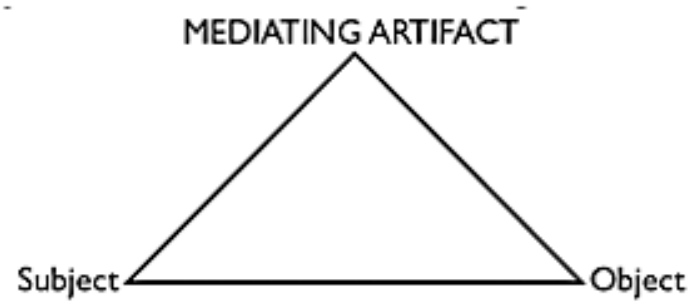


Figure 3-1 The dynamic mediating relations between the subject and object of activity (adopted from Engeström 1987, p. 59 and Vygotsky 1978, p. 40)

Leontiev (1978) took Vygotsky's (1978) theory one step further and proposed that the three components—the subject, the object and the tool—operate on three levels. First is the level of motivation, which is often tacit and unconscious but, says Leontiev (1978), always shaped by some object or idea, which means that the motive is objectified. The objectified motive directs and gives value to choice of action. Actions are conscious and can be captured, for example, by a video camera as what we call behavior, but a behavior of which the actors can talk. Underlying each action are numerous small, unconscious behavioral acts: I buy groceries, and to do so, I must be able to walk, grasp the handle of the shopping cart, take groceries from the shelf, read my grocery list—all of which Leontiev (1978) calls operations.

Leontiev (1978) argues that learning occurs in the broader social setting in which individuals are always situated. The notion of object refers to things toward which subjects direct themselves, so in a sense, the imagined, desired outcome manages the actions (Kaptelinin, 2005). Leontiev (1978) considered tools to be crystallized operations and hence act as a vehicle for transmitting human experience from generation to generation (Kaptelinin & Nardi, 2012). Appropriation happens as the artifact "*attains its qualities of function, aesthetics, and ethics as it is integrated into the actual activity; only in practice does it become a tool. In other words, to become a tool is to become part of someone's activity*" (Christiansen, 1996, p. 177).

Drawing on the ideas of Vygotsky (1978) and Leontiev (1978, 1981), Engeström (1987) developed an activity theory model (also known as Engeström's activity

system model) to move activity theory from developmental psychology to organizational psychology in order to facilitate the study of collective activities and the societal nature of humans. He argued that Leontiev's (1987) notion of activity did not completely represent the collective and societal nature of human activity. Engeström's (1987) activity system model accounts for relationships between participants (subjects) and objects mediated by tools, community, rules, and division of labor. Figure 3-2 shows a representation of a generic activity system as theorized by Engeström (1987).

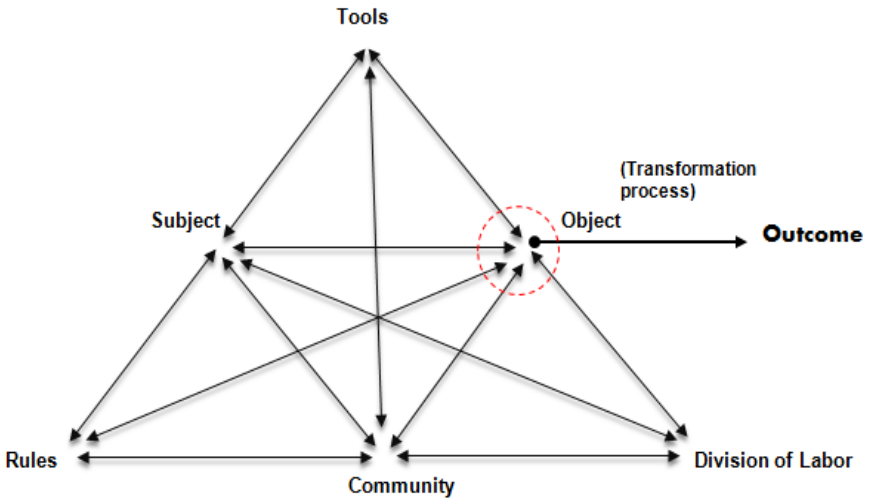


Figure 3-2 Graphical representation of a generic activity system based on Engeström 1987, p. 78

Vygotsky (1978) contributed the original idea that there is a qualitative difference between learning, which is a first-order expansion of ability, and development, which is a second-order expansion. Therefore, the term "expansion" is important because it emphasizes the role of the behavioral context, thereby helping technologists, such as I, teaching and developing ICT to better understand the situation into which I introduce ICT for actual on the ground use.

The circle (around the object in Fig. 3-2) indicates the pivotal role of the object of activity. The object gives meaning to the values of various entities (Engeström & Sannino, 2010). Kaptelinin and Nardi (2006) emphasize that it is "*sense-maker, which gives meaning to and determines values of various entities and phenomena*"((p.138). The term "community" in Fig. 3-2 refers to individuals and subgroups who share the same general object. Communities, according to Engeström's (1987) model, are defined by their division of labor and their shared norms and rules. The division of labor refers to the horizontal division of tasks and the vertical division of power and status. Rules refer to the explicit and implicit regulations, norms,

conventions, and standards that constrain actions within the activity system. Finally, activity systems are somewhat constrained by the formal, informal, explicit, implicit, and technical regulations and norms of the community.

A growing international research community has developed around this theory. Analyses of its intellectual origins are available in the literatures of several scholarly domains, including education (Barab et al., 2002, Basharina, 2007; Engeström et al., 1999; Murphy & Manzanares, 2008a; Paavola & Hakkarainen, 2005), human-computer interaction (HCI) (Kaptelinin & Nardi, 2006; Kuutti, 1996), and information science (Wilson, 2006). The concept of activity has become shared by these disciplines, denoting personal and socially shared meanings of clusters of actions, the context with which all change agents must deal.

According to activity theory as formulated within the research field of HCI, the computer is or might become a tool, which implies that computer implementation in organizations is a matter of mediation between subjects and their objects. Kuutti (1996) argues that humans impose artifacts/tools (e.g., computer) between themselves and the object of interest, establishing more culturally suitable artifacts/tools. The main focus of this theory is how actors transform their objects and how other components take agency. Engeström (1987) emphasizes that "the human activity is simultaneously and inseparably also social exchange and societal distribution. In other words, human activity always takes place within a community governed by a certain division of labor and by certain rules" (p. 149). Hence, the dynamics between the components of the triangle can be considered networks, a viewpoint which allows multiple perspectives of the same behavior. For instance, the shared ICT center model (such as the UISC[3] model) could serve as a tool in future (envisioning) action by FFs, while currently it is an object in their participation in the DLWs, which is staged. Similarly, technical rules for understanding ICT in community development activities could be the outcome of current participatory action through which technical skills requirements are identified or defined. When acting, one also produces knowledge about that activity, necessitating a reflective work orientation with its specific tools. The components of an activity system never stand in isolation. They are dynamic and continuously interact with each other, and that interaction defines the activity system as a whole.

[3] UISCs (Union Information and Service Centers) implemented by the government program Access to Information (A2I), which envisioned digital Bangladesh as the driving force behind the establishment of 4,501 ICT-enabled UISCs to serve rural citizens (Access to Information, 2009; Rahman & Bhuiyan, 2014). Recently its name has been changed as Union Digital Center.

Five Principles of Activity Theory

Research on ICT as a change agent suggests that activity theory is a helpful framework for studying, describing, and explaining human behavior. Engeström (2001) suggests the following principles of activity theory that can be helpful for operationalizing the theory as an explanatory tool of change processes:

(a) A collective, artifact-mediated, object-oriented activity system should be viewed in the context of the surrounding activity systems.

(b) Under the multi-voice principle, an activity system is multi-voiced, realized in participants' traditions, interests, opinions, and the diversity of instruments, rules, and histories present in any activity system, while the division of labor in an activity creates different positions for participants. The principle of multi-voicedness also argues that "expansive learning is an inherently multi-voiced process of debate, negotiation and orchestration" (Engeström & Sannino, 2010, p.5). In other words, multi-voicedness "is a source of trouble and a source of innovation, demanding actions of translation and negotiation" (Engeström, 2001, p. 137).

(c) The history of activity systems determines their development process as "parts of older phases of activities stay often embedded in them as they develop" (Kuutti, 1996, p. 26). Engeström (2001) explains the necessity of understanding history: "History itself needs to be studied as local history of the activity and its objects and as history of the theoretical ideas and tools that have shaped the activity" (p. 136). Thus, the appropriation of ICT tools for rural community development work needs to be examined in the context of the history of its local development organization and against the ICT innovation in the rural community development concepts and tools that shape this community development activity.

(d) Change happens through the adversarial interaction between the elements of the activity system. The contradictions result from tensions but also offer potential for transformation and development.

(e) The expansive transformation and the development of activity systems happen through expansive cycles of learning. This principle of expansive learning refers to the wider horizon of the possibilities for development in the previous mode of the activity, resulting in "embrac[ing] a radically wider horizon of possibilities than in the previous mode of the activity" (Engeström, 2001, p. 137).

The next section briefly sketches the historical landscape in which the potential for expansive learning has emerged. I then lay out the rationale for using the theory of expansive learning as the theoretical and methodological basis of this study.

THE EXPANSIVE LEARNING CYCLE

Expansive learning entails a process of transforming social practices which begins with questioning existing practices and discovering and implementing changes (Engeström, 1987, 1999a; Engeström, Miettinen, & Punamäki, 1999). A pivotal aim of expansive learning is to produce new forms of activities: "Learning is mastery of expansion from actions to a new activity" (Engeström, 1987, p. 125). Here, Vygotsky's (1978) thinking of the difference between learning and development meets Engeström's thinking of the difference between learning and expansion.

Vygotsky (1978) proposed a methodological principle called *double stimulation* which enables making the leap from learning to development. This concept of formative intervention is completely different from the linear intervention embedded in the traditional idea of controlled experiment (Engeström & Sannino, 2010). Double stimulation pushes the subject to go beyond the problem initially given and to open to the object behind the problem. Vygotsky (1962) gave the subject both a demanding task (first stimulus) and a neutral or ambiguous external artifact (second stimulus) which the subject could fill with meaning and turn into a new mediating sign that would enhance the subject's actions and possibly lead to reframing of the task (Engeström & Sannino, 2010). Through these external intermediary actions with new tools as intermediaries, participants can absorb the historical and cultural knowledge of these intermediary tools when these external intermediary actions warrant collecting and transmitting the social, historical, and cultural knowledge (Engeström, 1987). In Fig. 3-3, I reproduce Engeström's view of expansive learning which inspired the development of my own model for constructing and resolving successively evolving contradictions.

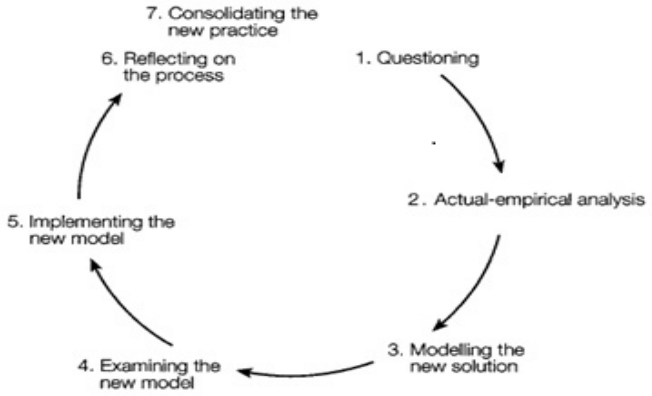


Figure 3-3 Sequence of epistemic actions in an expansive learning cycle (adopted from Engeström, 1999b).

The ideal or typical sequence of actions in an expansive cycle is described as follows (Engeström, 1999b): The first step consists of questioning and criticizing some aspects of accepted practices and existing insights. The second step is to examine the prevailing situation, while changing it either mentally or practically. The third step is to create a new model with new idea that represents an answer to the problematic situation. In the fourth step, the new model is analyzed in order to understand its dynamics, tensions, and contradictions. The fifth step is to apply the model. The sixth and seventh steps consist of reflecting on and evaluating the change and its outcomes, such as new practices.

Expansive learning allows participants to create new concepts and practices for their collective activity. Engeström and Sannino (2010) argue that the theory of expansive learning relies on its own metaphor of expansion and that metaphors of learning as participation or knowledge acquisition say little about the transformation and creation of culture. However, in expansive learning, learners learn something that is not yet there and emphasize the serious analysis necessary for horizontal movement and hybridization (Engeström & Sannino, 2010). Using expansive learning as a foundation for change interventions, as, for example, the workshops I have conducted, implies that all the complementary and conflicting voices of various groups can be heard.

Expansive learning places importance on communities as learners, on the transformation and creation of culture, on horizontal movement and hybridization, and on the formation of theoretical concepts, all of which have been important in my research. When I try to identify the learning embedded in the workshops I conducted (see chapter 6), I employ the three dimensions introduced by Engeström & Sannino (2010) to locate expansive learning in ICT appropriation in rural community development activities. I ask:

• Is learning primarily a process that transmits and preserves culture or a process that transforms and creates culture?

• Is learning primarily a process of vertical improvement and uniform scales of competence or horizontal movement, exchange, and hybridization between different cultural contexts and standards of competence?

• Is learning primarily a process of acquiring and creating empirical knowledge and concepts or the formation of theoretical knowledge and concepts?

CONTRADICTIONS AS A SOURCE OF CHANGE AND DEVELOPMENT

Activity theory is described as a powerful descriptive tool (Nardi, 1996, p.7). According to Engeström (1987), the power of activity theory lies primarily in

recognizing contradictions or disturbances that can emerge in from the historical and cultural roots of an activity system. These contradictions can serve as a driver of change for any organization or any work process. Engeström (2000) explains contradictions as systemic contradictions and describes the significant development and change potentiality of systemic contradictions within an activity: "Systemic contradictions, manifested in disturbances and mundane innovations, offer possibilities for expansive developmental transformations" (p. 960). Contradictions are important, not in and of themselves, but because they can result in change and development (Engeström, 2001). Engeström and Miettinen (1999) emphasize a view of contradictions as "the motive force of change and development" (p. 9).

Contradictions can be regarded as the interruption of the free flow of existing work practices. Engeström (1987) defines contradictions as double binds, referring to Bateson's idea of double-bind situations in everyday practices as "two messages or commands which deny each other" (Engeström, 1987, p. 174). Double binds constitute an essential dilemma in societies and are collective endeavors "[w]hich cannot be resolved through separate individual actions alone—but in which joint co-operative actions can push a historically new form of activity into emergence' (Engeström, 1987, p. 165).

Researchers have defined contradictions in many ways. For instance, Kuutti (1996) explained contradiction as "a misfit within elements, between them, between different activities, or between different developmental phases of a single activity" (p. 34). Barab et al. (2002) and Basharina (2007) describe contradictions as tensions. Barab et al. (2002) also proposes contradictions as systemic tension and conceptualizes tensions as system dualities. Murphy and Rodriguez-Manzanares (2008b) define contradictions as "tension, contrast, denial, or opposition between two propositions" (p. 1064).

Introducing a computer artifact always creates the need to reconsider the outcomes of changes. The computer artifact resides on the border of different communities of practices and introduces conflicting situations, contradictions, tensions. Bødker and Christiansen (1994) define contradictions as dilemmas: The "computer artifact lives on the borders between several communities of practice, surrounded by conflicting interests and requirements, and find themselves caught in a dilemma between awareness of tradition and orientation towards transcendence: on the one hand starting out from the praxis and history of the users in question, on the other hand making sure that something qualitatively new gets shaped in the process" (p. 1).

Activity systems are characterized by their inner contradictions (Engeström, 1987, 1993), so these internal contradictions are best understood as tensions surrounded by the components of the activity system. For instance, in community-based SICTCs, there is a pervasive tension between providing an information service to a rural community for its economic sustainability (described by Engeström (1987) as

exchange value) and providing an information service to a rural community so that the community can see its significance in dealing with their real-world problematic situations (use value). A similar example is FFs' struggle to collect information to sustain their rural development activity with marginalized groups (exchange value) and to disseminate information which the rural community can use to deal with their real-world problems (use value). These tensions are considered crucial to understanding the motivation for actions and the progress of a system (Engeström, 1987). These tensions cannot be considered opposites of which one should be eliminated; instead, they should be considered the driving force for change or the moving force behind disturbances which finally drive the system to change and innovate (Engeström, 1987).

Appropriating ICT or computer artifacts inevitably demand the change and transformation of existing way of working, and such technology appropriation work is always conceived by a person in a social setting. Phenomena which bridge the gaps between theory and practice or between social and technical practices need to be designed (Bødker & Christiansen, 1994). In this perspective, I found myself in activity theory and in the concept of contradiction. The concept of contradiction is considered a broad concept of tension comprised of different kinds of tensions in FFs' activities and different disturbances throughout community capacity building practices. The aim of this study is not to eliminate all these tensions through the expansive learning cycle but to create an environment where the tensions can facilitate the research participants' ICT knowledge creation and can create motivation for new practices. Instead of individual FFs' work process or patterns, I tried to select transition or transformation situations driven by local ICT policy as a research element and analyzed them through the activity-system model.

Engeström (1987) identifies four levels of contradictions in an activity system: i) Primary contradictions; ii) secondary contradictions; iii) tertiary contradictions; and iv) quaternary contradictions.

1) Primary contradictions are internal contradictions in each component of an activity system: subject, object, community, instruments, rules, and division of labor. For instance, the ICT tools used by SICTCEs include various ICT facilities in rural areas which, on one hand, have certain effects on innovation and good information access. On the other hand, these ICT tools are associated with their own costs (operating costs, electricity costs), working knowledge, and context-sensitive content availability. This double-bind nature of ICT affects the specific ICT services operated by local entrepreneurs.

II) Secondary contradictions arise between the components of an activity system. For instance, a certain information access rule might not be suitable for particular groups of people in rural area.

III) Tertiary contradictions describe tensions that emerge in the relationship between the existing forms of an activity system and it's potentially more advanced object and outcomes (Kaptelinin & Nardi, 2012).

IV) Finally, quaternary contradictions refer to contradictions within a network of activity systems involved in the construction of a joint outcome. For instance, the positive effect of ICT-enhanced government services in rural municipal areas can be destabilized by an improper ICT facility in rural entrepreneurs' systems or by entrepreneurs' lack of knowledge of available e-governance services.

In this study, the activity system is composed of *individual FFs, their stakeholders, their beneficiary target community group, their co-workers in the community development program, their practical tools, and the shared objects with their community*. This activity system accounts for the background of the subject and the history and environment of where the subject's activity takes place. Thus, the principle of contradiction allowed me to conceptualize the findings by using the theoretical framework of activity theory and its principles of contradictions. The theory also combines strong notions of mediation and helped in constructing the whole processes of this study.

APPLYING EXPANSIVE LEARNING AS A THEORETICAL BASIS

In this research context, I needed to examine how the FFs are embedded in their relations to other local and cultural entities. In line with Engeström's suggestions, I found it useful to look at collective, instead of individual, activity. I simplified the expansive learning model (Fig. 3-4) to give an overview of my research process. In chapter 4, I have exemplified my field research activities as a sequence of four phases (see Fig. 4-3):

The tensions as contradictions, as outcome from first two phases, work as stimulus of knowledge creation where the FFs develop awareness of the challenges and try to solve them through perceiving ICT into their developmental work context. Engeström (1987, 2000) holds that, in *expansive learning*, contradictions serve as a *springboard for or facilitators* of changing activity systems. Rather than adverse elements of analysis, contradictions are potential driving forces for innovation and the change and transformation of existing practices or services. I use this model in my understanding of what participants said about ICT appropriation. In the first two phases, I sought formulations of positions in regards to the present situation, and in the third and fourth phases of work, I focused on getting formulations of how participants saw ICT coming into their practice. I characterize phases one and two as first-order work and the ICT capacity building and new efforts to perceive ICT as part of known practices as second-order work and a knowledge creation process (in phase 3 & 4).

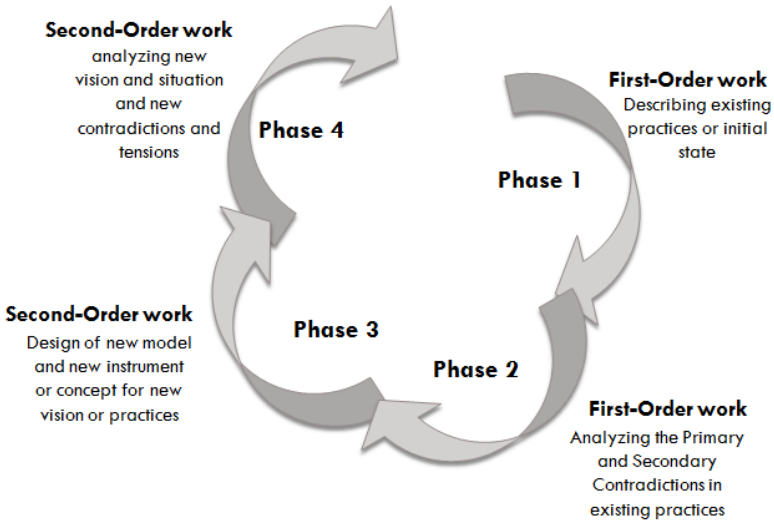


Figure 3-4 The expansive learning cycle as modified in relation to this study

FFs need practical tools and knowledge in order to take epistemic actions and create new concepts. The tensions identified in phases 1 and 2 are here considered springboards for facilitating phases 3 and 4.

In my research context, I did not impose a new model onto existing practices; instead, I tried to stimulate new practices through knowledge creation activity. These new practices were adopted as FFs encountered contradictions and frustrations in their existing practices. Consequently, phases 3 and 4 are considered to have involved the mediation and engagement of FFs in the transformation of existing practices. These two phases describe the new knowledge creation, namely, ICT capacity building. The inspiration I received regarding the organizing of participatory design workshops helped me develop what Engeström et al. (1999) call "intermediate conceptual tools."

I now move from this theory to first germ cell idea: that changes in ways of living in the community occurs as an interchange between participants and later in the individual. This idea is supported by activity theory and especially Engeström's theory of expansive learning. I also consider the second germ cell idea: that changes in ways of living happen in situations. For this discussion, I present Nonaka and Takeuchi (1995)'s theory of knowledge creation.

A KNOWLEDGE CREATION MATRIX AND SETTING

How do I see the connection between expansive learning and knowledge creation? I answer these questions at the end of this theoretical chapter, but when introducing

the concept of knowledge creation developed by Nonaka and Takeuchi (1995), it is important to emphasize my primary motivation: Expansive learning is learning to change present practices into new, expanded practices. Expansive learning is about process, and knowledge creation is the creation of a new form of output, a new quality. Knowledge creation is about product—and productivity, likely why the idea has caught on in western industrialized societies.

Much research on organizational change stresses the importance of knowledge transfer and acquisition between and within organizations (Nahapiet & Ghoshal, 1998; Nonaka & Takeuchi, 1995). Here, I present Nonaka and Takeuchi's (1995) position that knowledge is created through a cycle of continuous social interaction by tacit and explicit knowledge, giving rise to four modes of knowledge conversion: socialization, externalization, combination, and internalization (see Fig. 3-5).

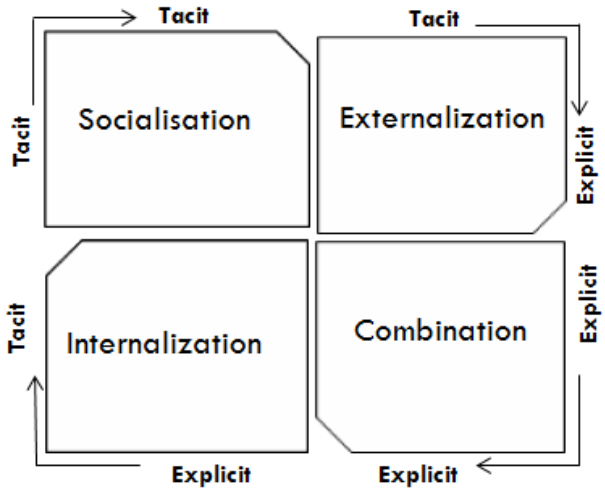


Figure 3-5 The SECI model with its four modes of knowledge conversion (adopted from Nonaka & Takeuchi 1995, p.62 & p.71)

The cycle is a spiral, and each iteration builds on earlier ones, accumulating knowledge. There are two types of knowledge: explicit knowledge and tacit knowledge. Explicit knowledge is expressed in formal, systematic language and shared in the form of data, specifications, and manuals. It can be processed, transmitted, and stored relatively easily. In contrast, tacit knowledge is highly personal and hard to formalize. Nonaka and Takeuchi (1995) argue that both types of knowledge are essential to the knowledge creation process. I have analyzed participation using the SECI model (Nonaka & Takeuchi, 1995).

Socialization is the process of converting new tacit knowledge through shared experiences. Tacit knowledge is difficult to formalize, so it often requires shared experiences, such as spending time together or living in the same environment. *Externalization* is the process of presenting tacit knowledge as explicit knowledge. In other words, explicit knowledge is crystallized, allowing tacit knowledge to be shared by others. *Combination* is the process of converting explicit knowledge into more complex and systematic sets of explicit knowledge. *Internalization* is the process of embodying explicit knowledge as tacit knowledge. Internalization is closely related to "learning by doing" (Nonaka & Takeuchi, 1995).

Nonaka and Takeuchi (1995) propose that the middle-up-down management model is the most appropriate setting of knowledge creation for organizational knowledge to grow or flourish. The term "middle-up-down management" was coined by Nonaka (1988) in an article discussing the role of a team of young engineers. This model presents the middle managers as leaders in knowledge creation, using a spiral conversion process involving both the top and the bottom management levels. "Middle managers work as knowledge producers to remake reality, or 'produce new knowledge', according to the company's vision" (Nonaka, Toyama & Konno, 2000a, p. 24).

This process places the middle manager at the very core of knowledge management at the intersection of the vertical and horizontal flows of information within the company (Nonaka & Takeuchi, 1995, p. 127). Middle managers play the role of field builders and, more metaphorically, work as 'knowledge engineers. Top management creates vision, strategy, and theory, while middle managers create middle-level theory and create concepts to solve practical problem and transcend the contradictions in reality and top management's vision.

Nonaka and Takeuchi (1995) argue that the middle-range theory and concepts developed by middle managers are tested throughout the organizational framework and perform a pivotal role in transforming management strategy into hands-on terms for lower-level employees to make sense of that formal structural format or statement. Nonaka and Takeuchi (1995) argue also contend that, without the efforts of middle management groups, managements' strategies might only be formal statements to lower-level employees. Thus, the transforming work of the middle management is much more visionary while also practically realistic (Nonaka & Takeuchi, 1995).

The concept of *ba* (meaning "place" in English) as a model of knowledge creation was initially proposed by Japanese philosopher Kitaro Nishida and further developed by Nonaka and Konno (1998). The ba is the shared context for knowledge creation; it is a "place for knowledge creation" (Nonaka and Konno 1998, p. 36) whose characteristics include self-organization with a corresponding

intention, objective, direction, and mission; shared sense of purpose; diversity of knowledge; and open boundaries (Nonaka and Konno 1998, p. 37).

This ba can be physical space (e.g., an office), mental space (e.g., shared experiences and ideas), or virtual space (e.g., email, Facebook). Nonaka and Konno (1998, p. 41) state that *"ba is the world where the individual realizes himself as part of the environment on which his life depends."* Hence, the group work with participants' collected pictures in the workshop served as a physical and mental space for knowledge creation through acquiring one's own experiences and reflecting on the experiences of others.

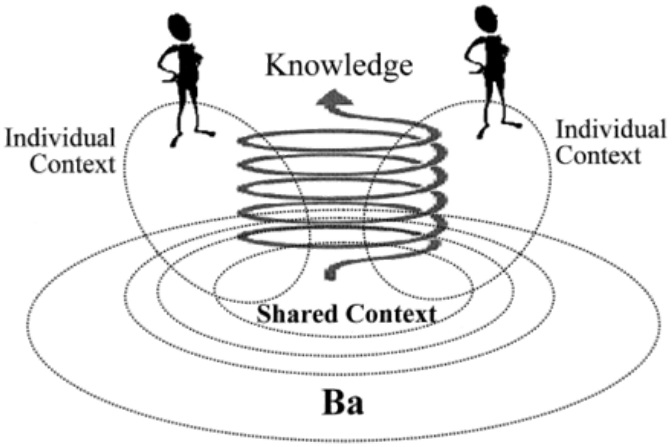


Figure 3-6 Ba and knowledge creation (Nonaka et al., 2000a, p. 14)

The knowledge creation process is a spiral that grows out of these three elements: (i) the SECI process, knowledge creation through the conversion of tacit and explicit knowledge; (ii) '*ba*', the shared context for knowledge creation; and (iii) knowledge assets, the inputs, outputs and the role of moderators of the knowledge-creating process (Nonaka et al., 2000a). The key to leading the cycle is dialectical thinking. The role of top management in articulating the organization's knowledge vision is emphasized, as is the important role of middle management (knowledge producers) to energizing ba. Using existing knowledge assets, an organization creates new knowledge through the SECI process which takes place in Ba where new knowledge, once created, becomes the basis for a new spiral of knowledge creation.

Contrary to the Cartesian view of knowledge which emphasizes the absolute and context-free nature of knowledge, the knowledge-creating process is necessarily context specific, particularly in who participates and how they participate. Knowledge needs a physical context to be created: 'There is no creation without

place.' Ba does not necessarily refer to a physical space but to a specific time and space, in line with what German philosopher Martin Heidegger called a locationality that simultaneously includes space and time. These ideas lie in the same family of concepts as situation in Suchman's (1987) work. In knowledge creation, especially in socialization and externalization, it is important for participants to share time and space. Close physical interaction is the key to sharing the context and forming a common language, a process which, according to Nonaka and Takeuchi (1995), places the middle manager at the very core of knowledge management, by positioning them at the intersection of the vertical and horizontal flows of information. At the concrete level, the term "setting" refers to the characteristics of a situation: the place, time, people, what they do, and how they do it.

In my research context, it is important to consider developing countries' shortage of resources and their administrative aspects, which often disrupt information access and result in inadequate institutional and administrative structures with unclear or ambiguous roles and responsibilities and a lack of structured data and information and of continuity in staffs. Administrative staffs at different institutional levels (ministries, departments, and local governments) might not be interested in information or knowledge sharing to gain legitimacy. These aspects create intra-organizational and inter-organizational boundary setting.

Nonaka and Takeuchi (1995) propose that the middle-up-down management model is the most appropriate setting for knowledge creation. "Middle managers work as knowledge producers to remake reality, or 'produce new knowledge', according to the company's vision" (Nonaka et al., 2000a, p. 24). FFs' role can be seen as similar to that of middle managers who are vital to accelerating the ICT appropriation process and ICT knowledge creation. Later, I present illustrative examples of FFs who play a vital role in the ICT introduction process through social communications with the top management of local organizations and the bottom-level rural community which is the main beneficiary of their activities. The paradigm of knowledge creation and the notion of the middle-up-down ICT introduction setting work allow me to identify what I call a knowledge creation hub in accelerating the ICT appropriation process in the developing country context.

INTERWEAVING THE CONCEPTS OF GERM CELL PROCESSES AND ICT APPROPRIATION

In this chapter, I have presented and explained theory about the germ-cell processes which I find useful for analyzing and explaining the findings in my data material: the expansive learning process, an adversarial, dialectical relation of subject, mediation, and object which holds in it a community's socio-cultural rules and division of labor, and the knowledge creation process, in which tacit knowledge

becomes explicit in a shared setting, ba, through materials provided by facilitators. How are these two processes related?

I have suggested that expansive learning focuses on process, while knowledge creation is concerned with products. Both focus on second-order learning, or learning-to-learn. Taken together, these two models provide an explanation of how appropriation happens: how something—in this case, ICT—goes from "being someone else's to become 'mine'. Knowledge creation and transformation happen when tensions serve as a springboard to stimulate learning situations. Disturbances or contradictions are crucial to possibilities for change and to the zone of proximal development (Vygotsky, 1978). Transformation emerges from efforts to face different tensions and opportunities to analyze the possibilities of the new historical object, which work as an expansive solution for the existing tensions. Engeström (1987) explains this object projection as a *zone of proximal development* for a collective activity. This zone is not the goal of any activity but, rather, is an invisible battleground for contradictions and objects which separates present and future practices (Engeström, 1987). Thus, the focus on disturbances and contradictions is crucial in understanding the ICT appropriation process and practices. *Tension-as-contradiction* encourages more local-context-sensitive ICT introductions. The FFs' actions are guided by knowledge and the purpose. I apply the concept of "intermediary actions and tools" to organize and analyze data by denoting intermediary tool/actions of the community based organization that are enabling the flows of information and knowledge within the network of people. Facilitating such flows contributes to the sharing of ICT experiences, knowledge and creating a community of practice through addressing similar issues in different contexts such as in different governmental and non-governmental bodies acting in rural community contexts. The *intermediary actions and tools* of the FFs' work develop potentialities as they show shared ICT resources' capabilities for knowledge brokering and usability resources and develop knowledge creation resources in emerging conditions. The *knowledge creation setting* concerns the intermediary work as a knowledge creation hub which successfully disseminates ICT knowledge to different levels of stakeholders in capacity building practices.

I have combined all these concepts in one conceptual model, see Fig. 3-7: "ICT Appropriation through Knowledge Creation."

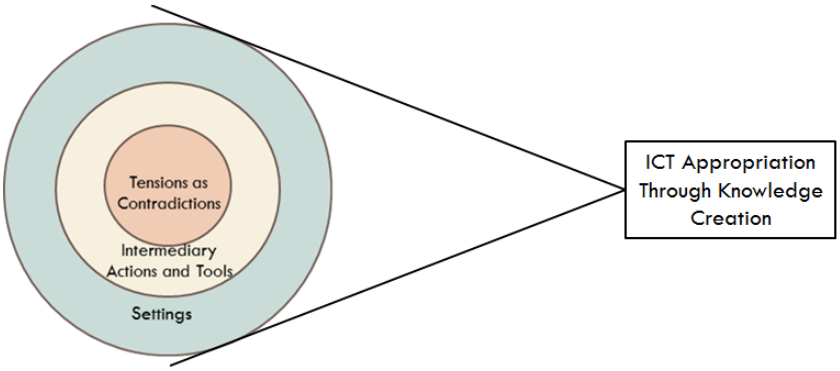


Figure 3-7 Conceptual model for ICT appropriation through knowledge creation.

The notion of ICT appropriation through knowledge creation helps explain some theoretical and empirical synergies.

1. The challenges and potential for ICT introduction that lie within rural community development practices like the Community Empowerment Program (CEP) program

2. The facilitation of knowledge expansion by using ICT in the community and among FFs.

CHAPTER 4. A SINGLE CASE STUDY: WHERE, WHAT, HOW, AND WHY TO TRUST MY INTERPRETATION

My research on ICT appropriation from a knowledge creation perspective unfolds empirically around a case study of rural community capacity building in Bangladesh. As in all empirical research, I made a plan based on my studies of how to conduct empirical research before I went into the field. In the field, everything that happened was a dialogue among me, my plan, and actual events in the field. Here, in my thesis, I present a coherent narrative, but in the process of research, many beginnings and many conclusions happened at the same time. My analytical work, in many ways, has been similar to unwinding a messy ball of yarn.

It was of great advantage to be a native speaker of Bangla, but because of time constraints, I have had to limit translation of data expressed in Bangla to what I have identified as key expressions. This means that, for now, I have had to leave for my future research many important meanings that can be found in my data. Before I present my plan for this single qualitative research case and argue for the choices behind it, let me introduce the heart of the matter: the work of FFs (so called field workers) in rural Bangladesh. Even before that, I must geographically and organizationally locate the project work that I have conducted.

The setting of this case study is the district of Mymensingh, approximately 120 kilometers north of the capital city Dhaka, and my field work there took place from September 2010 to May 2011. Organizationally, the setting for my study is the CEP (previously known as the Social Development Program which sought the socio-political empowerment of less-privileged, rural communities, especially women), founded by the NGO Bangladesh Rural Advancement Committee (BRAC). The CEP program takes a holistic approach to meet the information needs of marginalized people, especially women, and aims to provide basic livelihood information and cultivate people's skills. CEP's three key foci—community institution building, information access, and the practice active citizenship—are aimed at building the capacity of rural marginalized peoples through collective mobilization so that poor rural women can gain better access to information and available government and non-government services and resources, play more active civic roles, and act against exploitation and social injustices. The main objective of the activities studied in my case is to strengthen rural less privileged peoples.

The CEP program is part of a massive endeavor to improve life in rural Bangladesh. Through this project, approximately 12,000 community-based rural institutions

(RIs) called Polli Shomaj (PS) and Union Shomaj (US) have been established since 1998 (BRAC, 2009). A PS is a ward-level institution for the poor, especially women. Bangladesh has 11,234 PSs in 61 districts, with an average of 60-40 members each. Union-level federations of PS groups are known as US. US enhance the strength of the groups and allow for networking between leaders of different PS. There are 1,217 US in 61 districts in Bangladesh. The general aim of the RIs is to mobilize disadvantaged rural groups (especially women), to connect communities, and to promote the practice of active citizenship. PSs and USs work as tools for accessing information and applying that information to the livelihood practices of rural people (BRAC, 2009; BRAC CEP, 2014).

I focus on the relationships of three organizational instances: sub-district-level FFs called field organizers (FOs) and district-level FFs called regional sector specialists (RSS) (currently titled district manager) and the RIs. These both level of FFs directly interact with the village RI and different stakeholders of this program, including government agencies and NGOs. The CEP staff FFs and RSS has work responsibilities in different geographical locations at different organizational levels, as illustrated in Fig. 4-1.

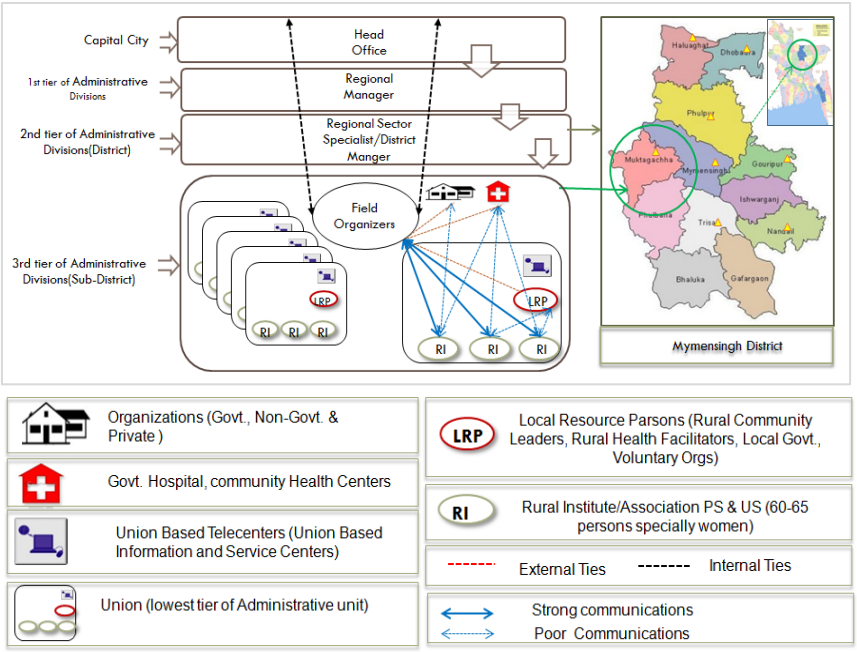


Figure 4-1 Responsibility map of Field Organizers and Regional Sector Specialist

FIELD FACILITATORS AS A SUBJECT OF ACTIVITY: TASKS AND ACTIVITIES OF FIELD FACILITATORS

The position of FF at the sub-district level is both a job for a person, typically a woman, and a role in the sociological sense of the work, defined by government authorities as a helping body on the ground, where very little government information reaches, let alone is understood. This role involves providing better access to information and building social resources. Resource persons, such as health care specialists, education advisers, and lawyers, are in urgent demand in rural Bangladesh, but poor infrastructure, poverty, low literacy, and a lack of knowledge or information limit access to basic services for a very large portion of the Bangladeshi population (Mahmud, 2006). As a patron of the CEP program, BRAC plays an important role in organizing, undertaking, and coordinating the activities of RIs. The key activities of CEP program are as follows (BRAC, 2009):

- Bridge information gaps in rural areas in Bangladesh which continue to remain unaddressed
- Provide information to the rural poor about local government or non-government resources
- Participate in making decisions on the types of public works to be undertaken in communities
- Handle irregularities, and address systemic inequalities
- Help local communities access to government services and resources
- Facilitating RI to access and participate in government training for income-generating activities, such as sewing, livestock, agriculture, fisheries, food processing, and handicrafts
- Participate in decision-making processes (local judicial processes or dispute resolution) on the use of local resources, such as *khas* (abandoned) land, water bodies, and government land alongside roads and rivers
- Engage in local social initiatives and activities, such as the prevention of dowry and early marriage, protesting against violence, and providing support for children's education

Most of the FFs at the sub-district level have completed bachelor's degrees, while some have only a high school education. They receive a modest salary, from which they are expected to cover their own costs for local transportation. In rural areas, FFs sometimes have to travel on foot to get to villages to meet RI groups or visit various organizations or government offices. FFs usually have a very basic mobile phone and carry notebooks for recording notes, registrations, and information. While trying to facilitate learning and knowledge sharing, they often walk on muddy roads and use boats sometimes to cross rivers. In addition to working with RIs (the PS and US), FFs also collaborate with the wider community of local

authorities in information domains (e.g., health, education, legal, and human development services), service providers of different social benefits, and other FFs.

In Fig. 4-2, I have summarized the flow of FFs' (specially the FFs at Sub-district level) typical everyday practices and tasks: preparation for RIs meetings and workshops, conducting RIs meetings and workshops, and visiting of organizations and local resource persons.

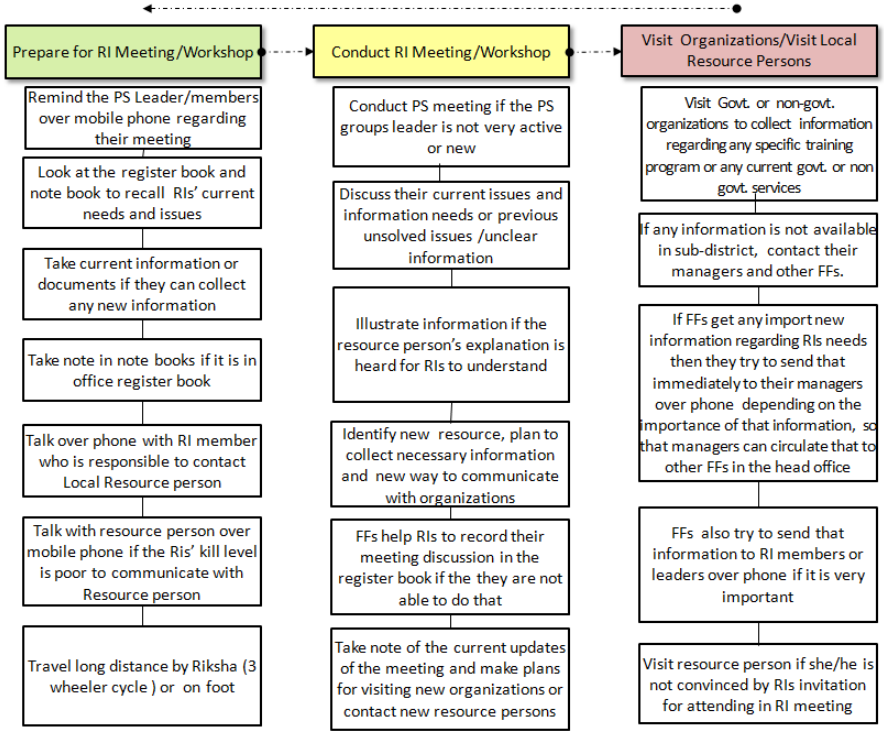


Figure 4-2 Typical workflow, everyday tasks, and activities of FFs

MY PLAN FOR THIS EXPLORATIVE, QUALITATIVE, SINGLE-CASE RESEARCH

As stated in Suchman's (1987) seminal work "Plans and Situated Action," a plan is useful because it gives researchers something from which to deviate when in the situation of realization. For a PhD student, it is necessary to have a research plan before entering the field. In the following sections, I present the research plan I developed before entering the field and the rationale for it.

My initial inspiration come from my theoretical PhD studies in Scandinavia in a research group consistently mostly of researchers who subscribed to the Scandinavian approach to systems development, which I here term participatory design or the collective resources approach (Ehn & Kyng, 1987; Greenbaum & Kyng, 1991a; Schuler & Namioka, 1993). I also gained inspiration from the PhD course Design Anthropology lead by Professor Tim Ingold, who has become a prominent figure in the emerging discipline of design anthropology (Ingold, 2001). Overall, I selected three characteristics for my empirical research:

i) *Explorative*
ii) *Qualitative*
iii) *Single Case Study*

Here, I present the considerations for each of these points in my initial research plan, including my ontological and epistemological positions.

EXPLORATORY RESEARCH

The main focus of this research was to explore the dynamics and factors involved in ICT appropriation in rural community capacity building activities. According to activity theory and the theory of expansive learning (discussed in chapter 3), ICT appropriation is a change process, transforming old tools into new tools. Based on my assumption that what, ontologically speaking, is a patterned set of assumptions concerning reality and, as phrased by the constructivist paradigm, "there is no reality other than what we put together in our head and that this based on our social experiences and making it historically and spatially specific" (Long, 2007, p. 197), I focus on the processes of interaction among participants and their specific contexts and background. My own background as a researcher, of course, influences the research interpretation and knowledge creation (Creswell, 2009). I do not stand outside the process of interpretation; rather, I am an active part in it. Reality is what is recognized as meaningful by a group of people who agree on some description which can be termed objective reality. This approach, I find, is consistent with Mingers (2001, 2004) because the construction of the social world as meaningful in a research project such as mine happens through the interaction between the researcher and participants.

Orlikowski and Baroudi (1991) published a significant paper about the role of epistemological views in shaping information systems (IS) research. They described three theoretical and epistemological positions: the positivist, interpretive, and critical ways of doing research, based on Chua's (1986) idea of research epistemologies which has influenced IS research. Orlikowski and Baroudi's (1991) epistemological view recognizes that "understanding social reality requires understanding of how practices and meanings are formed and informed by the language and tacit norms shared by humans working towards some shared goal" (p.

14). Ontologically, interpretive IS research assumes that the ontological elements are in a social world which is produced and reinforced by human actions and interactions. As Orlikowski and Baroudi (1991) state, "the aim of all interpretive research is to understand how members of a social group, through their participation in social processes, enact their particular realities and endow them with meaning, and to show how these meanings, beliefs and intentions of the members help to constitute their actions" (p. 13). Positivist theory, mostly grounded in descriptions and theory, prefers prior fixed relationships within phenomena, whereas the constructivism/interpretivism values subjectivity.

To make these positions work in my practical empirical research, I followed Ingold's advice to approach the field as a traveler, for whom the journey is the destination, and the log book is the first tool at hand. At first, I noted down my subjective understandings of my conversations with FFs, as well as my observations of the context which surrounded us during our talks. Then, drawing on what I had learnt in Scandinavia about participatory design, I planned a series of encounters with FFs which I hesitate to call design workshops or teaching workshops, because I wanted our encounters to be mutual conversations, as I contributed knowledge about ICT and participants contributed stories about their context of appropriation, their way of making sense of things. To start, though, I employed some tools and techniques I became acquainted with in the eLearningLab at Aalborg University and the SPIRE research center at the University of Southern Denmark during my PhD course work.

QUALITATIVE RESEARCH

In qualitative research, the paradigm plays an important role. A research paradigm consists of an ontology, epistemology, methodology, and methods. Guba (1990) defines a research paradigm as *a patterned set of assumptions concerning reality*, epistemology as *knowledge of that reality*, and methodology as *particular ways of knowing about the reality*. The research paradigm should be selected based on what epistemological commitments or assumptions are acceptable and appropriate for the research topic of interest (Guba & Lincoln, 1994, p.108). Guba and Lincoln (1994) also stress that all theoretical assumptions are speculations and that the philosophical foundation of each paradigm can never be empirically confirmed or refuted.

Qualitative data are soft, rich and deep, while quantitative data are hard and objective. Many scholars in IS research, my original field, recognize the potential of qualitative research to find 'more open and nuanced ways' of studying and analyzing complex IS and their relation to social and technical phenomenon (Walsham, 1993, 1995a, 1995b, 2006; Myers & Avison, 2002; Myers & Avison, 1997; Myers & Newman, 2007). Thus, taking a position as an interpretative researcher, I further argue that my qualitative research is aligned with critical

assumptions about ICT implementations because I am also concerned about power relations and whose social reality is considered and attempt to give under-privileged actors a voice in using ICT as springboard for development. Orlikowski and Baroudi (1991) emphasize that social reality is historically constituted and urge researchers to explore the hidden contradictions and potential in social relationships and practices. Klein and Myers (1999) claim that critical assumptions "enhance the opportunities for realizing human potential" (p. 69). Myers and Klein (2011) suggest in their recent article a set of principles for conducting critical research in IS. In my planning, I hoped to take a critical position by employing participatory design tools and techniques in the Digital Literacy Workshops (DLWs) during the second half of the empirical study.

This research project was based on two distinct concerns: first, to describe in more detail the relationship of ICT appropriation and rural community development; and second, to understand the ICT knowledge creation and capacity-building dimensions of a specific rural community development situation, namely, the CEP run by the NGO BRAC in Bangladesh. This study aimed to contribute to micro-level qualitative research in ICT4D field (discussed in the literature review in Chapter 2) using the specific case of CEP program. The study can be seen to have exploratory aims because it adopts a case study strategy (Yin, 2003) and undertakes a conceptual investigation to explain the *capacity building–ICT–and development* relationship and provide an account of its dynamics in a particular case. Yin (2003) not only justifies the rationale for case studies and argues for using case studies as a strategy in exploratory and descriptive research but also explains the case study's suitability for explanatory and theory- building research.

A SINGLE CASE STUDY

A case study is empirical investigation in which the area of study is limited to a small number of units, and the investigation is performed in a contemporary phenomenon within its real-life context, "especially when the boundaries between the phenomenon and the context are not clearly evident" (Yin, 1994, p. 13). A case study is useful for answering why and how questions, enabling the researcher to look in depth at a topic of interest or phenomenon. While Denscombe (1998) refers to a case study as a strategy, not a method, Creswell (1998, 2002) describes it as a methodology that allows the researcher to grasp a holistic understanding of the phenomena. Creswell also (2002) claims that, if the research problem relates to an in-depth understanding of a case, the case study provides a boundary system for data collection. Crotty (1998) defines it as a method for understanding research. Case study research strategy does not follow a rigid definition but allows flexibility in data collection methods as researchers adapt their techniques while the research continues (Miles & Huberman, 1994). According to Flyvbjerg (2006), case study research generates knowledge that is context dependent and provides a rich, nuanced view of reality.

In ICT/IS research, Orlikowski and Baroudi (1991) state that the case study has established the ability to generate a well-founded interpretive comprehension of human technology interaction in natural social settings. Creswell (1998) states that the case study design is suitable for assisting the researcher in defining the unit of analysis to be studied and the "bounded system by time and place" (p. 61). Based on this view, Stake (2005) argues that he does not see the case study as a method itself but as a frame in which we can include a number of methods. The work of the researcher is to identify "coherence and sequence" of the activities within the frames of the case study (Stake 2005, p. 444)

Flyvbjerg (2006) and Siggelkow's (2007) discussion of case design contributes a deep understanding of the phenomenon and provides a persuasive arguments for the appropriateness of the single case study. Siggelkow (2007) argues that any *criticism* regarding the single case study for lacking representativeness or having bias stemming from the selection of a single sample can be rejected because of the value of the rare incident studies. Even though a single-case study simply aims to identify a set of portrayed facts but it can produce important contribution towards understanding research phenomena (Flyvbjerg, 2006). Flyvbjerg (2006) assumes that some researchers might value theoretical knowledge over practical knowledge and argues that one cannot generalize from a single case as it is difficult to summarize specific case studies. While Flybjerg (2006) claims that single-case studies are no less scientific than multiple-case studies, Ragin (1992) argues that single-case studies 'are multiple in most research efforts because ideas and evidence may be linked in many different ways' (p.225). This is what I understand from working on the ground, and this is exactly why this micro-level analysis of a single case study, when conducted as a generalization based on causal analysis, is also relevant to meso- and macro-level strategic political consideration.

On a more practical note, that there is no alternative also plays a role in my choice of a single case study. I simply had the opportunity to study in depth this case of CEP, and my timeframe did not allow for more than one case study.

CASE STUDY CONTEXT AND SETTING THE SCENE FOR FIELD STUDY

Based on this rationale, I set out to plan my empirical study: We are in Mymensingh District, and some rural community development activities take place, with FFs (at the district and sub-district levels) as the central performers, with whom I wanted to have conversations and conduct explorative ICT workshops. There is no one size fits all model, so participation requires a wide range of techniques and tools for researchers to become fully involved with participants and take action toward a sustainable change. Participatory design provides techniques and practice for research designers and technology designers to participate with users in the design of technologically supported practices.

The emergent field of design anthropology (Barnard, 2000; Ingold, 2001) helped me to develop and improve my understanding of the participatory design research approach. The design anthropology field can provide a comprehensive understanding of users and their context and aided me in developing a holistic understanding of the relationship between the social cultural sciences and the design sciences (Ingold, 2001; Leach, 2010). In this study, I perceived the field of design anthropology a practice for making a change and as a discipline for engaging in fieldwork. The ethnographic practice of the anthropological method can identify approaches which are most effectively and closely connected to real activity. Considering the CEP case, I selected ethnographic participatory design methods (Greenbaum & Kyng, 1991a; Hammersley & Atkinson, 2007), which offers a wide range of methods to investigate research problems. Combining ethnographic research with the participatory design approach results in more design outcomes and can explain all contradictions in the existing systems and discuss new features of the system (Buur & Matthews, 2008; Leach, 2010; Wasson, 2000) by engaging in the field.

Information and communication systems are not only dependent on the technological factors but also encompass social and institutional factors, and consequently, many donor-driven ICT projects do not fit with local needs (Heeks, 1999; Heeks, 2010). In response to these issues, participatory approaches, such as cooperative design (Bødker et al., 1993) and situated design (Greenbaum & Kyng, 1991b), are considered promising vehicles for exploring direct and indirect users' perspectives of ICT interventions in the rural community capacity building process. My view of participatory design is one in which community field workers take control of the ICT appropriation process in terms of both directing what should be done and how they can increase their capacity to solve local community problems through the use of ICT tools.

My research plan included initial exploration phases during which I performed the roles of listener and observer. During the first two phases of research, data were collected on FFs' everyday practices following an ethnographic approach to cover all relevant aspects of their activity. Here, I followed the ethnographic inquiry approach (Hammersley & Atkinson, 2007) which offers a wide range of methods to investigate the research problem. My plan consisted of conducting participatory observation, participant narration, several semi-structured and spot interviews and discussions over 10 days from October 2010 to January 2011 with 5 RIs groups; RSS(District level FFs) from different sectors, such as Local government representatives' capacity building, and popular theater; local resource persons, such as local government representatives and Community Health workers. I made observations of FFs' monthly meetings, RIs workshops, and general meeting conducted by FFs. Some of my fieldwork events are listed in Table 4-1.

Table 4-1 Some Ethnographic Moments/Events[4]

The Ethnographic Moments/Events	**Participants**	**Time**	**Location**
Participate in an annual meeting of sub-district level FFs	• 17 FFs of the Mymensingh District • 1 RSS (Union Porishod capacity building) • 1 RSS (PS) • 1 RSS (Popular theater)	Jan. 16, 2011, 12–4 p.m.	BRAC Training and Resource Center (TARC), Mymensingh
Conduct a discussion session with all sub-district-level FFs considering their activities	• 17 FFs of the Mymensingh District • 1 RSS (PS)	Jan. 16, 2011, 4–5:30 p.m.	BRAC TARC, Mymensingh
Conduct a spot interview with a RSS	• RSS (capacity building of local government sector)	Jan. 16, 2011, 5:30–6 p.m.	BRAC TARC, Mymensingh
Participate in a PS (RIs) general meeting Hold a group discussion with PS members and leaders	• 1 RSS (PS) • FFs of Tarakanda sub-district • PS members	Jan. 17, 2011, 9:30 a.m.–12:30 p.m.	Tarakanda sub-district, Mymensingh
Conduct a discussion session about computer and Internet support in FFs' activities	• RSS (PS) • 1 RSS (Popular theater)	Jan. 17, 2011, 2–430 p.m.	BRAC TARC, Mymensingh

[4] I have added one trip's information in this table from my 3 trips to the field study location during the Phases 1 and 2. Each trip was around 2-4 days long.

Participate in a PS (RI) meeting Conduct a group discussion with PS members and the local resource person (community health worker	• FFs of Gouripur sub-district • Local resource person (community health worker) • PS members	Jan. 18, 2011, 10 a.m.–12:30 p.m.	Sub-district Gouripur, Mymensingh
Visit 3 union-based information and service centers (UISC). Conduct short discussion sessions with 2 UISC entrepreneurs (individually)	• FFs of Gouripur sub-district • UISC entrepreneurs	Jan. 18, 2011, 2–5:30 p.m.	Union office (local govt. office) at Gouripur Union Union office (local government office) at Bukhai Nogor Union
Participate in a PS RIs meeting at Bukhainagor Union. Conduct a group discussion with PS members	• FFs of Gouripur sub-district • PS members	Jan. 19, 9:30 a.m.–12 p.m.	Bukhai Nogor villagers' house, Mymensingh
Conduct 1 semi-structured interview with FFs. Collect important documents (photocopied and photographed) related to FFs' and RIs' work activity	• FFs of Gouripur sub-district	Jan. 19, 2011, 2–3 p.m.	Gouripur BRAC branch office, Mymensingh

Data collection was made through a combination of field notes, unstructured interviews, storytelling, and spot interviews during observations, and video taking of community field workers work process. Audio interviews were done when interviewees gave permission, and field notes were used when it was not possible to record discussions, conversations, or interviews. Field notes from participatory observations were written in a work log file on the same day or as soon as possible after the observations. Secondary data sources included newspaper clips, official documents, workshop booklets, and the diaries and register books of FFs.

Next, in the intervention phases (Phase 3 & 4), I conducted ICT capacity building workshops with selected FFs (from both the district and the sub-district levels) to envisioning their future practice. Although the aim of the initial ethnographic research was to obtain a holistic understanding of the context of the CEP program and the conditions it set for the work of the FFs, I thought this material would also help me to plan the intervention workshops and identify relevant issues. Additionally, there was an advantage to identifying relevant issues through an investigation of the ICT change and capability of the development program itself. Finally, I extended the methodology of participatory design research through the ideas of actions and design during last two phases of field work.

The following diagram summarizes the four-phases process (*see figure 4-3 below*) of investigations.

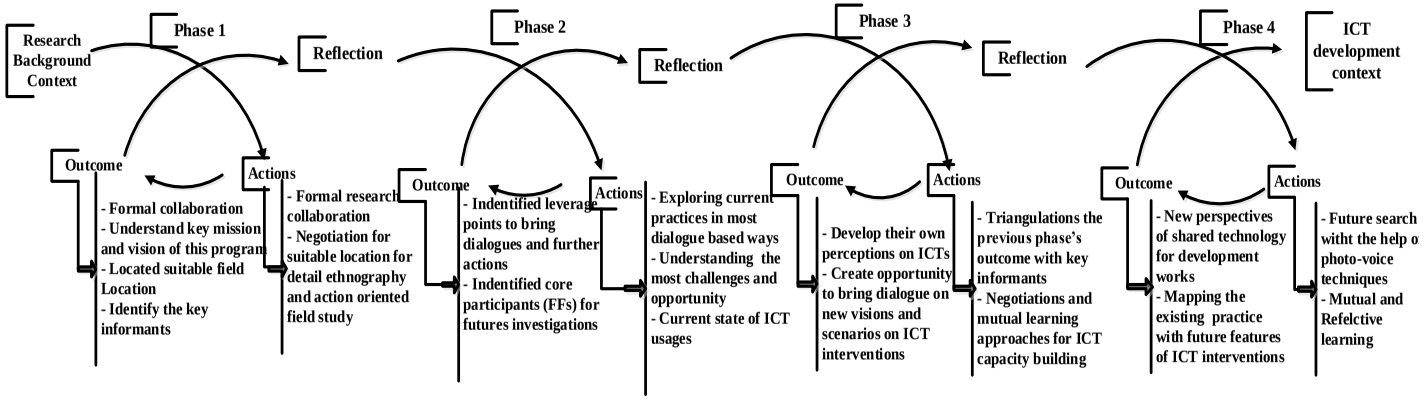


Figure 4-3 Phases of Collective Resource Approach

Participatory design does not support any fixed framework to organize and analyze the full research design activity, so I summarize my field activities as a sequence of four phases (see Fig. 4-3):

- *Grounding*: My plan as it unfolded in situated action
- *Exploring*: Exploring current practices based on dialogue
- *Synthesizing and sense making*: Mutual capacity building
- *Engaging and mediating*: Reflecting on prevailing practices and envisioning the future

GROUNDING: MY PLAN AS IT UNFOLDED IN SITUATED ACTION

I started the work with a formal collaborative meeting with the CEP program director and senior program specialist, at which I tried to understand the current challenges of this program. They were both very concerned about the information dissemination and capability development challenges in their community empowerment work. They had to maintain relationships with many governmental agencies and NGOs and were also concerned about the digital Bangladesh vision. After receiving a formal invitation for research collaboration from them, I decided to work with one specific group of FFs and RSSs. To familiarize myself with the RSS in different sections of this program and the relevant FFs, I stayed three days in that location during my first field visit in the Mymensingh area.

I had to be involved with the actors in this CEP-case program at various levels. A developing country context is complex and requires a multilevel approach as argued by Sahay and Walsham (1995): "The process of IT use in developing countries is a complex phenomenon, and it typically involves actors at various levels. It is important to study the interaction of these different actors on the process of IT implementation and use" (p. 118).

During the introductory phase of the fieldwork, I collected the background information about the program and familiarized myself with the people and activities of the CEP program. I introduced myself to the participating FFs as an academic researcher with my previous professional background in computer engineering and explained them my current role as a researcher. I tried to intimate myself with the participants in order to gain their trust. I also explained to the participants about the issues of confidentiality of information. Table 4.2 lists all the steps taken in this phase.

Table 4-2 Steps Taken in the Grounding Phase

Actions and Participants	**Time Period**
Formal collaborative meeting with key persons of the CEP	Sept. 6, 2010
Daylong participatory observations over 1 week: FFs' activities (such as 1 workshop with community group leaders, 2 general meetings of PS groups, visit to local government offices with FFs)	Oct. 9–12, 2010
1 inter-organizational workshop and 1 FFs' monthly meeting	Oct. 9–12, 2010
1 group **discussion with 4 key participants**	Oct. 9–12, 2010
2 informal meetings **and** discussions **with** sector specialists **and** program specialists **at** the head **office**	Oct. 9–12, 2010

EXPLORING CURRENT PRACTICES THROUGH DIALOGUE

This phase investigated the background of BRAC's rural community capacity building system and explored the target beneficiary of this system and the initial contexts for FFs' focus and knowledge creation system and the target beneficiary and information lifecycle of the community.

The main goal of this phase was to enable the dialogue and participation by the different levels of participants in this community empowerment process who were geographically distributed in rural areas. This stage also focused on an exploring and codifying FFs' current practices by asking about their best and most frustrating experiences in their work. While working in this phase, I found other RSSs whose work was closely related to this community institution process, such as the RSS of Active Citizenship and Accountable Local Government and of popular theater. On some occasions, I decided on the spot to conduct complementary group discussions and informal interviews with them about their current situation and future challenges in this transformation work regarding to the vision of digital Bangladesh. During sessions with participants' (especially with RSSs), I encouraged them to talk

about their existing practices using their self-created materials, such as posters and their booklets to explore their common practices.

The aim of this phase was to understand existing practices. I identified some their common vocabularies and existing practices that corresponded well to the problem of ICT intervention. In the short and spot interviews, informal meeting, and discussions, I asked about participants' practices, opportunities, and challenge and how they viewed the digital Bangladesh vision and ICT deployment, especially as e-Governance activities are changing or affecting their existing practices.

Table 4-3 Steps Taken in Exploring Current Practices Based on Dialogue

Actions and Participants	**Time Period**
Meeting with key informants, rural community groups, and stakeholders in this development process	Nov. 2010–Jan. 2011
10 semi-structured interviews with RSS and FFs	Nov. 2010–Jan. 2011
Daylong participatory observations over 1 week: 3 UISCs visits with FFs and informal discussions with 3 UISCs entrepreneurs	Nov. 2010–Jan. 2011
Daylong participatory observations: 3 PS General meeting visit and 3 Spot interviews with PS leaders, 3 Local Resource Persons.	Nov. 2010–Jan. 2011
participation in FFs' (sub-distrct level) one annual meeting	Nov. 2010–Jan. 2011 (16th January 2011)

SYNTHESIZING AND SENSE MAKING: MUTUAL CAPACITY BUILDING

Participation is a collaborative, empowering process which brings dispersed people together to share common problems and opportunities based on their experiences and understanding. Capacity building helps contextualize individual problems and weaknesses and links them to realities and further actions for development and it is about a set of techniques for design conversation (Robertson et al., 2006). Regarding ICT interventions that seem acceptable and feasible to users or their impacted users, Ehn and Kyng (1987) argue that users need pre-qualification

understanding and learning in order to take part in the process effectively. Bødker et al. (1993) also explore the need for participants to have the ability to participate fully: "Full participation, of course, requires training and active cooperation, not just token representation in meeting" (p. 158). To enable users to contribute with their tacit knowledge in technology design process, it is important to stimulate future work situations which create illusion of actually working with the projected system (Bødker et al., 1993). Therefore, the research phases 3 and 4 were set up with the expectation that mutual learning and capacity building can support development of skills so that participants and researchers can participate effectively in all participatory investigations of ICT interventions.

In this stage of work, I switched my role from observer to activist, staging and conducting workshops. The main objective was to develop practitioners' ability to stand on their feet and give them appropriate ICTs with points of departure for their own work. Working with ICT skills made participants feel that they benefitted personally and professionally from participating in the workshops both. I reached a mutual agreement with the senior program specialists to continue action-based participatory workshops with two groups of talented FFs. Most FFs did not have a strong background in computing. However, contrary to my expectation, a few were skilled in basic computer operation and Internet usage. Some had received basic training in computer programs such as Microsoft Office but were not confident enough because of a lack of use and practice.

Table 4-4 Approaches Taken in the Synthesizing and Sense Making phase

Actions and Participants	Time Period
Meeting with key persons based on reflections on previous research phases and the triangulation of our understanding, observation, and data	February 2011–March. 2011
Meeting to negotiate mutual actions and FFs' ICT capacity building.	February 2011–March 2011
Development of training curriculum based on mutual understandings with key persons in this program.	February 2011–March 2011
Decision taking for mutual collaboration between selected FFs (at sub-district level) and Entrepreneurs of UISCs.	February 2011–March 2011

MEDIATING & ENGAGING: REFLECTING ON PREVAILING PRACTICE AND ENVISIONING THE FUTURE

In this phase, all participants attended the four episodes of activities. I have summarized the actions of the workshop sessions in Table 4.5 and Table 4.6. For these, I designed two-fold DLWs for eight district level FFs and eight FFs sub-district level. The focus at this stage was on framing a space for conversation and reflection in order to envision practitioners' future with their improved understanding of ICT capabilities. This workshop gave me a sense of how FFs can develop their capability to envision ICT-enhanced work processes. This phase also emphasized the learning outcome for newcomers in this group of practitioners. Participants used paper materials and photo-voice notes to create a frame for their perspectives of the present and the future. The main purpose of this exercise was to try to turn participants into 'reflective practitioners'(Schön, 1983) who can frame the problem in the situation, determine the features on which they will focus, the order they will attempt to impose on the situation, and the directions in which they will try to change it. "In this process, they identify both the ends to be sought and the means to be employed" (Schön, 1983, p. 165). In particular, the paper materials, the notes, and the collected photographs helped participants look at what they were doing and how other stakeholders were acting regarding the issue of ICT as an instrument for improving existing practices.

The goal of this phase was to illustrate some steps to explore how ICT can support the rural community empowerment process and how ICT-driven changes influence community development activity. The following were the objectives for participants in this phase.

1. Develop their own views of ICT, and create opportunities for new visions and scenarios to perform their work
2. Create opportunities for confrontations, discussions, and evaluations of complex change in information cultures and community development processes depending on the digital vision and ICT-policy-driven change

Figure 4-4 Workshop sessions with FFs

Table 4-5 The approaches taken in this Mediating and Engaging stage (Team 1)

Actions	Participants and Time
Episode *Seed* - Training in basic computer programs (Microsoft Word, Excel, and PowerPoint) - Conducting workshops on the usage of social network tools (e.g., Facebook, Twitter) and group forum tool (google group) - Allowing all 8 participants continue their normal work equipped with a digital cameras for one- week	Arrangements with 7 RSS (Distrct Managers), 1 Field Organizer and 1 Division Manager Time span: March 10th 16th and 19th 2011
Episode *Basis* - Individual presentation on one-week activities and sharing and discussing their individual challenges and findings with all participants (using collected pictures of their existing practices)	
Episode *Enhancement* - Three Group sessions with the collected pictures and materials (posters and sketch indicating the ICT usage opportunity and challenges) considering following three themes: a. Rural community's information challenges and ICT b. Stockholders Capability Building and The role of ICT c. Community Based Organizational Information Policy and The Role of ICT - Three Group presentations and participatory discussions on the above three different themes	
Episode *Evaluation* -Individual brief Interview	

Table 4-6 The approaches taken in this Mediating and Engaging stage (Team 2)

Actions	Participants and Time Span
Episode *Seed* - Conducting group meetings and discussion sessions with FFs on ICT-enabled UISCs - Demonstrating the usage of digital cameras - Arranging visit for each FFs' to 2 UISCs for observing activities and interacting with the operator of the UISCs (FFs were equipped with a digital camera).	
Basis - Individual presentations and discussion with other participants on weekly work activities - Presentation of individual ideas and new visions for the use of UISC in work (using collected pictures, notes, and Post–it notes)	Arrangement with 8 FFs (sub-district level) Time span: March 19th - 27th 2011
Enhancement - Group work with posters, flashcards, Post-it notes, and selected pictures on work processes and challenges - Group presentation and discussion on UISCs' activities and existing practices	
Evaluation - Presentation of individual ideas and new visions for the use of UISC in their work (using post-its) - Individual semi-structured interviews	

DATA CAPTURING METHODS

To achieve my goals, I employed a number of tools and techniques, some are briefly presented here.

***Spot Interview and group discussion*:**

Spot interviews were used to enable interpretation of any event participation and to increase my understanding and awareness of the FFs' or RIs' practices. These interviews were conducted to extract and clarify detailed information that I could not directly observe, such as feelings, thoughts, intentions, and missing information and situations not present at the time of observation. Spot interviews and group discussions enable researchers to access historical and personal information (Patton, 1990).

***Program documents analysis*:**

Reading materials, such as FFs' register books, documents, and bulletin boards, helped put into perspective data from other sources and improve the reflection. These materials also helped identify the relationships between different types of data and guided me in expanding the analytical view/frame.

Participation in different activities of FFs

Participation in different activities with FFs allowed building trust and relationships with them and gave them confidence to allow me to realize my ideas for workshops.

Photo-voice technique

There has been considerable interest in using photographs in social science and anthropological research, particularly as interview stimuli (Wagner, 1978; Hurworth, 2003). Photo-voice research method is first articulated by Caroline Wang and Mary Anne Burris (1997). They describe that "people can identify, represent and enhance their community through a specific photographic technique" (Wang and Burris, 1997, p.369). Wang et al. (1999) also emphasize that photographs can be used to enable community change. The photo-voice technique (Wang, 1999; Wang and Burris, 1994) improved understanding of data, got participants more active and engaged, and ensured the engagement of the whole community. My interest for photo-voice techniques also comes from the collaboration it stimulates. As Douglas Harper claims that "When two or more people discuss the meaning of photographs they try to figure out something together. This is, I believe, an ideal model for research" (Harper, 2002, p.23).

Picture: DLWs episodes with FFs **(**sub-district level)

In the design of the workshops, the photo voices stimulated in-depth understanding of participants' problems and situation. Participants developed a daylong activity photo documentary based on selected photos. In group work, they worked with their individual collected pictures, which allowed me to come closer to the unspoken talk of the participants. Also, the photo-voice approach appeared to give participants a richer understanding and sense of the complexity and potentiality of their situation, and using their own collected photos ensured active participation and created a feeling of ownership in that research activity.

Field Work Log Maintained Sept. 2010–May 2011:

I maintained a field work log during my study period. I immediately recorded all important information or remarks about the field visit or field participation in the log that same day. Table 4.7 shows the template for the field work log.

Table 4.7 Field *Work-log* [5]

Activity Description	Key Persons or Organizers	Date and Time	Organizations	Location	Future Actions/ Activities	Remarks
…	…	…	…	….	…	…

[5] Table content was not included in this table to guarantee promises of confidentiality made to research participants

Maintaining of Data Content Log:

Moving from a mass of qualitative data to a report or to results requires a method for organizing and keeping track of the data (Patton, 1990). I have prepared content log of unstructured interviews, meetings, group discussions, and workshop video/audio data. The content log gave me guidelines and an overview of each recording of video or audio information and field notes. To develop the content log of audio and video files, I followed the template in Table 4.8 step by step.

In Content Code, field visit is attributed by FV followed by a serial number for each trip for example FV1 for first field trip. Data of individual interview are identified by 'I' and group discussion/meeting are identified by 'G'. Each Participant is attributed by a number. In this way, (FV1-I-03) is marked as the data of an individual interview during the first field visit by a participant whose attributed number is 3 and (FV2-G-04) as the data of a group discussion /meeting during the second field visit by the participant whose attributed number is 4.

RIs' data are attributed by 'RI' followed by a number (i.e RI1) and the data of Digital Literacy workshop is attributed by DLW, followed by the episode initials (i.e. Seed for 'S'; basis for 'B'; Enhancement for 'En' and Evaluation for 'Ev'). For example: (DLW-Ev-3) is marked as data from the evaluation session of digital workshop from the participant of attributed number 3.

Table 4.8 *Sample of a Content Log*

Content Code: FV2-I-08
Data Format: Audio
People and Place: Scheduled Meeting with Senior Sector Specialist in the BARC head office **Date: Nov. 8, 2010**
Subject: **Regarding my last field visit in Mymensingh District**
Meeting theme: **Discussion of the current situation and future thoughts about ICT implementation**

Audio Record Item No: **FV2-I-08 (Duration 15.59 minutes)**			
Transcription:			
Time log	Discussion Themes	Meeting Discussions	Note
0.0.0–0.3.0	**Capacity-building tools**	*FA: I have participated in PS meetings and attended the workshop during my visit. Do you consider these to be tools for capacity building approach?*	How marginalized groups access information
	Rules	*08: It might not be considered only as a capacity-building process. If you attend the popular theatre, you will see that the event plays a role in disseminating information and creating public awareness of important issues. In the workshop, we work mostly with currently available information and try to make use of the information which, in turn, plays a role in capacity building for the PS members. While training focuses on capacity building, the workshop focuses on information and its use.*	

Table 4.9 *Sample Theme: 'Information Behavior'*

Questions	**RIs perspective**	**FFs' perspective**	**Content**

generated			**Log code**
Kind of information sought	Livelihood, health, education, employment, human rights, and agricultural information	Current and updated information health, education, employment, human rights, and agricultural information in mediums such as government gazettes, circulars, and advertisements on health, employment, and agriculture	FV1-I-02 FV1-G-01
Information sources used	Community FFs, family and friends, community resources: Potential participants such as community members and leaders School or college teachers, NGOs members at the community level	Contact with municipal governments, NGO visits, newspapers, television news, radio news, internal organizational contacts, local leaders, local community members, RIs meeting and workshops	FV2-I-08
Challenges accessing these information resources	Motivation, trust, powerlessness, social relationships, literacy, gender		FV3-I-02 FV3-I-03

WHY TRUST IN MY INTERPRETATION?

I have outlined how I planned to conduct my empirical research and explained the rationale. Now, I present how I analyzed my findings and argue why other scholars should have faith in my interpretations. To establish this reasoning, I must return to activity theory because my argumentation for the relevance and trustworthiness of my data interpretations rely on the following assumptions, which might metaphorically be seen as triangulation, or the process used by surveyors to determine the location of a point by measuring the angles to it from known points at either end of a fixed baseline. In my research, my one known point is activity theory, which is used as a prominent source of sense making by scholars in the field of HCI (Kaptelinin, 2005). My second known point is my account of what I have

done in the field and what the FFs and other actors said to me. By critically reflecting on the angles between the baseline and the sense I make of my case study in regards to my research problem—a knowledge creation perspective of ICT appropriation—I try to establish a route for other scholars to follow so that we can jointly discuss the trustworthiness of my sense making.

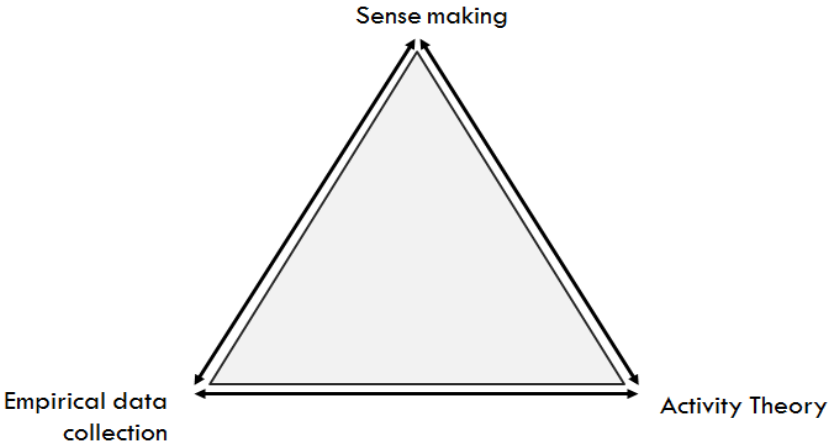


Figure 4-5 Triangulation as a response to data interpretation: empirical data collection, activity theory, and sense making

I have already accounted for the empirical end of my baseline, so I account for the other end: activity theory as a trustworthy foundation for sense-making of empirical data. Engeström (1987) expounds on the value and strength of activity theory, with its philosophical roots in dialectical thinking and basic assumption that all change stems from the clash between opposites: in other words, from contradiction. Specifically, in Engeström's (1987, 2000) explanation, these are not any contradictions between opposites but between opposites formed within the concept of activity that Leontiev (1978) formulated: subject meets object as mediated by tools, language, organization, and skills to operate the mediators in to accomplish the overall wish, which Leontiev calls motive. These two lines of contradiction, running orthogonal to each other, create a dynamic in-equilibrium which requires learning of both the individual and the community to which the individual belongs.

Engeström (2000) also defines contradictions as historically accumulating structural tensions within and between activity systems. To analyze FFs' activity, I conceptualized the tensions that emerged from studying their activities. The contradictions I found arose from the FFs' concerns about the challenges of different kinds of mediation work or tasks and other difficult situations in the context of ICT implementation (see chapters 5 and 6 for details). In rural community development, activities are subjected to long-term influences by their

surrounding information-resource community, such as government agencies, NGOs, and available ICT, which create tensions and opportunities in everyday practices. By revealing the tensions and potentiality of elements of activity systems and the interaction between different activity systems, it is possible to reconstruct the existing activity systems, show their richness and diversity, and predict the development of the system (Engeström, 2000).

My aim as a PhD researcher was not to eliminate or resolve all the tensions but to find ways to create an environment in which tensions can stimulate participants' knowledge creation and motivation. I applied activity theory to analyze data in two stages: first stage analysis is based on the data from the first two phases of data collection and second stage analysis is a comprehensive analysis of results from the first stage analysis and the data from the intervention phases (3 & 4).

Activity theory is used as an instrument in the data analysis which considers the following components assumed to interact dynamically and continuously with one another: subjects, objects, mediating tools, languages, organization, actors' skills and wishes, and the web of their interrelationships. In the workshop data, I aimed to see when and how actor–participants transformed their objects and took agency during workshop activities and what mediators they used in transforming these objects. Therefore, I asked 'What kind of tensions emerged within the FFs' activity?' and 'What kind of ICT-related non-well-being tensions came up during the ICT-driven change situation?' Investigating FFs' challenging situations using activity theory as an analytical tool revealed insights about mediation relevant to the dynamics of mediation and knowledge creation in rural context.

FIRST STAGE OF DATA ANALYSIS

The concept of tension as contradiction can arise in different circumstances, for example, during the introduction of a new tool, such as new ICT-enhanced information service or e-governance activity, which requires new skills or knowledge in human mediation practices. This creates new tensions for FFs and their target group RIs when they interact with other activity system for e-services because the new community (the e-service provider) might have a different motive or objective for providing e-services. The tensions and challenges within a mediation practice which I consider an activity system of FFs was examined to find a possible means for ICT appropriation in this intermediation practice and to show the potentiality of ICT in rural community capacity building practices.

By defining FFs as the subject of one or more activity systems, I established a framework for analysis of what they told me about their work, what they did in workshops, their different activities, and their ICT knowledge creation activity. Thus, I could learn about their collaboration as a mean to knowledge creation and capacity building. The data from semi-structured interviews, spot interviews, and

observations provided knowledge about subjects, objects, mediating tools, languages, organization, actors' operational skills and wishes, and the web of their interrelationships. Based on that knowledge, I could identify the tools, rules, and communities that enable the FFs to affect the object (i.e., collaboration with inter-organizational community, community group RIs). The social power roles, social norms, and strong hierarchical monitoring system and highly geographically fragmented location of FFs become visible when asking about division of labor. This knowledge adds up to an overall picture of FFs; activity system and allowed me to understand thoroughly the dynamics of FFs' knowledge creation process.

To operationalize my work in this analysis, I am inspired by Mwanza-Simwami's (2009) idea of the decomposition of activity systems which followed three operational guidelines:

i) Focus on the object of activity.

ii) Focus on an actor or a doer of activity represented by a subject or a community component.

iii) Focus on a mediator of an activity represented by the tool, rules, or division of labor component

Mwanza-Simwami (2009) uses activity system decomposition adopting Engeström's activity triangle comprised of subject, object, community, tools, division of labor, and rules, which are interlinked as explained in theoretical foundation chapter 3.

By going through the elements of the activity system according to their position in the diagram (see Fig. 3-2), my analysis verifies how the subject the FFs perform on the object through the different elements of this activity system, such as tools, division of labor, rules, and community. Thus, one main relationship—*subject-mediator-object*—is considered crucial in investigating tensions where only the subject performs the actor position of this analysis, and the community, rules, division of labor, and tools are considered mediators of that activity. Thus, I have devised a decomposition of the activity system which I apply to my data, generating diagrams of four specific sub-activity systems shown in Fig. 4-6.

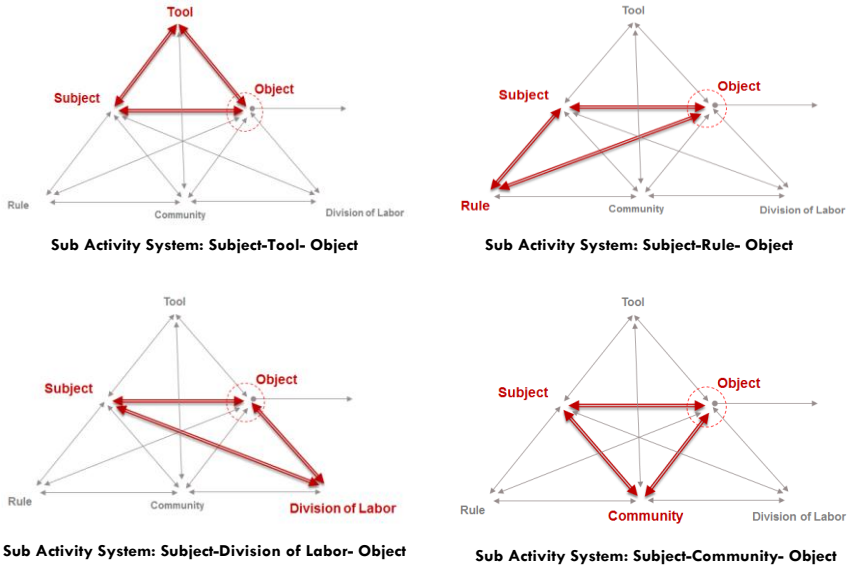


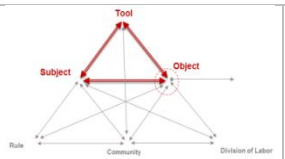
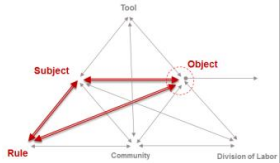
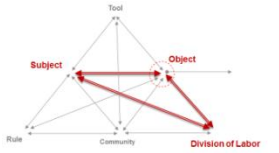
Figure 4-5 Diagrams of four sub-activity systems

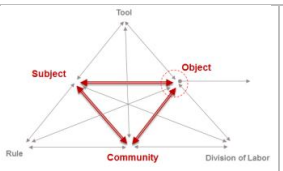
These four sub-activity systems lead to four general questions for investigation based on the activity theory perspective and to specific investigations for the specific set of questions (details in Table 4.10) based on my conceptual framework and the research question presented in chapter 1 and 3. The decomposition of activity systems modeled for tension analysis is intended to minimize the complexity of the data analysis and organize the data into more handy constituent units.

Table 4.10

Four Sub-activity Systems Triangles and General Questions and the Generated Questions of the Data Investigation

Sub-activity Systems	**Questions Generated for Data Extractions**	**More Specific Questions for Data Extractions Considering the Conceptual Framework and Research Questions**
Subject–Tool–Object	What tools do the subjects use to achieve their objectives, and	▪ What tools do the FFs use to achieve the objective of rural community capacity building, and how? ▪ How do ICT tools help FFs

	how?	support RIs' capacity building activities?
Subject–Rule–Object 	What rules affect the way subjects achieve their objectives, and how?	▪ Do the rules for conducting meetings or workshops influence the way FFs share knowledge to support their objective of RIs capacity building? ▪ Do the rules for information collection by government agencies, NGOs, and fellow FFs influence the way of FFs work to support their objective of RIs capacity building?
Subject–Division of Labor–Object 	How does the division of labor influence the way subjects satisfy their objectives?	▪ Does the division of labor in meetings and workshops influence FFs share knowledge and collect information to support RIs capacity building? ▪ How does the role of distributed information resource persons affect FFs' work to achieve the objectives of the RIs? ▪ How does the role of fellow FFs affect FFs' work to achieve their objectives?
Subject– Community–Object	How does the community influence the way subjects achieve their objectives?	▪ To what extent does the Local Resource Person working with RIs achieve the objective of RIs capacity building? ▪ How does inter-generation

		play an important role in achieving the objective of FPs' RIs capacity building? ▪ To what extent do information resource organizations influence the way of FFs knowledge sharing work to support the RIs' capacity building approach?

Searching for the tensions led to the identification of different categories, which I labeled as *ICT-related non-wellbeing, ICT-policy-driven change, highly geographically distributed information resource systems and the collective level of work for knowledge creation*. For each category, I synthesized the tensions considering the mentioned four sub-activity systems diagrams. The aim of these tension analyses was to comprehend the knowledge expansion and broaden understanding of the community challenges in developing country context. These tensions characterized ICT introduction and knowledge creation when I employed participatory design activities as intermediary tools and actions at the FF level (see Chapter 6 for details). The outcomes of the analysis (see Chapter 6) demonstrate how tensions can lead to opportunities for ICT appropriation and reveal emerging tensions in the rural community context.

This analysis not only help to elicit tensions but showed a systemic way to interpret (see Chapter 5 for details) the challenges of rural community development activities and to identify potential areas and tools. I used the actual language of interviews and field notes as much as possible during my interpretation in order to provide deep insights into the lived practices of FFs.

SECOND STAGE OF DATA ANALYSIS

At this stage, I analyzed the insights from the participatory workshop activity with FFs, intended to develop a mutual learning framework among the FFs for ICT skills development.

The concept of activity provides a way to characterize aspects of social practice as dynamics of collective activities and the realization of collective activities within institutions when the social practice takes place through a subject's actions (Chaiklin, Hedegaard, & Jensen, 1999). This theoretical assumption helped make sense of the data while keeping the focus on knowledge creation. The process of

FFs' work and the transformation of community capacity-building practice are local and historical processes. The continuous renewal and changing of processes affects the activity systems through the expansive learning cycle, in which the community initiates and seeks new solutions and makes sense of the work process. The object of expansive learning comprises the whole activity system. The expansive learning cycle enables systematic analysis of the learning and developmental situations and modeling of new relationships; we can also examine the prevailing model, implement the new model, and reflect on the outcome into a new form of practice (Engeström, 1999b). To give an overview of my conceptualization of this theory, I have in Fig. 4.7 modeled the expansive cycle as I understand it.

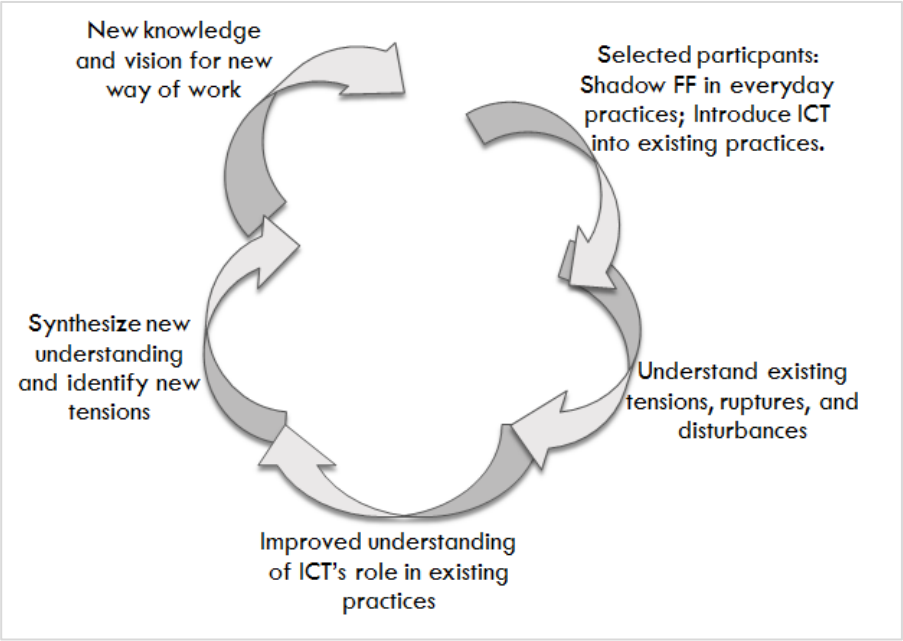


Figure 4-6 Expansive learning cycle adopted for research design and analysis

In the first stage of data analysis, the data from the first two phases of research showed how emergent ICT-policy-driven change in local government activities and the public organization's information practice created new tensions in information access by less-privileged groups from rural areas. The ICT implementation seems to have amplified the tensions at the FFs' level, and consequently, they struggle to achieve different foci with a lack of ICT-related well-being. Realizing this trend, I designed and facilitated DLWs to allow negotiation and mutual collaborative learning (see detail analysis in chapter 6). My aim as a researcher was not to eliminate or resolve all the tensions, so Fig. 4.7 describes the different steps

employed in the expansive learning cycle to analyze actions based participatory design workshop activities.

Thus, in the ***second stage of data*** analysis, I used the previously identified tensions as a *springboard* for investigating participants' ICT knowledge expansion and creation. Here, I focused on better understanding the use of ICT in rural community development activities through knowledge creation activities within a team of FFs. Asking "Would the ICT introduction process enable knowledge expansion, and how?," I analyzed the workshop process from the perspective of expansive learning (Engeström, 1987). I did not impose a new model on existing practices but tried to stimulate a new practice. Hence, research phases 3 and 4 were designed to mediate and engage the practitioners in the transformation of existing practices and to suggest ways to adapt these practices for community development practices. The participatory design workshop approach was employed as an *intermediary* and the photo-voice technique for dialogical design space creation and storytelling aligned to FFs' skill development. In the analysis of these activities, I try to describe the mutual learning systemic reflective view and its dynamics.

Thus, the outcome of this second level analysis (see Chapter 6) includes the systemic interpretation of ICT knowledge creation at the FFs level. I also explain the process by which I try to resolve the prevailing tensions, such as ICT-related non-wellbeing tensions among FFs vs. ICT-driven change, through mutual learning tools and techniques.

CONCLUSION ON THE SINGLE CASE STUDY

In this chapter the research approach and design were exemplified, and a description was given of how data collection and analysis were accomplished. Conducting a single case study as a combined ethnographic-inspired research and participatory design workshop has provided deep insights into the problems and practice of FFs in community development practice and detailed knowledge about the appropriation of ICT and the possible changes in practice when implementing ICT. This single case produces general findings about the tensions and their transformation which can be transferred to other regions and settings. This method building on Engeström's (1987) model provided a productive framework for organizing and analyzing the data what I have presented in Chapters 5, 6 and 7.

CHAPTER 5. FIELD FACILITATORS AS MEDIATORS OF EXPANSIVE LEARNING

In this chapter, I analyze the situation in the case at the time of my visits based on interviews and observations. The analysis is guided by my objective to understand FFs as mediators of expansive learning of ICT in rural Bangladesh. As the reader might recall, in my account of the theoretical foundation of my work, I mention Vygotsky's (1978) idea of "more capable peers" (p.86) as a key factor providing safety in an explorative learning situation. In this chapter, my point of departure is that the FFs I encountered perform this role but have difficulty doing so. Therefore, I want to dig deeper and identify the problems and potentials of their position.

The concept of expansive learning (Engeström, 1987) is a principle which implies a radical localism and points to the societal relations and contradictions of the given sociocultural formation. In this study, the societal structures of activity are carried out by rural communities' FFs and their surrounding stakeholders. Analysis occurs at the micro and meso levels, looking at the collective activity performed by individual FFs because development and expansive learning views society as multilayered, interconnected activity systems.

Using Engeström's (1987) expansive learning theory, I worked the field data into learning circles. First, I reviewed the data to identify first-order tensions in the relationships between elements of the triangular model (Fig. 3-2) and asked: What are the tensions between top-level governmental and NGO actors and FFs, and how are these tensions shown in my material? What are the internal tensions in FFs' work, especially regarding how tools mediate the objectives of their work. Additionally, I looked at the first-order tensions as they are manifested and mediated in the community, culture, and rules. Having answered these questions, I conclude the chapter by listing the tensions that laid the ground for the second-order analysis in the participatory design digital literacy workshops (DLWs), discussed in chapter 6. Thus, this analysis lays the foundation for a qualitative change situation and new knowledge creation, which Engeström (1987) terms expansive learning.

If the reader recalls Engeström's (1987) triangle diagram, I take the FFs as the subject' of an activity system, RIs capacity building through knowledge creation as the object, and the socio-political capacity development of less-privileged rural groups as the outcome. The data were not collected only from the FFs but also from the surrounding context, including the program's senior practitioners, and from an

exploration of how the RIs learn and build their capacity through participating in capacity building activities.

Activity systems are characterized by inner contradictions (Engeström, 1987, 1993, 2000). In this case looking at rural ICT development from an activity theoretical perspective reveals a persistent tension between the use value realized on the ground in a rural village and the exchange value of introducing ICT from a governmental perspective. This contradiction cannot be eliminated but it is the driving force for change and the moving force behind various disturbances. In this chapter, I understand tensions in the context of the components of an activity system. This study explores "tension": as a term used by activity theory to refer to problems, disturbances, breakdowns, and clashes (Kuutti, 1996; Murphy & Rodrigues-Manzanares, 2008b). In this analysis, *tensions as contradictions* concern the importance of the field-level work sector. For example, FFs join the ICT development community to make visible their information access, knowledge creation problems, and challenges when ICT is introduced into their existing process and practices. This investigation of tensions also points to the need for more local-context-sensitive ICT introductions.

More specifically, these two interlinked theoretical concepts of 'tensions as contradictions' and the 'expansive learning' were used as analysis tools. Thus, the theory of expansive learning is considered from the following perspective of the analytical implications for FFs' intermediation practice:

i) A descriptive and analytic tool for arranging the components and relationships within the intermediation activities of FFs. For example, the basic model of Engeström's (1987) activity system was used to describe and represent the structure of intermediation activities in the focused FFs' (subject) areas (see Fig. 5-1).

ii) A descriptive and analytical tool for mapping out different tensions and their relationships within the intermediation activities with the help of the principle of contradiction using four sub-activity systems (see figs. 4-6 and 5-2)

iii) Analysis of FFs' intermediation system from the perspective of FFs' existing practices and principles of rural community development requirements and from the perspective of identifying the tensions, contradictions, and changes that emerges as a result of introducing ICT-driven change for digitization.

iv) The creation of new knowledge objects, *two systemic tensions* (see Fig. 5-4), used as stimuli for the second staged analysis of participatory design DLWs (in research phases 3 and 4) and as *springboards or facilitators* of ICT knowledge creation among FFs.

In this chapter, I attempt to investigate i) the elements of this capacity building activity and ii) how the elements shape FFs' perception of the object and how FFs respond to human capacity-building process. The analysis is divided into two parts. First, I explain the elements of the activity system in order to identify potentials and contradictions, for instance, what tools FFs use, who acts with the FFs on this objective, and what rules conform to achieve their objectives. Then, Analyzing contradictions as tensions, disruptions, and challenges (Barab et al., 2002; Basharina, 2007; Kuutti, 1996; Murphy & Rodrigues-Manzanares, 2008b), I identify tensions between the four sub-activity systems, as demonstrated in Chapter 4.

As discussed in the theoretical foundation Chapter 3, the object in an activity system is regarded as the raw materials which need to be shaped for fruitful results or outcomes, and the object of any activity defines its goals or actions (Engeström, 2001). Thus, the four sub-activity systems are considered here to identify the tensions when the subject FFs act on the object, creating difficulties for the subjects to achieve their objectives.

In exploring the sub-activity-systems, I found significant interactions and tensions between elements of the activity system by asking specific questions regarding FFs' work. The tensions are discussed here by uncovering the themes in the data that generated specific questions in Chapter 4 (Table 4-10). To verify how the subject (FFs) performs on the object through the four elements of this activity system (e.g., tools, division of labor, rules, and community) and where the tensions emerged, tensions in the four sub-activity systems (see Fig. 4-6) are analyzed.

The following section explains how FFs are termed the subject of this Activity System, as well as their mediating elements and other contexts. The following sections describe the tensions areas at different sub-activity system levels and maps the interlinkages of those tensions.

INTRODUCTION TO DIFFERENT ELEMENTS OF FIELD FACILITATORS' ACTIVITY

Tensions as contradictions can motivate step forwards in different circumstances, such as the introduction of a new ICT-enhanced information service or e-governance activity that requires new skills or knowledge in FFs' mediation practices. This situation creates new tensions between FFs and their target RIs when they interact with other activity system in e-services because the e-service provider might have a different motive or objective for providing e-services than FFs and local residents in general. Understanding the tensions and challenges within mediation practice gives insights into the motives and objectives of the actors in an activity system. In my analysis, I focus on mediation of the objectives caused by the

relationships to the community, rules, and division of labor within RIs capacity building.

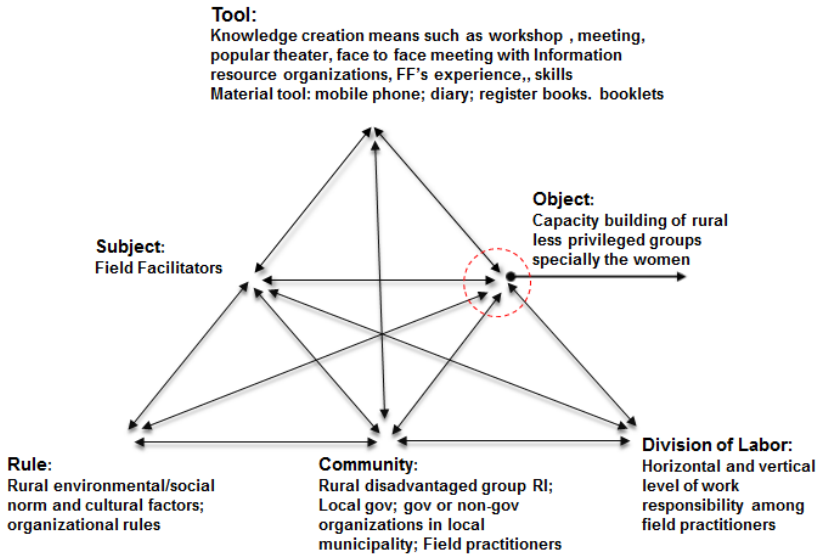


Figure 5-1 Modeling of FFs' basic activity system

I model the basic activity system (Fig. 5-1) of RIs capacity building with FFs as the subject (considering the FFs working at the district and sub-district levels, namely RSS/district managers and FOs, respectively).

FIELD FACILITATORS AS SUBJECT IN CAPACITY BUILDING MODELED AS AN ACTIVITY SYSTEM

The study views the FFs (subject) working at the sub-district and district levels as the central performers of rural community capacity building. FFs at these levels work on shared objects which comprise work with the rural marginalized people regarding their information needs and the collection of information about human capacity building, training, and livelihood information for reporting to the pertinent managers.

Local resource persons, such as health care advisers, community healthcare field workers, education advisers, legal advisers, and other local facilitators, are in urgent demand in rural Bangladesh. Poor infrastructure, poverty, low literacy, and lack of ICT-related well-being or access to ICT opportunities limit access to basic information, making the basic learning process difficult for rural communities, especially marginalized people in rural areas. To counter these challenges, FFs

constantly work with RIs to facilitate socio-political development, learning, and knowledge sharing. FFs also attempt to collaborate with the wider community of local authorities in health, education, legal, and human development services and various social-benefit-related services, as well as with other FFs.

The material tools here are the meetings, workshops, popular theater and note-taking diaries by pen and paper, while the psychological tools are FFs' practical experience of working with RIs and their knowledge of local situations. Feedback is the form of action which is also the outcome of the FFs' activity system. Here, feedback includes feedback to the community, to higher levels in the form of reports, and to colleagues working in same region.

TOOLS AND ARTIFACTS THAT SERVE THE FIELD FACILITATORS' CAPACITY BUILDING ACTIVITIES

The tools that FFs use to act on and transform the object—feedback, as mentioned—are materials such as diaries, basic mobile phones, information catalogues, newspapers, and pictorial materials, as well as psychological skills and experience, and trust relationships with community. For materials, FFs at the district and sub-district levels use mostly register books, paper forms, mobile phone, and computers for composing reports and sometimes sending report or email. The official mean of transportation for FFs at the district level normally is motorcycles, while FFs at the sub-district level travel on foot or in three-wheeled passenger carts (*rickshaws*) to less-privileged rural groups, to organizations, general meetings, and workshops.

Rural Institutions' General Meetings and Workshops

FFs support RIs during meetings and workshops which follow guidelines and handbooks in order to maintain the schedule and ensure coherence in discussions. In RIs meeting sessions, FFs use diaries or notebooks and RIs' register book to track previous meetings' resolutions and decisions and the current information needs and ultimately identify problem issues in their community. In the workshops, FFs use different teaching aids, such as posters, flashcards, guidelines, chalkboards, and techniques (e.g., group discussions, question-and-answer sessions, storytelling) in order to make the discussion and suggestions easy for participants to understand.

Picture 1 left: Workshop session with PS leaders. FFs run workshops and training sessions using paper-based materials, oral presentations, and discussions. These are one-to-many and many-to-many situations, in which both presentations and group discussions take place

Picture 2, right: An FF disseminates information to the RI in the village, along with a local resource person (LRP). The tools used in this process include a paper-based form for demonstrations and oral explanations so that the RI members remember the information. This is a one-to-many situation, and the FF, PS leader, and a LRP collaborate in presenting information to PS members.

Popular Theater

'Popular theater' is an important tool used to promote RIs capacity building. The theater has gained much popularity and successfully attracted large local crowds mainly because the performers use the local dialect and everyday language. The performances are mostly informal and improvised, and dialogues are sometimes gender sensitive, promoting positive attitudes toward women. Through constant monitoring and management of these theater activities, FFs try to bring about positive change in attitudes toward women and to create positive images of women in rural communities.

Skill and Experience of FFs

Along with the tools discussed, the FF's subject position also influences the psychological type of tools (e.g., FF's personal experiences, skills in rural community development work, interpersonal-relationship-building capability). These mediating tools are used as learning aids when FFs share their knowledge with RIs, co-workers, fellow FFs, and information resource persons in different organizations.

RULES GOVERNING THE CAPACITY BUILDING ACTIVITY

Cultural practices, social norms, and organizational rules drive and regulate FFs interactions. FFs have to conduct meetings and workshop with RIs and meeting with resource organizations based on the current needs of RIs. FFs must organize RIs information and data for weekly and monthly reporting to their managers at the district office. The district-level FFs (RSS) have to prepare reports and send them to the regional level. They occasionally send daily reports about, for example, an issue of serious violence involving any member of RIs in their community. Also, district-level FFs coordinate the flow of information to information resource organizations, arrange for local resource persons to attend RIs meetings and workshops, help adolescents mitigate the limitations of RIs, and collect information from RIs, information resource organizations, and local resource persons.

GROUPS OF PEOPLE WHO WORK TOGETHER IN COMMUNITY CAPACITY BUILDING

FFs work with the community to achieve the goals of capacity building. Attendees at meetings with RIs include the local resource person, RI member, the community educated adolescent who writes meeting resolutions, and FFs (both FO and RSS) who collaborate on shared problems. In a wider sense, community-based organizations, members of the community's RIs, teachers in the community school, health workers at community health center or the BRAC health department, officials with human development services, and local government representatives are part of the community because they all are responsible for driving the object to achieve the outcomes of the meeting. Hence, seen as an activity system, the community consists of FFs (subject), information resource organizations at the municipal and district levels, local governments, donors who influence the object of this activity through supporting different community capacity building programs, and the RI members in a particular district.

Local Resource Persons

Local resource persons (such as health care advisers and workers, educators, local government representatives, and other community facilitators or leaders) and information resources are in urgent demand in rural Bangladesh. Poor transportation and other infrastructures, poverty, low literacy, and a lack of ICT-related well-being and access to ICT opportunities hinder the less-privileged rural groups from accessing basic information, making difficult the basic learning process. Responding to these challenges, FFs constantly work with and engage local resource persons in RIs capacity building activities, such as RIs general meeting and workshops.

Information Resource Organizations

FFs regularly visit different community and municipality organizations to access information about different government and non-government services for RIs. Usually, FFs at the sub-district level visit local community and municipal organizations to access information. The leaders or members of RIs sometimes accompany the FFs while visiting these organizations. Their input helps local government authorities identify eligible recipients for government safety programs and social protection schemes, such as food aid cards or allowances for the elderly, widows, freedom fighters, and disadvantaged people. FFs also help the RIs receive other resources, such as student allowances for children, installation for tube wells for less-privileged community, and skills development training programs provided by government agencies and NGOs. The poor and vulnerable have difficulty accessing their information and related services.

Picture: A FF collects information from the Department of Public Health Engineering (DPHE) in her sub-district. Tools used in this process include official documents from the health department (not in the possession of the FF), and a pen and a paper notebook for making notes about relevant information. This is a one-on-one situation, and the FF serves as a carrier of information.

In this context, FFs work as information brokers. The following excerpt from a FF reveals this role (my translation).

'*We regularly visit different organizations, sometimes with the RI leader, in order to find out information about new programs or services for members of our RI. We also receive information about new services from our colleagues who are working in different sub-districts or districts. If we get any new information about those services, we first inform our RIs, and then we try to contact other field facilitators by mobile phone to make them aware of that service. … Sometimes we discuss the issue in our monthly meetings and try to find ways to get more details by visiting the specific organization or the resource person*.'(FV2-I-4)

DIVISION OF LABOR: WHO IS RESPONSIBLE FOR WHAT IN THE CAPACITY BUILDING ACTIVITY

The division of labor shapes how the subject(s) acts on the object and, in turn, is shaped by the actual working power relations (Engeström, 1987, 1993). The vertical and horizontal distribution of organizational responsibilities and the power relations with the external organizations determine the division of FFs' work responsibilities.

RIs are expected to invite local resource persons to their meetings, FFs visit municipal organizations (sometimes with the RI leaders) in their sub-district level, and district levels FFs are responsible for district-level organizations. The introduction of new institutions and information for human capacity development can force a shift in the roles of FFs, as well as community groups.

Example of the Division of Labor in RIs general meetings

In a general meeting, RIs need to be introduced to a variety of learning and knowledge-sharing tools, and the FFs should have learning and knowledge creation aids ready to ensure that RIs actively participate in the meeting. A description of the chain of actions from my field work notebook can illustrate this use of tools.

Table 5-1 *Distinctive Chain of Actions in RI's Meeting*

Action 1: Preparing for the meeting with community groups, looking at the notebook and register book for detailed information on that RIs'current needs
Action 2: Make a phone (mobile) call to the local resource person (e.g., community health facilitator or worker, school teacher, local government representative, knowledgeable person, community leader) and leader of that RI to remind them about the meeting, time, and place so that they can arrange for participants to arrive on time
Action 3: Start the meeting with the RI, identify its problem areas, and introduce the local resource person to the RI (if the local resource person is new to some members of the RI)
Action 4: Discussion lead by the local government representative
Action 5: Sharing of RI members' problems in detail with the local government representative; explicit explanation of the problem to the RI by field practitioner, using different examples
Action 6: Take a decision to find a new local resource person based on the current information priority for next meeting; identify the organization (name and location) which the RI needs to visit, with or without the FF; recording of the meeting outcome, decisions, and future actions in the FFs' notebook or diary
Action 7: Assistance for the RI from an adolescent girl to write the same

information, such as meeting outcomes, decisions, and future actions, in the RI's register book.

FFs, mostly at the sub-district level, were observed to be involved in sending invitations, making arrangements, and coordinating with the RI for the meetings. FFs also made decisions regarding the urgent needs in the RI. Controlling and coordinating these actions requires different steps of action, such as maintaining the RI register, regularly checking the need lists, and reviewing earlier lists of required information from FFs' diaries and the RIs' register book. FFs carry out actions to fulfill the main objective of make RIs aware of the current situation, information needs, and ways to find information and create knowledge.

In the **first and second actions**, FFs paid attention to the information resource materials and local resources person arrangements.

In the **third action**, the focus shifted to the local resources person. From interviewing the FF immediately after this series of actions, I realized that this action sometimes deviated from the standard way of work. Instead of calling the selected local resources person, such as the member of local government on duty, the FF or RI leader sometimes invited respected members of the community who were well known to them. FFs informed me that they sometimes did this because of the unavailability of local government member or other valuable resource persons during the scheduled meeting time.

In the **fourth action,** the subject position was taken by the local government representative, and the FF moved to the background. During the observed meeting, the local government representative was invited to the meeting as the local resource person. She showed the original form of digital birth registrations and explained how it should be filled out, where to submit the form, and whether submitting it requires paying a feed. She explained the need for birth registration forms in future situations in a very concrete, detailed way. In this action sequence, an important mediating factor is the division of labor between the FF, community members, and the invited local resources person. The FF knows that it is important to explain not only how to fill in the form but also the important future benefits of doing so. Her deep knowledge of community needs and practices helped her realize the importance of sharing how to fill out and send birth certificates.

In the **fifth action,** the subject position was taken by the community group members who face other difficulties. One member informed that she wanted to get her child's birth registration certificate which is needed for admission to school but couldn't mange without money. She expressed her frustration to the FF and local

resources person. This action of meeting arrangement was mediated by community members' practical experiences and challenges.

PURPOSES OF THE ACTIVITY

The primary object of the FFs' activity is the RI's capacity building and wellbeing. FFs express their overall goal as ensuring information availability, usability and knowledge creation for RIs. In addition—or in activity theory terms, the secondary object is to report to their managers and make them help strengthen community development activities.

INVESTIGATION OF THE TENSION AREAS OF FIELD FACILITATORS' ACTIVITY

In this section, I have attempted to organize my field data using the components of an activity system (Engeström, 1987) to scaffold my analysis and presentation. I shall now examine the tensions FFs face and how I see these tensions hindering FFs from achieving their motivating goal: the social and political wellbeing of the RI. Identifying the major tensions also helps me to see how the division of labor, rules, and community mediate between subject and object and what tensions representing the four sub-activity systems emerge.

Dividing the material into four sub-activity systems helps identify the relation of the tensions to the common object. For instance, the question, "How does the division of labor mediate the subject's work on the object?" can define tensions in the practice of this mediation constructed by the specific division of labor to model FFs' activity. The object is continuously constructed (Engeström, 1987, 1999b), so the object also continuously defines the actions and horizon of work. Thus, identifying the sub-activity system of *Subject–Division of Labor–Object* indicates to what extent the division of labor mediates how the subject works on this object.

SUB-TRIANGLE: SUBJECT–TOOL–OBJECT

FFs use different learning and knowledge-creation strategies and tools for capacity building in rural, less-privileged communities. FFs facilitate RIs' work with practical demonstrations of information and guide RIs to gain needed information in different domains, such as public health, education, legal services, and skills development training (in fishery, agriculture, livestock, sewing, and etc.) from government agencies and NGOs in their municipality. Among the most common mediating tools used by FFs are face-to-face meetings and workshops with RIs, the presentation of pictorial formulations of information, practical demonstrations, and explicit illustrations of information and its use. This practice can causes excessive information load during RIs meetings and creates tension between the large

information load and the time available for RIs' knowledge and capacity building. Sometimes, managing this tension is beyond the capabilities of the FFs. Allowing time to process the information a suitable pace for RIs, however, hinders FFs' ability to deliver all necessary steps. FFs sometimes feel exhausted because of their desire to fulfill their goals, their need for more information, and the need to give explicit explanations to RIs. FFs feel that it is difficult to create knowledge and understanding for action as they wish.

FFs use different techniques to transmit and disseminate information. When using photographs, posters, or others verbal messages, a great deal of skill and effort is required to formulate these materials so that rural residents can easily understand them. The purpose of communication and information transmission is to influence RIs so that they respond well and make appropriate decisions based on that information. The following quotation of one FF describes this process:

'*We need to talk all the time in the meetings and workshops, especially during the workshops. Sometimes, we feel that we are exhausted from dealing with RIs, especially with those who do not have that kind of ability to understand the information in a normal way. RIs need to expose different types of learning strategies for motivation"(FV2-I-3).* In this respect, it is important to note that informal relationships sometimes work better than formal ones, as the FF explains: '*They just want to share their problems with me and do not want to share with any local resource person because they are scared of formal communication with the local resource person of any resource organizations" (FV2-I-3).*

Most FFs had limited access to computers and a low level of computer literacy and preferred traditional paper-based writing and communication. Some a little bit more familiar with computer and online communication were also frustrated and reluctant to use computers and the Internet in their everyday work and communication because of their limited knowledge. During one meeting, a senior practitioner in the head office said that "*FFs don't show any interest or motivation to use computers, although we have provided some of them computers." (FV3-I-1)*

During field visits, I realized that the lack of ICT skills and knowledge, poor infrastructures, and absence of permanent technical support hinder the computer illiterate from using computers. Additionally, the FFs' work in the field and little time in the office keep them away from working with the available desktop computer. The following excerpts from the transcript of conversations with FFs illustrate the ICT-related tensions in their work:

"I have little knowledge about computers. I mainly use the computer for composing the monthly reports." (FV3-G-4)'

"I don't have much idea about computers." (FV3-G-12)

"I took some basic computer training earlier. I might have forgotten it because I don't practice." (FV3-G-13)

"I don't have clear knowledge of computers and the Internet." (FV3-G-14)

"I do not have any email ID. That's why I sometimes use other people [a friend or computer shop operator] e-mail ID to receive or send any urgent mail. I think using e-mail to send or receive any document is easy and convenient as the postal service is not always reliable and takes time." (FV3-G-5)

"We need an uninterrupted supply of electricity to use computers, which we do not have." (FV3-G-16)

"I have a shared computer facility in the office, but I do not get enough time to sit in the office with the computer because we have to spend most of our time working in the field." (FV3-I-5)

"I sometimes prepare reports using the computer, but I sometimes need help from a nearby cybercafé operator." (FV2-I-3)

'I use email and Facebook frequently when I get back home after work. I have a computer and Internet access at home." (FV3-G-9)

FFs at the district level have access to shared computers and Internet access at their offices, although the Internet service is not satisfactory. At the sub-district level, FFs do not have access to computers in their offices. They have to go to cyber cafes or SICTCs for paid service, which discourages them from use computers frequently in their work. The lack of an uninterrupted supply of electricity is also another reason which demotivates FFs to use computers in the office.

Computer and Internet illiteracy creates a technology dilemma for FFs. One FF argued that working at the field level requires only the relevant information, not a computer: "*Computers are not for us because we have to spend most of our time working in the field, and therefore we do not have any time left for working with computers. However, sometimes I face strange difficluties to type on a computer while making a report*." *(FV2-I-3)*

During one of my visits, I noticed that a FF paid the operator of a cyber cafe to type and e-mail a report to the head office. When asked, the FF answered that she preferable doing so because of her lack of skill and practice at operating computers: *"Bengali typing is difficult for me, and it takes long time to gain that skill. Moreover, because of an inadequate knowledge of operating computers, we often find major technical difficulties when we try to operate computers."* She added that "*the cybercafé operators are efficient, and they know computers well. I know we*

have to use computers, but I don't feel much confident about using them" (FV3-I-2).

However, this situation is not the whole picture: One FF (at district level) appeared to be very enthusiastic and motivated about computer use because of access to a computer both at the office and at home. This constant access to computer made him enthusiastic, and he said that he preferred using computers for his official work in office and that he was willing to use computers instead of the traditional, manual report writing and researching in register books.

Making such a shift, however, poses a major challenge to most FFs, partly because most, especially at the sub-district level, are not fully aware of what services cyber cafes and telecasters offer. Some FFs thought that these centers offered only typing, composing, and printing services. Those who knew about Internet access experienced difficulty when they sought service from those places because they had to depend on another person or the operator of the center to compose any official document or report.

Although this transcript dates my field work in 2011, it illustrates what the ICT transition implies from the ground level (my translation):

"*There was an incident of violence with one of the RI members in our district a few months earlier. We have official instructions that, when there are some serious incidents like violence that involved our group members, we must inform the Dhaka head office about the incident as soon as possible. We used to use a fax machine to send this type of emergency information (using an official format) to the head office, but now-a-days, we also use e-mail to communicate with our head office. So this time we first tried to send a fax to the Dhaka office, but when we went to the shop, we found that the fax machine was out of order. The operator said that people are not using fax machines these days. Instead, they use e-mail for communication, and for this reason, he is not interested in repairing the fax machine anymore. Then, we recomposed the report in the needed format and completed the incident report to send by e-mail. But, unfortunately, just before sending the composed report to the Dhaka office, the electricity to that shop went off. We just failed to send the report at that time because the shop did not have any alternate power supply, like a generator or battery-powered IPS [instant power supply] machine. The operator of the cyber cafe said that because of slow business, he could not afford to maintain the cost of an alternate power supply. So this is the situation we face when we try to use ICT for any emergency communication." (FV2-G-9)*

I find that the uncertainty whether the transformation is an improvement creates tension toward learning about ICT and the Internet. FFs fear that, if they fail to understand what using ICT-based forms requires, then, instead of being empowered, they will be more marginalized. For FFs to accept ICT as a tool in their

activity requires a new division of labor, with computer expertise at the level of the available cyber café operator or telecenter's entrepreneur. This arrangement, however, create a new tension, because the exciting new possibilities for shared ICT tool based learning and knowledge creation might impact the rural community's capacity building in unforeseen ways. In addition, it is a concern that cybercafés and telecenters cannot assist marginalized or less-privileged groups of people. The following excerpt of one FF illustrates the tensions further:

"I'm not sure whether I should prioritize using the computer because I'm expected to do everything to provide the necessary information to rural less-privileged people and also to carry out my other responsibilities…I am also confused how much the rural less-privileged community will benefit from this because they have a lot of limitations other than me." (*FV2-I-3*)

A FF's subject position also influences the use psychological tools, such as experience, skills in rural community development work, and the ability to build interpersonal- relationships. FFs use these tools as learning aids when they share knowledge with RIs, fellow FFs, and information resource persons from different organizations. The following excerpt from an entry-level FF describes this issue:

"*I joined this program recently and found it very difficult when I visit any government offices to personally meet the resource persons. While our senior FFs can easily meet the persons in sub-district offices and manage to get the resources and information for the skills-development training programs for RIs, I usually experience difficulty when interacting with the resource persons in those organizations. I think that relationships play important roles in dealing with people in these organizations. The first time I visited a government organization, I faced lot of questions from them about the purpose of my visit and my identity. But after visiting them multiple times, they can now recognize me, but they are still reluctant to cooperate fully with me. I know that only a good relationship with them can create the trust between us that will make my work easy and comfortable, and it is only possible if I visit them frequently."(FV2-I-4)*

In addition to building relationships with organizations, communication and persuasive skills are also important for FFs as they try to motivate and inspire the RIs. In this regard, one FF made the following comment to explain the tension in that situation:

"*I think that I am not very good at communicating with RIs at this stage because of my lack of experience of working with them. Understanding the RIs' circumstances and their problems is also important for me when I need to deal with information from different organizational levels. So the experience of working with rural communities is vital for anyone who wishes to properly perform her activities. I*

hope that, with some experience, I will be able to do my best as a field facilitator for the rural community." (*FV2-I-13*)

SUB-TRIANGLE: SUBJECT–DIVISION OF LABOR–OBJECT

From my observations and interviews with FFs and community members immediately after their meeting and workshop, I noted that some actions deviated from the standard script. For instance, instead of calling the designated local resource person, the FF or community group leader sometimes invited respected members of the community to meeting. Managing the local resources person for meetings also depends on the RIs ability to convince them to attend.

The FFs again felt that they could do very little alone during their information collection and organization of RI training and workshops because the focus was laid much more heavily on their information search, as two FFs stated.

"*I can't manage all information alone, and it is also hard to collect right information. It's one kind of sharing process with our colleagues and other organizations' peoples."* (*FV2-I-13*)

'*So it's difficult to work alone. We have to communicate all the time with others FFs in different sub-districts. If they hear some interesting information, then they just call us or share during our monthly general meeting*." (*FV2-I-4*)

FFs mostly follow three main streams of work: different events in which they participate, different places they visit, and different people with whom they share.

However, FFs at the sub-district level have difficulties interpreting information which is conveyed in various informal ways. The following excerpts from one the FFs describe this situation: "*We need to keep in touch with colleagues of other sub-districts over mobile phones and communicate with each other information for human skills development programs in their area. Consequently, we sometimes face misinterpretation problem because we are conveying information over the phone from one person to another person." (FV2-I-11*)

"I have to go and meet them personally to inform them about the information. I often have to verify this type of information by myself before informing RIs because sometimes, we get wrong information due to misinterpretations, or we find that those types of programs or schemes are not always available in all districts at the same time." (*FV2-I-4*)

FFs were frequently stressed because of their field work: *"I have to conduct 2/3 meetings in a day and visit different organizations from time to time for collection information. ... The RI needs plain, simple and clear information. ... Most of the*

time, information from radio, TV, or newspapers is not enough for them because they can't interpret the information properly for RIs. Although they can get help from any of their neighbors or schoolgirls of their locality, they need an illustration of the information so that they can relate it to their problem on which we are mainly working." (*FV2-I-3*)

The learning and pictorial tools and the practical demonstrations for information acquisition used in solving real-life problems differ substantially among community groups and the needs they face in their lives. Various forms of division of labor have easily been identified in information collection. FFs often indicated different division of labor in their information searching work. For instance*: 'me and my colleagues…' and 'we use various sources' …."*

FFs face different problems during the course of information searching and collection, in particular, a tension over the means of information transmission. When FFs collect information over the phone, they sometimes get the wrong information or interpret the information in the wrong way. As a result, they visit the wrong organizations for detailed information, creating many problems in their daily activities. In these cases, they have to visit the right organization or call other colleagues to confirm information about the organization.

On the one hand, FFs have to manage RIs and their difficulties by combining knowledge-sharing strategies and techniques, such as organizing meetings and workshops and maintaining continuous communication with RIs. FFs feel that, in doing so, they gain profound expertise like a specialist within a targeted field of knowledge, such as local knowledge and RIs' special needs and local capabilities. On the other hand, FFs have to be generalists in human development information. They have to manage all the difficulties encountered during communication with resource organizations and local resource persons. They constantly have to work with the local municipality organizations and other organizations or resource persons. Sometimes, the lack of cooperation and coordination frustrates them, as illustrated in the following excerpt from one FF: "*It is difficult to make contact with organization people over the phone. I feel very bad when I think I need partial information about some issue, but I have to travel a lot to visit the organization. Although when I think that this little pieces information makes a big difference in RIs' life, then I get motivated to go the organization again and again*" (*FV2-I-3*).

SUB-TRIANGLE: SUBJECT–RULE–OBJECT

Donor agencies support most community development programs in Bangladesh. Consequently, these donor agencies are involved directly or indirectly with the RIs'capacity building project and occasionally present data requirements to FFs. In interviews, one FF described the tensions this demand creates: *"When this program introduced a new project, we found new requirement for information or data to be*

collected from RIs and for reports based on that data. …. Sometime, this new requirement for data and reports added an extra workload to field-level workers who constantly work with target groups and are required to prepare different reports based on report requirements and instructions" (FV2-I-3).

Such requirements affect the FFs' daily work routine because they have to revise their work plan to accommodate the changes. They have to allocate more time for conducting meetings with RIs and preparing reports, which requires rescheduling their daily work. Consequently, the outcome of the changes causes tensions for FFs while they work on their objects. In other situations, FFs' information resources are spread across many documents, and FFs face difficulties quickly finding the right information when needed. Such situations can involve excessive amounts of paperwork and redundancies and inconsistencies in documentation. The following comment from one sub-district level FF describes to a situation in which repeated paperwork hindered delivery of the FFs' normal activities and services to RIs: *"It is really difficult for us to update the register book every day as our daily activities. ... We usually use dairies or notebooks during our field work and in meetings with RIs and take all the notes and information in the dairy to update the register which we keep in our office. Since we spend the whole day covering long distances in rural areas working with RIs, it sometimes becomes tiring for us to update the register every day after coming in from field work. However, at the end of the month, we face another challenge to prepare the monthly report which should be made on the progress and the status of current activities with RIs" (FV2-I-4).*

When there are no obvious tensions between routine work and coverage of all the issues, FFs are motivated by the meeting rules which require covering all meeting agenda and communicating with most RI members their problems and current situations. However, more frequently, FFs struggle to accomplish their task within the given schedule. This contradiction plays itself out as a tension between the RIs' work experience and skill levels and their work routine of demand-driven activities that require active participation by RIs within a specific timespan. One of the FFs describes this tension following way: *"We try to share information with all RIs' members, but sometimes, they cannot understand what we [including the invited resource person] are saying. …The big community group has around 40-60 members. I don't get enough time to reach all of them within the meeting time. Also, I have to visit several RIs. … You just saw now what I did. I need to give them some information considering their practical situation and current needs, which requires time as well as knowledge of their family and background. … Since I have worked with this program for a long time and know most of their background, it is sometimes easier for me to understand their information needs." (FV2-I-4)*

As well, special social norms in rural areas also drive FFs' activities. For example, FFs set meetings at times when most RI members are free from family household work and when members' husbands are at work or their children in school. This is

an important practice to include members in meeting or workshop. Hence, active participation by group members also depends on their family.

The RI's position in the community impacts the type of rules members use for knowledge sharing and information searching, which affects how they act on the object on the activity. At the community level of RIs, rules on RIs' information searching and knowledge sharing are shaped by leadership and collective work, as indicated by one RI member:

"*We work together ... If we go alone, we don't feel powerful. We are poor; nobody will listen to us. But we feel good and can be successful sometimes if we go with our leader or with other members or with our FF, then together we can manage our demand. Even if it doesn't work, then we take one of our FFs with us. In this way, we still depend on the FF when we need some service from these organizations. Usually, FFs advise us where to go for what service and information and how we should approach these organizations for our needs."(FV3-RI1)*

All participants stated that RI members work collectively to act on any object, such as finding new information for educational institutions, searching for information about current skill development programs offered by government agencies or NGOs, or finding benefits on the elderly or widows. A FF describes supporting RIs' motivation for collective capacity building: "*If the RI members work together to access some information and to collect their entitled benefits from governmental or non-governmental organizations, then it works fine. I am guiding them to show them the way how to get informed first time. We are also giving them practice time to collect information by themselves." (FV3-RI1)*

FFs report that the collective work motivates RI members to build their power to raise their voices to local resource organizations and motivates them to learn new information related to their livelihood and active citizenship. Leadership is the key to this collective work, as stated by a senior field practitioner. "*Strong leadership is the key of the success of RIs. If we feel that one group doesn't have a strong leader, we create a sub-group and give them some responsibility. For example, one sub-group will collect educational information, health information, and so on. This sometimes helps to find a strong leader in that RI." (FV3-I-8)*

A good leader in any RI can run their general meetings by herself. Without strong leadership, an adversarial situation might arise in which RIs are in constant need of help from FFs. This tension occurs in circumstances in which the RI's sustainability is in question. RIs' persistent engagement through conducting workshops, meetings, and practical demonstration of their information-searching process is the key to creating effective leadership among RI members. However, often there are visible tensions, as in this situation noted by an FF: "*Some RIs can use their practical knowledge without any help from me, but there are some weak RIs who do not have*

practice, so they need constant help and communication. Especially the category C RIs, they don't have that kind of strong leader. So we need to keep a constant eye on them and keep communication with them to ensure their information searching work done." (FV2-G-3)

Another FF adds to this them: '*RIs call me about information, but the calling is difficult sometimes for them because most of them doesn't have their own mobile phone. They have to depend on mobile phone from other persons or from small shops where they can make paid calls. You can see it's really hard for rural, poor, marginalized people. So if I don't visit frequently, then they sometime forget an important message from us. So we try to make practice for searching information and inspire them with success stories and practical demonstrations of information sources, such as regularly visiting organizations with the weak group's member." (FV2-G-4)*

To keep all RI members active and engaged in discussions, FFs arrange question-and-answer sessions in which all members can participate and express their opinions. This is a highly effective way for RI members to acquire knowledge by engaging in discussion about their real-life problems and success stories, instead of only receiving information. FFs need to create a context of learning in which information is not only transmitted but is processed and made relevant to RI members' current needs. FFs try to make information accessible to RI members through a process of transformation. FFs often relate information to real-life situations on the ground, which motivates RI members and helps them understand the need for the information. The following statement by an FF clarifies this process: "*When I tell them about digital birth registration, they just ignore it and think they don't need this certificate of birth registration. But when I tell them that they would need this birth certificate if they wanted to prevent their daughter from entering an early marriage [early marriages can occur because of pressure from other family members], or if they want to send their daughter to work in a garment factory, she will need this certificate since the garment industry will not allow underage children to work. Now the RI member can realize the need for birth registrations." (FV2-G-4)*

A senior field practitioner addressed this topic during a discussion session (field visit January 2011):

"*There is no value to broadcasting information to them if they can't realize the need for that information. Most of the time when they fall into problems, then they cannot understand the need for the information because they are vulnerable and poor, illiterate. I can give you an interesting example of this. When the government took the initiative to make free digital voter ID card, people were asked to go to the nearest school to get their digital photograph for issuing an ID card. ... But less-privileged people in this rural area did not understand the importance of getting a digital voter ID card, and some of them just ignored it because they were not aware*

about digital photographs. But when they needed correct ID card to get any information service or other service from any government or non-government organization, then they realized its importance. Now they have to pay for issuing a new ID card or edit the information of existing card ... so you can see how these poor people compensate and miss the opportunity of getting free service because of a lack of understanding. This is the reason why we are always trying to relate information to their daily life by giving a lot of examples which help them realize the importance of information." *(FV3-G-8)*

To apply information related to real-life issues, RIs need practice in information use, which entails knowledge creation. the senior field practitioner also explains this situation: "*When we demonstrate to the rural people how to wash their hands in a hygienic way, they can easily learn because they have the chance to apply it in their everyday life. But when it comes to some official paper relating to any legal issue, for example, the Warish certificate [required for every woman when their husband or father dies], it becomes extremely difficult for them to remember the information about the procedure for getting this certificate. Although the information is regularly circulated in national TV and radio, most people still do not remember afterwards. In these cases, we use the collective method of capacity building in order to make them work together as an institution so that they can help each other when they need this kind of information." (FV3-G-8)*

When FFs work with RIs for a long time, they feel attached to the members of the RIs in ways that go beyond their professional relationship. This personal relationship and relationship based motivation makes FFs feel a kind of moral responsibility which encourages them to work with RIs. However, they still have to maintain formal communication and coordination processes in which their professional identity plays a vital role, especially in intra- and inter-organizational interaction. The following comments by FFs speak to this issue: "*As you know, we are paid a moderate amount of money for this job. But sometimes, I travel a lot to deliver some message to RIs by myself because I feel a deep connection with them. I feel an instinctive pressure inside me that I have to give some important message to them. I forget the professional duty. I do that from my heart. I think that one simple piece of information can make them happy and can save them from the poor condition … One day I went to the Upazila health complex for my daughter's vaccination and found that some vaccinations were free of cost for a limited time. I knew that the RIs were not informed about this, so I visited some RIs and made phone calls to others. I was on leave at that time, but I thought it would help them a lot if they got this information at this moment. I did that because I know they are poor and vulnerable and unable to buy any vaccination for their children. … I do not take this work as my profession, but I feel that it is social work" (FV2-I-4).*

"*When I talk to RI members informally, they express their needs more clearly, so I always feel that I have to work with them informally and be friendly, not like a field officer. When I think about organizational communications, most of the time, they are regulated by a formal relationship and a formal time schedule, which*

sometimes makes it difficult for us to get a lot of information out on time. I feel that I am behind my schedule because of our formal communications with the organizations. Sometimes, it takes time to collect simple information because of the unavailability of the right person of that organization" (FV3-I-13).

FFs sometimes feel anxiety in their work when they need to contact their managers or government agencies or NGOs. Especially for newcomers, navigating the inter-organizational communication is stressful. In this regards, one FF states: "*When I joined this program, I was a little confused. I did not know how to communicate with managers and senior officers at other organizations. Also, there was other pressure on me from the rules of the organization and the time schedule of their work. But, at the same time, it was easy for me, and I felt comfortable when I communicated with other field workers in my department or other departments, such as health, legal or education" (FV3-I-13).*

Many FFs' face dilemmas created by the interplay between formal and informal interactions with municipal organizations and other local resources persons, with whom they feel the need to build interpersonal relationships. In this context, FFs distinguish between their professional identity and their interpersonal relationships: "*When I go to any municipal organization, I introduce myself as a BRAC field worker. Since BRAC is a renowned organization in Bangladesh, I usually do not face any problems access any organization. But when I need to have conversations with some officials to get detailed explanations of some issues or topics, I see the importance of my interpersonal skills. Because of my lack of experience and interpersonal relationship skills, I often do not get as much attention from the people of these organizations as my senior colleagues" (FV2-I-4).*

Rules in government organizations are mostly social practices determined in a top-down approach by the department overseeing public service organizations. In other words, FFs and the service organizations work according to the available time. Social norms then appear as a tension, such as power relations in the work process. As well, the issuing of new rules by other organizations can tension because of the difficulty of informing RIs, sometimes even by FFs.

In summary, this section has focused on the rules, social norms, and conditions of the activity system which FFs need to follow. Rules in any organization or public service institution are common practices. The prominent rules in this study are social norms: organizational rules (self), such as *go beyond the information transmission and dissemination practices, continuous communication and coordination with fellow FFs and RIs, relationship building, and a collective level of work,* and *organizational rules (external) that focus on information collection and learning*.

The rules mentioned are the most important standards around which activities revolve and which determine what information to disseminate to the community RIs, what topics to discuss in workshops and meetings with RIs, and what is needed

to explain issues. Linked to these social norms and organizational rules are the assessment rules put in place to determine whether RIs can access information or services and move to the next level of expertise.

SUB-TRIANGLE: SUBJECT–COMMUNITY–OBJECT

The section *Subject–Community–Object* describes the tension areas caused by community mediation. FFs need different types of community involvement in order to act on their object. The following example relates to situations in which FFs have difficulty visiting government and non-governmental resource organizations whenever they face new persons as information resource persons: "*Every time when we meet new persons, we have to introduce ourselves again as field workers of the BRAC developmental program and try to make a positive impression about us and our activities. Then we have to explain to them about our activities with RIs and our requirements from the concerned organization or persons. Convincing them of RIs' information needs always depends on how we introduce ourselves and how frequently we visit them" (FV2-I-4).*

One FF describes situations when FFs social status results in discrimination against them and creates tensions while visiting organizations for information: "*Sometimes when I visit governmental or non-governmental organizations after coming from day-long field visit, I feel very uncomfortable because I usually look very tired, exhausted, and filthy. As you know, we are field workers, and we have to travel a lot in rural areas, even in harsh, hot, and rainy weather. In this situation, we are usually not treated with respect by the people of these organizations*." *(FV2-I-3).*

Another RI echoes this experience of social status tensions: '*If we go alone to any organization for some skill development training information or social benefits, we don't get any respect. We just get ignored. … Since we are poor, nobody wants to listen to us.' (FV2-RI2)*

For the FF, the aim of meetings is to ensure community groups' engagement with their current need for information and knowledge. FFs simply cannot serve as an independent tool for RIs' learning because of FF's own limited knowledge of specific issues, such as health, laws, and education. Therefore, they prefer to always have a local resource person present during meetings and workshops. These local resources persons are considered trusted experts in their specific field and authentic information providers, and in the above context, they work as a tool for capacity building and knowledge creation. Authentic information is an urgent need for marginalized people in the rural areas because they are deprived and deceived because of their illiteracy, ignorance, and limited cognitive power.

Hence, local resources persons play an important role in development activities as authentic information providers. In my field work, I came to see them as important for the success of the RIs meetings and workshops. The purpose of inviting local

resources persons to meetings is to allow the RI members to establish personal relationships, so that, in the future, they can contact the local resources person directly without the help of FF when they need detailed information related to that resource person's domain area. Establishing links between RIs and local resources persons allows better integration of information practice and knowledge sharing. It also gives RIs access to the local government, community, and their services.

In an informal interview, a former leader of an RI shares a success story *(FV3-RI2)*.

> "I was an ordinary member of a RI and had never thought of going to any government offices for any information. Being a housewife, I was supposed to stay at home and do the household work. But after becoming a member of the RI, I got the opportunity to work together in a collective way for the BRAC program and got encouraged to find different information myself regarding different skill development activities to which we are entitled. Then, I gradually became a leader of RIs because of my success in different activities, and finally, I was selected as a candidate for the union election [local government representative election]. Now I am an elected representative of the local government, and I know what our rights are as citizens. I know how information can make us conscious citizens."

Community adolescents play an important role in RIs activities. RI members are mostly illiterate and cannot record their meeting minutes and decisions in RIs resolution books, access written information from government agencies or NGOs, or submit the required paperwork to apply for social benefits or for skills development training. FFs cannot always assist all community groups or ensure the long-term sustainability of RIs. In this context, adolescents in rural communities perform the crucial role of educators, and this division of labor opens up exciting possibilities for knowledge sharing within community groups. With the help of community adolescents, the RIs cope with the tensions in their activities and can accumulate and interpret the information to create the needed knowledge for them. In this process, field workers, RIs, and adolescents work together and develop a collective understanding, shared knowledge, and ways of dealing with the tension of RI members' illiteracy.

The following situation shows how RI members can use ICT facilities and how FFs go through an ICT-policy-driven process in order to fulfill the government's ICT implementation procedure: "*This human capacity building process is not giving RIs food or money but trying to show the information relevancy to RIs' real-life problems. … TV and radio work very little for RIs. They have limited cognitive power to remember the information and to implement it in the right situation and at the right time. Information technology such as TV news is not an extensive way of*

working for the community. Most of the time, it is unable to serve as a capacity-building tool because the poor, marginalized people are mostly unable to see the relevancy of the information in their findings" (FV3-I-8). There are constant tensions between the learning tools and communities. Information media are considered a low-level information-finding tool for marginalized groups, as illustrated in the following excerpts.

A RI member explains the current situation for technology usage: "*We just follow the TV for entertainment because we don't have a TV ourselves. If we get a chance to see TV from our neighbor, we just follow Bengali movies or dramas. We don't follow radio much. ... We don't have much time to listen to the radio*.' Regarding computer usage, the RI member simply replied, '*It's not for us. ... We are poor. ... I just heard that a computer will be available in our union [the last tier of Bangladesh's administrative units] complex." (FV3-RI1)*

A FF expounds on this topic: "*They mainly wanted to say that they have heard about a union-based computer service center which was recently implemented by the government. ... Actually, you know they don't have that kind of motivation to follow the important information from radio or TV. For example, it was advertised many times about the digital voter ID card on TV and radio—the government-provided, free digital voter ID card amending for last few months. But that time, a lot of rural less-privileged people didn't want to participate because they didn't feel the importance of it*" *(FV3-RI1)*

On the same issue, a senior FF remarks: "*I know one person who is suffering a lot because of the digital voter ID card. ... When it was announced by the government that issuing/editing the voter ID card was free of cost, she didn't realize that it would be needed, but when she went for the VGD [Vulnerable Group Development] benefit from the local union office, she found that, without a right voter ID card, she cannot receive the benefit. ... So now you can see the condition of the poor." (FV3-I-3)*

A FF at the sub-district level touched on this issue: *"We usually visit the organizations regularly for updated information. We also encourage the RI to visit the organization regularly. But a problem arises when there is a new resource person we need to face or there is a new way to find the information. For example, when we heard that the computer-based birth registration system was being implemented, we didn't understand what it meant. I got that information from one of my colleagues, but I actually didn't know where I should go. So I decided to go to local government representative [one of the local resources persons]. The local resources person was not very aware of the computer-based activity. She only informed me about the Union-based Information and Service Center (UISCs) are implemented by the government in union office [at the last tier of the administrative unit, namely, the union] to provide information services" (FV3-I-4).*

CONCLUSION ON FIELD FACILITATORS AS MEDIATORS OF EXPANSIVE LEARNING

Through this analysis, I have identified two themes for further exploration and discussion:

1. *Tension areas of intermediation actions*
2. *Opportunities of intermediation actions*

In the following sections, I discuss these two themes, considering both the conceptual framework and the research questions. I also look ahead to identify the implications of this analysis for the next phase of analysis of what happened in the participatory design-inspired workshops I conducted.

Tension Areas of Intermediation Actions:

The section *Subject–Tools–Object* describes the tension areas surrounding the mediating tools and artifacts of the FFs' intermediation activity system. The subject (FF) uses various tools or mediating artifacts to perform on her/his object. The focus, therefore, is on the tools' influence on how the subject makes sense of the object. The mediating tools also mediate the FFs' activity within the context of different settings, either allowing or hindering the subject from performing on his/her object. In the workshops and RI meetings, FFs mostly work with pictorial materials and skills-development information, with the help of the local resources person, educated adolescent, or RI Leader. In some ways, this activity fulfills the objective ' RI capacity building'. However, using the tools does not always make it possible to act on their object. Different skills-development curriculums are not always available to FFs/RIs, so they frequently depend on the local resources person, who plays a key role in explaining the information in a situated way. This process could make it difficult for FFs to model their work on their object in RIs' meetings and workshops. These tools could create a promising setting for knowledge creation and information practice when combined with the supportive role of involved stakeholders and the beneficiaries. The mediating tools in FFs' inter-organizational communication setting are face-to-face meetings and mobile communication. Many instances in the data analysis show that face-to-face meetings play a very vital role, whereas mobile communication sometimes gives rise to misinterpretation tensions in FFs' inter-organizational communication. The data analysis, though, also points out that face-to-face meetings in inter-organizational settings are often challenging for FFs because of the different implicit and explicit rules of the inter-organizational level. It is also evident that different social norms and social discrimination influence this process.

The section *Subject–Community–Object* lays out the tension areas caused by community mediation. FFs need different types of community involvement in order to act on their object. RIs' workshops and meetings include the RI members, local resources persons, and educated adolescents interested in helping the RIs. These communities contribute to how the FF comes to act on her object. The same can be said for the information resource collection community, including stakeholders, resource organizations, local resources persons, fellow FFs, and other members of development community. Stakeholders such as the local resources person, local government representatives (LGR), and the resource persons from government agencies and NGOs could be different objects. RIs' links with information resource organizations are not strong enough to facilitate their capacity building. FFs are better prepared through their intermediation activity and try to link information resources and knowledge creation in order to mediate RIs. There could be a divergence between FFs' information practice with these resources and knowledge creation object. The different objects of various communities often interrupt the subject's intermediation process among the community, subject, and object. Although cooperation from information resource organizations is urgently needed in FFs' mediation work, this analysis shows that the community does not always support the object. Government agencies and NGOs organizations and the local resources persons have their own timeframes and resource constraints, which could limit FFs' (subjects') objectives. A lack of harmony in all community involvement can be seen as a limitation or tension in RIs' capacity building.

The section *Subject–Rule–Object* examines how the rules mediate FFs' work on their object. Rules are in place so that a community will follow different ways or processes within an activity system. From the activity theory perspective, the rules refer to the social norms, policies, and procedures that define the social power related to the instructional context of any activity (Engeström, 1987; Engeström, 1993). FFs need to follow explicit and implicit rules. For example, govt. organizations lay down rules for face-to-face meetings with information resource organization, requiring that FFs record detailed information or ensure the attendance of the local resources person in order to make clear the information sources. Implicit rules also mediate FFs' relations with the community as they act on their object, such as the culture of the government agencies' information resource practices, the internal legitimacy of these organizations, their practices which go beyond the information dissemination and transmission practice, and the RIs' learning or information-searching practice. All these rules influence how the subjects (FFs) perform on their object and define the horizon of their feasible actions. For instance, workshops with RI leaders and the RI's general meeting are required to link information with actual practice so that RIs can use the available information in daily life. This requirement is necessary because capacity should emerge as knowledge creation from RIs' meetings and workshops. As well, policy rules dictate that FFs should help the RI by demonstrating how to complete government forms and applications for skills development needed for educated

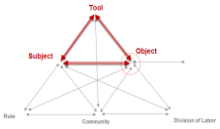
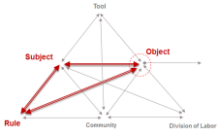
adolescents. Policy rules also guide relations between information resources and knowledge creation practices. FFs often claim that local resources persons should help their activity with RIs in this regard. Getting this type of support frequently is difficult because, as this analysis suggests, there is not always coherence between the object of FFs and local resources persons. It is important to note that the rules for knowledge creation practices in workshops and face-to-face meetings with information resource organizations are also influenced by the explicit and implicit rules and policies of the information resource organizations and local resources persons. These policies who do not take into account the information needs of less-privileged peoples can widen the gap between information practice and knowledge creation practice, which serves RIs' capacity building activities.

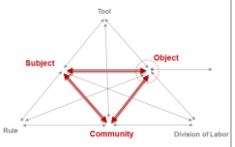
The section *Subject–division of labor–object* discusses the division of FFs' responsibilities and tasks in RIs' meetings and workshops and in their information resource management process. This sub-activity system focuses on how the division of labor frames the FFs' object of RIs' capacity building. Clearly, the division of labor plays an important role in setting the meetings and workshops with RIs. The different responsibilities among the FFs and the local resources person and the intergeneration support build a link between information and information practice for knowledge creation. In the context of RIs' capacity building, how this activity can be performed and what coordination and cooperation take place around FFs' information and knowledge creation practice are significant matters. Thus, the question was how the division of labor permits FFs to perform on the object. The preceding sections details the tension areas undertaken by the community of this activity system and the rules related to the community, for instance power relations, social discrimination, technology policy realted change and technology usage which influence how the subject (FF) performs on her object.

This analysis attempted to reveal the gaps, complexities, and interactions between the different sub-activity systems formed by the tension areas in the different elements (i.e., rules, division of labor, tools, and community) of this capacity-building activity system, shown in Fig. 5-2 and in table 5-2. The identified tensions indicate how these gaps influence what FFs do to understand and process their object area (RIs' capacity building) in this special context. Arrows coming from three specific tensions in Fig. 5-2 (as indicated in this figure with round-headed arrows in three sub-activity systems areas*: subject-community-object*, *subject-rule-object* and *subject-tools-object*) are directed to the associated tensions of different sub-activity systems.

Table 5.2 *Four Sub-activity Systems Triangles and the Identified Tensions*

Sub-activity System	**Questions for Data Extractions Based on the**	**Tension Areas**

	Research Questions	
Sub-activity System: Subject–Tool–Object 	▪ What tools do the FF(s) use to achieve the object of rural community capacity building, and how? ▪ How do ICT tools help FFs support RIs' capacity building activities?	• RI's meetings, workshops, popular theater • Face-to-face meetings with information resource organizations • Lack of ICT skills and knowledge at the FF level • Resistance to ICT implementation: lack of ICT awareness • Feeling of marginalization because of unstable ICT tools and infrastructures in rural communities • Skills/experiences of FFs
Sub-activity System: Subject–Division of Labor–Object 	▪ Does the division of labor in meetings and workshops influence how FFs share knowledge and collect information to support RIs' capacity building? ▪ How do the roles of distributed information resource persons affect FFs' work to achieve the RIs' objective?	• Social discrimination during communication and coordination with information resource persons • Need for leadership by RIs and local resource persons • Intergenerational work to mitigate the tension of RI's limited knowledge and skills • Misinterpretation of information
Sub-activity System: Subject–Rule–Object 	▪ Do the rules for conducting meetings and workshops influence how FFs share knowledge sharing to support their objective of RIs' capacity building? ▪ Do the rules for information collection by government agencies, NGOs, and fellow FFs influence	• Overwhelming paperwork and excessive information load in workshop and meeting schedules • Coordination with information resource organizations and local resources persons • Collective level of work • Relationship building and motivation through informal communication

	how FFs work to support their objective of RIs' capacity building?	• Going beyond information transmission and dissemination policy • Social practice and organizational rules and norm • New rules and policies for digitization of information systems
Sub-activity System: Subject–Community–Object 	▪ To what extent do local resource persons work with RIs to achieve their objective of capacity building? ▪ How does intergenerational help achieving FFs' object of RIs' capacity building? ▪ To what extent do information resource organizations influence how FFs share knowledge to support the RIs' capacity building approach?	• Highly geographically distributed RIs and information resource organizations • Lack of ICT awareness among RIs and different stakeholders • Unavailability of local resource persons

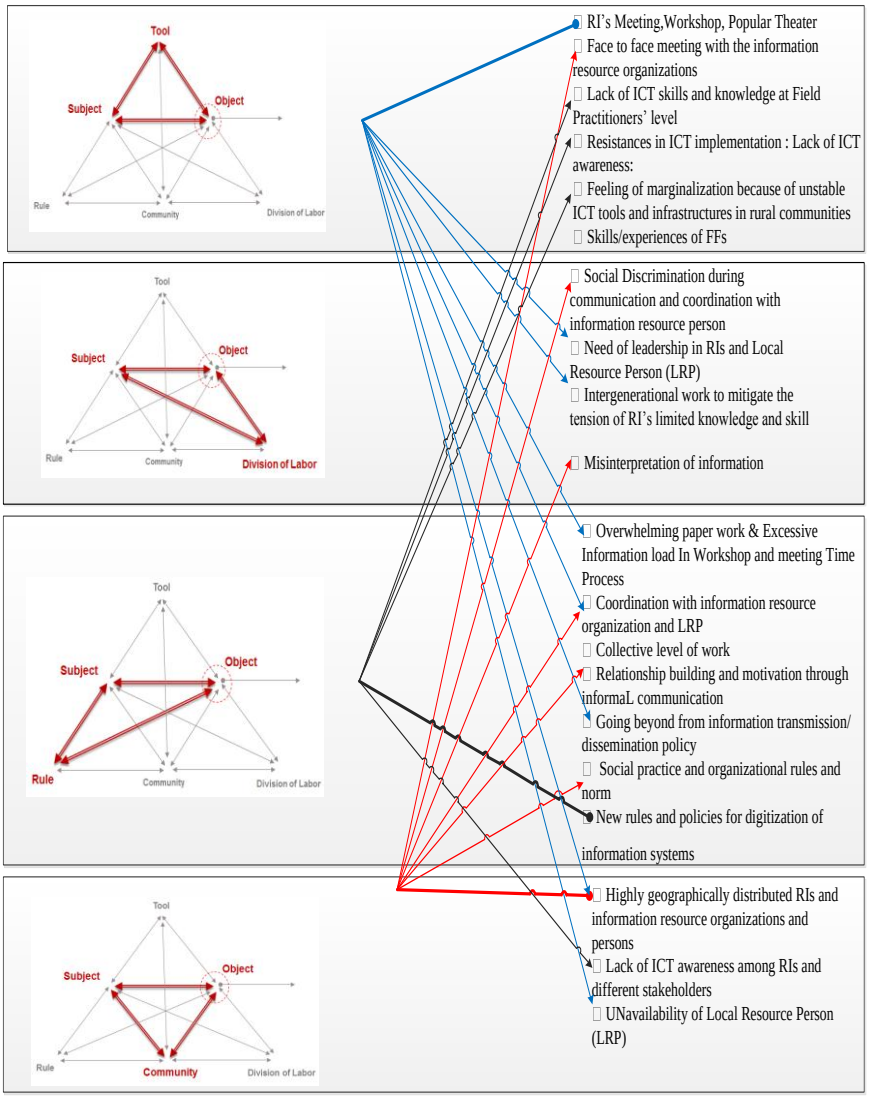


Figure 5-2 Tension map of FFs' intermediation activities

Opportunities of Intermediation Actions:

An effective information flow must be a two-way process that, as described by Madon and Sahay (2002), on one hand, ensures that the voices of the poor are heard by policymakers and, on the other, ensures that information about government services and benefits reaches the poor. When intermediation takes place, it brings out new meanings in groups' and institutions' development (Madon & Sahay, 2002). In this discussion, I aim to sharpen understanding of and demonstrate the

importance of intermediation in creating connections between information and knowledge creation through information practices in rural community life. Fig. 5-3 summarizes the findings regarding current intermediation practices and expands on the issues described in Fig. 5.4 in the following section.

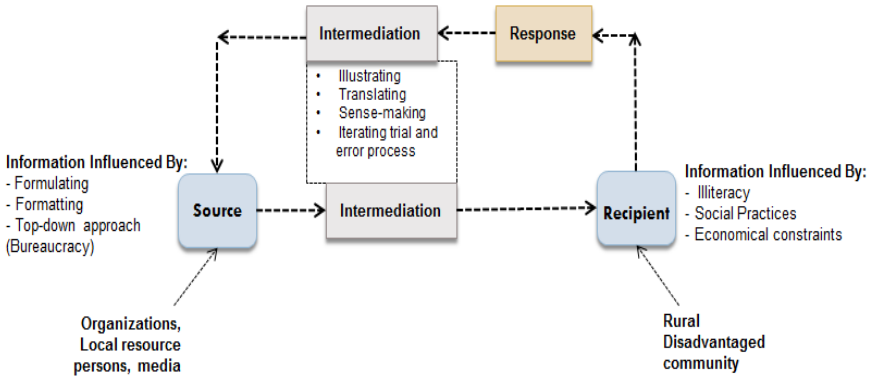


Figure 5-3 Graphical representation of the intermediation process.

This intermediation process has three major components in the mediation process: sources for information and knowledge (organizations, local resource persons, and media); recipients (the disadvantaged rural community); and the intermediation activities (illustrating, translating, sense making, and the iteration of trial and error processes). FFs who function as mediators in our study perform intermediation work in both directions as information travels *from* source *to* recipient and vice versa.

The formulation and formatting of information mainly results from the understanding of the source, and consequently, recipients often have problems comprehending the information. In addition to the clears problems faced by those who are illiterate, there is also a need for literate people to translate ideas and concepts presented in, for example, material from health authorities or local government representatives. FFs do so with the use of appropriate words and tone of language. Additionally, experienced FFs have acquired a certain level of knowledge by spending time in the rural community and domain experts.

It is clear that rural people are also bound by long-lasting social practices which need to be addressed and dealt with by a mediator. For example, a FF states: *"I try my best to explain to them why this message is important and how this information will work in the future.* Concepts related to the vision of Digital Bangladesh (e.g., birth certificates for all children) can be difficult to understand if they are not part

of the everyday practices and experiences of the local community. The mediator plays a vital role in this process.

Another example of how FFs work as translators can be found in the case of government information on old age benefits which is sent from the national to local governments, which translate it for people in rural communities. However, when the reformulated information is available, the recipients still need to understand how to make use of it. A RI member tells the following story which illustrates the consequences of the top-down approach in formulating information:

"My father is 50 years old, sick, and depends on my income. One day, I heard about the old age benefit. I went to the local government office and filled up the form. I also helped my neighbor do the same, and later, I went again to submit the form. It took many days to do that process. Finally, I learned that my father was not eligible because he was not old enough. So whenever we have the chance to talk with the FF, we share our problem with her first."(FV-2-RI1)

Regarding the effect of media on the RI groups, the data show that the media is not used very much for information dissemination. RI members view television and radio mostly as entertainment sources. RI members use mobile phones to talk to each other about matters which need no interpretation or detailed information.

The analysis of this intermediation activity shows information practice and the ability to create knowledge are grounded on the positive motives or strengths posed by the following intermediation acts:

- Community engagement through institutional models of collective action
- Boundary-spanner: Create external ties with information sources as a boundary- spanner
- Information brokering: information illustration and transformation for knowledge creation
- Create relationship-based motivations and build trust

CONCLUSIONS AND THE SEED IDEA FOR NEXT CHAPTER

The contextualization of tensions as contradictions and the object-oriented learning theory of activity theory' are used to reveal the challenges FFs face in their daily capacity building activities. This analysis further illustrates the broad involvement of embedded stakeholders through collective activities which ensure that RIs create practical knowledge for socio-political and socio-economical capability development. This chapter also illustrates the strength of Activity theory in serving as a broad tool for inquiry into the rural community development setting, including

FFs' and RIs' backgrounds and perspectives and the tensions of the intermediation system.

To summarize my tension analysis, I conceptualize the tensions areas as two systemic tensions—*ICT-related non-well-being vs. ICT-policy-driven change* and *highly geographically distributed information resource systems vs. collective level of work for knowledge creation*—which FFs encounter in their capacity building system (see Fig. 5-4). Engeström (1987) refers to such contradictions as systemic contradictions and argues that they offer possibilities for developmental transformations. He also describes contradictions as unintentional digressions from the normal scripts, and agues that their identification can be used as contribution for the development of revised activities (Engeström 1987, 2001). Wenger (1998) views interplaying tensions as system dualities which are polar, dependent opposites and driving forces of change and innovation. He discusses the importance of understanding the community in terms of the interplay of system dualities (Wenger, 1998). He interprets this duality as a single unit which consists of inseparable, mutually constitutive elements whose inherent tension can give rise to the concepts of richness and dynamics (Wenger, 1998).

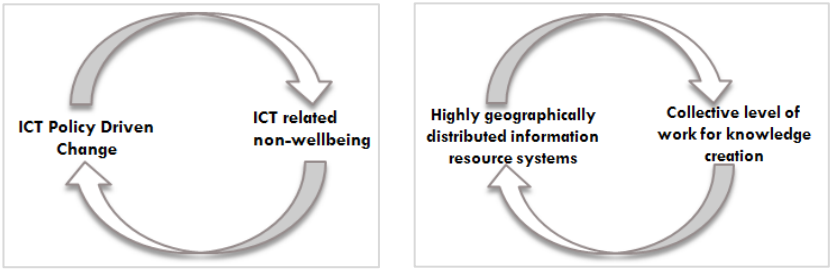


Figure 5-4 Two systemic tensions in FFs' intermediary actions

ICT-related non-well-being vs. ICT-policy-driven change

District-level FFs can use shared desktop computers at their office, but most did not show interest in using computers because of limited accessibility and their limited knowledge of computers. Given the limited accessibility of and lack of knowledge about computer, the Internet, or online facilities, FFs don't have sufficient motivation to use these tools to obtain and organize necessary information. Low levels of knowledge about current technology and a lack of the skills to use ICT tools in everyday work demoralize FFs regarding the use of technology in work. In addition, the nature of FFs' work—for example, travelling long distances every day in rural areas without easy transportation and spending the whole day in the field—means that FFs cannot allocate enough time to learn and work with computers. ICT-

related non-wellbeing tensions refer to tensions which emerged from FFs' perceptions and beliefs about ICT and their patterns of skill on ICT. Whereas, ICT-policy-driven change tensions emerged during the process of FFs' interaction with ICT as new ICT regulation and protocol demand changes to achieve for digitization. FFs' activities with RIs are affected by this process as the FFs have to comply with these changes. The ICT change tensions are created by e-Governance-policy-driven changes and by the incorporation of cutting-edge ICT technology in adverse situations in the rural community development process. This tension was first apparent early in the collaboration for this research when a senior practitioner of the development program expressed concerns about the ICT changes which were taking time away from existing processes. Especially during the field observations, numerous examples of tensions were noticed and later discussed in tension analysis section and mapped in Fig. 5-2.The identified tensions related to ICT change resistance among FFs and RIs, grounded in the map of tensions in FFs' activity system, are a *the lack of ICT knowledge and skills, lack of access to new technology and the feeling of increased marginalized because of ICT-policy-driven change, frustration with poor ICT infrastructure at the rural level, and concerns about RIs' lack of ICT awareness.* The tension areas analysis also illustrates how ICT policy driven changes took place in the ground-level rural community development work and lead to transformations in information delivery and knowledge creation, which demanded new ICT-related wellbeing among FFs and RIs.

Thus, the analysis shows that the source of the tensions lies in the interplaying tensions between *ICT-related non-well-being* and *ICT-policy-driven change for digitalization*. This suggests that *ICT-policy-driven change for digitalization* frequently demands ICT capacity-building and ICT well-being actions of FFs and RIs—hence, the persistent struggling between the two major tensions of *ICT-related non-well-being* and *ICT-policy-driven change*. It is important to understand the interplay between these two tensions as a single unit of tensions which might stimulate a sense of ICT appropriation at the level of rural community development practice.

Highly Geographically Distributed Information Resource Systems vs. Collective Level of Work for Knowledge Creation

Information does not travel easily across levels or organizational boundaries (e.g., from the national government to local governments to citizens), so there are persistent tensions related to communication and coordination evident in this investigation. FFs' interest in information mediation leads them to strengthen knowledge sharing and explore the information available in various activity systems. FFs established this information-mediation and knowledge-sharing activity system to manage information resources and the information flow among parties (e.g., the community RI and local government representative) who have divergent interests in different systems. The diagrammatic representation of these

relationships (Fig. 5-5) shows the wide range of information resources which influence FFs' information-exchange and knowledge-sharing activities.

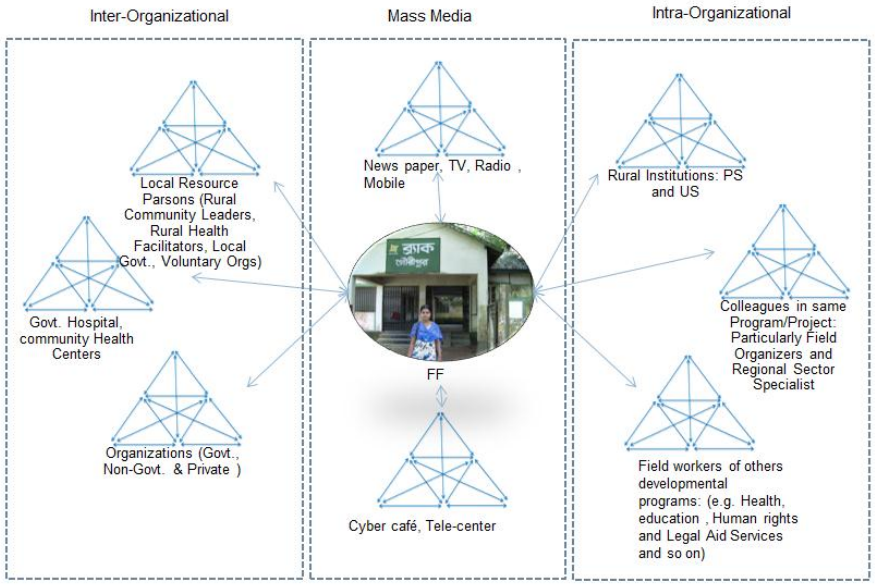


Figure 5-5 Field facilitators' embeddedness in different information resource systems

This analysis demonstrates that information literacy and knowledge creation are the focal points in intermediation practice. Information access, networks and knowledge creation are considered as sources of human capacity development (Castells, 1998; Heek, 2014; WSIS, 2014). Researchers also argue that the inclusion of people, societies, and nations in the new knowledge economy depends on their ability to connect with information processes and compete in local and global contexts (Beck et al., 2004). Heeks states that ICT-enhanced communication can significantly support rural development process by enabling the flow of information and knowledge between the rural communities and more developed regions of a developing country (Heeks 2010; Heeks & Bhatnagar, 1999). However, the information available through ICT poses new challenges for effective usage in rural areas of developing countries. Researchers (Heeks, 2010; Madon, 2009; Sein et al. 2008; Walsham, 2013) have identified many challenges to ICT-enhanced, rural, community-development initiatives as depicted in chapter 2 (see page 30). Usually, people need the abilities to read and organize information in order to be information literate (Campbell, 2008). They also need the ability to effectively use information to create knowledge and solve problems (Heeks, 2005).

Focusing on the tension areas of intermediation practice, it shows that information literacy and knowledge creation are grounded on effective participation and the

engagement of FFs in multiple information resource organizations and society. Therefore, FFs are encouraged to work collectively through communication, coordination, and cooperation with the highly geographically distributed information-resource community. Thus, this analysis of tensions points to another systemic tension in the intermediation practice: *highly geographically distributed information resource systems vs. collective level of work for knowledge creation*, which grounded in the tension map in Fig. 5-2. These two interplaying tensions also influence each other.

It is plausible that the transformation caused by the recent ICT intervention increasingly challenges the daily field work of FFs at the ground level of development organization; thus, the construction of ICT transformation and changes is grounded locally as well. In this analysis, FFs are referred to as the subject. The focus of the four sub-activity systems is to determine the complexity of the community capacity-building activity system, which is influenced by interconnected elements in the sub-triangle that mediate how the subject FFs perform on the object.

Based on the findings from this analysis of tensions as contradictions, it can be suggested that the ICT change necessarily involves paradigm shifts in community capacity building. In fact, the ICT-related non-well-being is a result of ICT changes and innovations in local settings. It was of paramount importance that the tension in activities at FFs' level defines the situations which enable creating the logic of *second-order work* (Engeström, 1987) and *ICT capacity building work*, instead of taking these tensions as the seeds for the breakdown of the ICT change and implementation.

These first-order systemic tensions and insights were identified through explorative ethnographic work. In the next chapter, I use these results as the starting point for the planning and execution of digital literacy workshops (DLWs) in order to identify the ICT knowledge creation activity and expansive learning taking place in them.

CHAPTER 6. MUTUAL LEARNING THROUGH WHICH CONTRADICTIONS BECOME SPRINGBOARDS FOR AND FACILITATORS OF LEARNING

In this chapter, I analyze the outcomes of the series of participatory design (PD) digital literacy workshops (DLWs) which I planned and undertook after the observation and interview phases of my field work (see chapter 5). The purpose of conducting these explorative DLWs was to contribute to ICT capacity building of FFs (phases 3 and 4 in the research cycle, Fig. 4-3). In this part of the analysis, I use activity theory and expansive learning theory to illustrate and analyze the dynamics of the PD DLWs and the mutual learning about the use of ICT which took place.

In this analysis, I focus on the mutual learning between the participating FFs and the entrepreneurs of the telecenters UISCs (Union Based Information and Service centers) and how these mutual learning activities enhance knowledge and understanding about ICT among FFs as a base for expansive learning. In the analysis of data from the PD DLWs, I focus on two prevailing systemic tensions (see Fig. 5-4): i) *ICT-related non-well-being vs. ICT-policy-driven change*; *and* ii) *highly geographically distributed, multiple information resource systems vs. collective level of work for knowledge creation*. My findings indicate that the role of the researcher and participatory design approach should aim not to eliminate all prevailing tensions but to balance the relationships between the prevailing tensions and the creation of new knowledge about ICT among participants.

The following research questions guided the PD DLWs and the analysis: *How will the process of contextualizing and resolving the prevailing tensions be constructed as a mutual learning process? Can the mutual learning process enable ICT knowledge expansion among participants?* The theoretical concepts underlining these research questions are mutual learning based on Engeström's (1987, 1993) idea of mediation, the concept of the reflective practitioners (Schön, 1983, 1992), and the concept of re-mediation (Lektorsky, 2009), in which the selected FFs can be mediated by a reflective system during the DLWs sessions.

This chapter highlights how ICT appropriation in the rural community development process can help resolve problems and challenges and synthesize and transcend various tensions and contradictions related to the tool-mediation process in the activity system of the rural community.

TENSIONS AS SPRINGSBOARDS FOR ICT KNOWLEDGE CREATION

The first stage of data analysis (chapter 5) identified a dilemma: While e-governance policy expect ICT to be used to enhance community development, field workers face a number of difficulties implementing the e-governance policy for a number of reasons which I have called the ICT-related non-well-being tension:

i) Feeling of incompetence in operating computers
ii) Limited knowledge of computer and Internet capabilities
iii) Frustration with poor ICT infrastructure at the rural level

Policy-driven changes in FFs' work have commonly taken place, affecting individuals and groups' engagement in community development practices and creating the need for ICT knowledge creation at varying scales. The research design for phase 3 of the case study explores the tension between the government wish to make ICT a tool of communication for rural populations in the villages and the ICT-related non-well-being experienced by FFs. I have formulated the object of my investigation as the expansion of ICT knowledge from the individual level to collective level.

Table 6-1 *Actions in Phase 3*

Action description	**Time Span**	**Objectives**
- Meeting about my reflections on previous visit and clarify key issues for my understanding of the tensions between FFs' ICT related wellbeing and the ICT policy driven change at gound level work - Meeting to negotiate mutual actions and FFs' ICT capacity building - Develop a training curriculum, based on mutual understanding - Decision taking for mutual collaboration between selected FFs (at sub-district level) and SICTEs	February – March 2011	Set out a structured agenda to create an environment for dialog on ICT capacity building and develop FFs' own mental models to participate in DLWs

The ICT intervention did not come about by simply balancing the situation between the FFs and their surrounding environment but was designed to resolve FFs' tensions towards working with ICT which, according to Engeström (2000), implies a search for new ways of solving problems. This goal also requires finding a way for the practitioners and researcher to initiate and seek solutions and make sense of the work process (Engeström, 2000). Therefore, after carrying out the first and second stages of my field work, I discussed the potential ramifications of ICT capacity building with the program's senior practitioners and regional managers. They expressed concern that ICT training and skills development for FFs and the difficult of providing sufficient ICT training would take time away from FFs' presumably *real* activity. A high cost for ICT infrastructure was expected because the many highly geographically distributed FFs at the sub-district level would and exceed the budget of the current project.

Consequently, I had to negotiate with higher CEP officials and ask if we could provide ICT literacy facility to the bottom-level FFs (sub-district level) in a different way. At this point, a huge discussion took place about the UISCs being implemented by the government program Access to Information (A2I), which envisioned digital Bangladesh as the driving force behind the establishment of 4,501 ICT-enabled UISCs to serve rural citizens. It was assumed that the success of the Digital Bangladesh plan would lie in mainstreaming the marginalized population using ICT (Access to Information, 2009). Hence, I developed the tension discussion related to *ICT-policy-driven change for digitization* and made a proposal for mutual collaboration between the FFs (at sub-district level) and UISC entrepreneurs.

In my planning, I was inspired by Bødker et al. (1993) who state that "use situation as a fundamental focus for the design processes"(p.159). I was also inspired by their argument on cooperative design, "designing a computer application is secondary activity whereas for designers it is their primary work. This means that the designer should know how to set up the process and need to make sure that everyone gets something out of interaction" (pp. 158–159). Considering these set of ideal of cooperative design, I prepared ICT training materials for FFs (at the district level) on using basic computer programs (e.g., Word, Excel, PowerPoint) and social networking tools relating to their current needs and practices.

In my planning, I considered participants' mental orientation toward prevailing practice and tensions so that they could frame and interpret experiences informed by different perspectives of the potential of ICT. Thus, I conducted ICT capacity building intervention workshops (DLWs) with two groups of talented FFs through a mutual negotiation process. This gave an opportunity to introduce ICT into their work processes, develop their ICT skills, and help avoid them feeling victimized by the ongoing ICT-policy-driven changes. The workshop activities were organized as

mutual learning between the local ICT centers' entrepreneurs and the FFs' other work.

THE EXPANSIVE LEARNING CYCLE IN THE ICT APPROPRIATION PROCESS

Changing of work processes and ICT intervention require resolving tensions within FFs' activity system by developing new tools or a new division of labor according to the ICT intervention at the rural level. As Engeström (2000) explains, the process of change and technology intervention is always a complicated, historical process. It demands an expansive learning process in which the participants affected can seek solutions and make sense of the work process (Engeström, 1987, 2000). Hence, FFs conduct ICT capacity building (in terms of ICT knowledge creation) through different participatory design activities. FFs (at sub-district level) engage in mutual collaboration with local shared ICT centers' entrepreneurs, along with their existing work practice, and take part in group collaboration sessions (here DLWs) with fellow FFs using the prevailing tensions and collected pictures as stimuli.

A small-scale expansive learning cycle was applied to analyze the activities of the participatory-design DLWs. The expansive learning cycle presented in Fig. 6-1 was used as framework for analyzing the small-scale ICT knowledge creation approach in the fourth research phase (see figure 4-3) of participatory design.

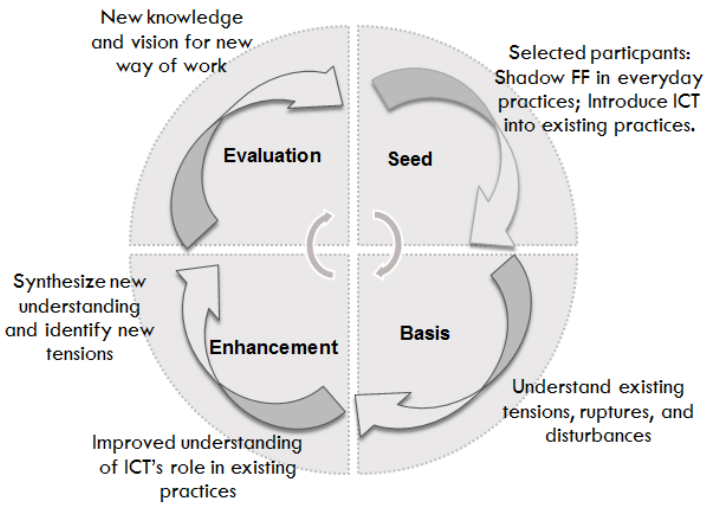


Figure 6-1 Expansive learning cycle and its embedded participatory design workshop session

From March 10 to March 27, 2011, I conducted eight workshop sessions with two groups of FFs to facilitate, support, and follow ICT knowledge creation and learning in the implementation of participatory design activities (detail in Chapter 4). The activities were developed collaboratively with the program specialist, senior sector specialist, and the divisional manager of Mymensingh District regional office.

Local Entrepreneurs of UISCs who serve as agents ICT-policy-driven local change were included and collaborated with a group of FFs coming from eight sub-districts in the Mymensingh district. In this chapter analysis, I focuse on the specific DLWs design with this group of eight sub-district-level FFs considered a pilot unit within this large organization. This analysis focuses on mututal collaboration of FFs (at sub-distrcit level) with UISCs' entrepreneurs. In DLWs, all participants attended the four episodes of activities. I have summarized the actions of the workshop sessions and aligned the expansive learning cycles with the DLWs' episodes. Details of these DLWs' episodes are presented in Table 6-2. The next section shows how ICT knowledge creation was closely connected with FFs' existing everyday challenges, i.e., their prevailing tensions which can transform FFs' object and create new knowledge about ICT.

Table 6-2

Summary of Actions of DLWs Episodes (with FFs at the sub-district level) and the Expansive Learning Cycles Employed

Expansive Learning Cycle	**Workshop Session**
1. Selected participants: Shadow FF in everyday practices; Introduce ICT into existing practices.	**Seed** ***Action 1*:** Informal group meetings with eight FFs regarding UISCs. ***Action 2*:** Simple training in the use of digital cameras ***Action 3*:** Visits by each FF to 2 UISCs and interaction with the operator/entrepreneur over 6 weekdays, taking notes and pictures
2.Understand existing tensions, ruptures, and disturbances	**Basis** ***Action 4:*** Individual presentations and discussion with other participants of weekly

	work activities ***Action 5:*** Presentation of individual ideas and new visions for UISC in their work (using collected pictures, notes, and Post–it notes)
3. Improved understanding of ICT's role in existing practices	**Enhancement** ***Action 6:*** Group work with posters, flashcards, Post-it notes, and selected pictures on work processes and challenges
4. Synthesize new understanding and identify new tensions	***Action 7:*** Group presentation and discussion of UISCs' activities and existing practices
5. New knowledge and vision for new way of work	**Evaluation** ***Action 8:*** Presentation of individual ideas and new visions for UISC in their work (using flashcards) ***Action 9:*** Individual semi-structured interviews

Episode: Seed:

The first step of the workshops was to introduce FFs to the seed ideas and questions about the USICs, community-based SICTCs (Shared ICT Centers) model. For example, I asked "How can the SICTC assist your activities?"

The purpose of the seed questions was to frame the current state of knowledge about these telecenters' activities. Every participants FFs were instructed to collaborate with two UISCs and identify the resources of the centers (i.e., entrepreneur, Internet, printing facilities). FFs were advised to interact directly with the entrepreneurs over one week time in order to enhance their understanding of the shared technology center model and its utilities. FFs were urged to share their activities and practices with the entrepreneurs. FFs were expected to develop a clear idea of the centers' current activities and identify the opportunities and practical problems of SICTC's existing activities while interacting with the entrepreneurs. However, I visited three UISCs with a participant in order to gain a firsthand idea of how to use the centers and how the perticipants collaborate with the SICTCs' entrepreneurs.

All participants were equipped with a digital camera and instructed to respect cultural sensitivities and privacy while using the camera. FFs were also advised to carry on their normal activities while visiting SICTCs for 6 days. They were instructed to view this collaboration work with SICTC's entrepreneur as a resource-organization visit work. The purpose was to help frame participants' learning and knowledge about SICTCs' activities in the context of their existing activities.

The negotiation over FFs' ICT capacity building with the program specialist, sector specialist, and division manager during the negotiation phase (research stage 3) led me to think about a mutual collaborative learning structure with UISCs that could assist FFs' (sub-district level) ICT capacity building. I was inspired by Wenger's (1998) idea that a community of practice is a good context for learning. Therefore, at the beginning of this seed session, we collaboratively arranged a formal meeting with 8 FFs (from different sub-districts in the Mymensingh district) to discuss the SICTCs model UISCs initiatives in their respective local areas. In the meeting, we tried to identify FFs' current state of knowledge about the SICTCs and to give seed ideas for collaboration with UISCs' entrepreneurs in their respective areas. This formal meeting was the result of mutual collaboration with divisional manager and RSS, which I call *seed conversations*, and consider as expansive instrument in order to expand knowledge. The experiences from this initial episode evolved during next three workshop episodes as eight selected participants shadowed FFs in their everyday practices.

Episode: Basis

The second episode of work was held seven days after the seed conversation work. In this session, individual participants shared their work challenges and opportunities using their collected pictures, Post-it notes, and notes. All participants were asked questions by other participants about their understanding of SICTCs and the challenging part of their normal practices (activities over six week days).

The question-and-answer session with participants emphasized the following issues, taking into account participants' normal practices:

- What is the purpose of this activity?
- How did you manage the information?
- Who were the facilitators of these events?
- Do you face any difficulties during this event? If so, what?

Regarding participants' SICTCs collaboration effort, the following questions were asked:

- With how many UISCs entrepreneurs were you able to interact?
- What is your impression of this collaboration?

These questions were asked to frame the activities in a coherent way for all participants. The divisional manager and two RSS participated in this episode of work. Other participants collaborate with me to ask all the questions.

Episode: Enhancement

In this step of work, participants were expected to describe the functions of the shared technology centers in order to investigate and challenge their understandings. They were given one-and-half hours for group brainstorming and preparation of group presentations and discussion. There were both novice and experienced FFs, and all of them didn't have equal opportunities to collaborate with SICTCs' entrepreneurs. Thus, unlike the ***Seed*** and ***Basis*** episodes of work, this ***Enhancement*** step emphasized minimizing the knowledge gaps among participants. Groups were created with novice and experienced FFs which helped them perceive themselves as capable of addressing the potentiality and challenges of these mutual collaborative activities.

In this session, participants gave a group presentation on the functionality of their activity, using their drawings and pictures that compared and contrasted their program activities with those of the SICTCs and with the tensions of these community technologies in the context of community development activities. The divisional managers and two RSS also participated in this work session. In this information-driven capacity-building process, FFs face constantly changes in information locations and sources, resource persons, events, and patterns of information. Therefore, I emphasized their practices and work challenges so that they could model their activities to contextualize the situations and challenges for others. I suggested that, to do so, they use photographs of their normal activities as **anchor points** on which to gradually build their ICT understanding.

I intended to contextualize ICT knowledge creation around the community capacity building activities because I assumed that this method would allow participants to learn about ICT and perceive their prevailing challenges in new ways. In the workshop design, I emphasized flexibility, so participants could get a rather long period of 6 weekdays to visit the entrepreneur while still undertaking their regular practices. The collected photographs served as mirror materials to stimulate their involvement and group collaboration. The method worked: Group collaboration in sharing and discussing the individual photographs facilitated mutual understanding of FFs' challenging situations and achievements and facilitated FFs' understanding regarding the current opportunities of SICTCs.

Figure 6-2 DLWs' episodes with FFs (at the sub-district level)

Episode: Evaluation

The mutual understanding of FFs' challenging situations and achievements served as a stepping stone for participants to evaluate the dynamics of the shared ICT centers in the context of community development activities. All participants had a basis of understanding and of perceiving FFs' challenges and opportunities. Participants' basic understanding of the SICTCs gained from the *Seed*, *Basis* and *Enhancement* episodes of work eventually lessened their panic and frustration about technology usage.

This analysis emphasizes that the ICT capability, in particular, is enriched through mutual interaction. In the *seed* meeting, many participants did not express their knowledge about ICT and SICTCs. Although some knew about the centers, some of them were not fully aware of its facilities. After visiting the centers, participants had many ideas about the UISCs. They created individual flashcards for information from two perspectives: i) ICT centers as an object of field practitioners' ICT learning and, ii) SICTCs as tools for community development practice or, in broader sense, for community RIs and future shared ICT usage.

The experiences of each participant were explored in a semi-structured interview. Importantly, all participants agreed that they could understand the mission of the digitization of information and how they could benefit from ICT. Participants were confident that, if they had opportunity to access a computer, they could use it in their own work, for example, in information searching. Most participants stared that they benefitted from the collaboration with the SICTCEs and from the group work with experienced FFs because their different experiences helped participants understand the challenges of and strategies for their work. FFs expressed commitment to overcoming the challenges to using Internet-enabled information services in their human development work.

MUTUAL LEARNING IN THE WORKSHOP ACTIVITIES—AN ACTIVITY THEORY PERSPECTIVE

A constant question in research on learning is "How can you argue that *learning happens*"? My answer in this case study is that, *if* I can see in my data that participants changed their focus and expanded their object of activity, *then* learning and development happened (Engeström, 1993; Kuutti, 1996). I explain how I see these results in the DLWs.

According to Engeström (1987, 1993), the relationships between subject and object in the triangular model of activity are mediated by tools, community, rules, and the division of labor. From the HCI research perspective, Kuutti (1996) argues that it is crucial to consider these to be *participant–object* interactions when using computer artifacts as mediators. According to Engeström's (1987) theory of expansive

learning, an activity system is made up of networked activities and actions and can be subdivided into components or separate activity systems, depending on the analytical perspective. For example, although the SICTCs model (e.g. UISC telecenter model) might serve as a tool in FFs' future work, currently they think of the SICTCs model as the object of their activity when participating in the workshop I designed. Similarly, the technical rules of SICTCs that affect participants' understanding of the role of shared ICT in community development (e.g. their development of computer skills) could be the outcome of current participatory actions through which the FFs' technical skill requirement is identified or defined. When acting, one is also producing knowledge about that activity, which requires reflective work orientation with its specific tools. Consequently, it obviously requires second-order competence, which means knowing how to learn about this specific thing, as described by Ahonen, Engeström, and Virkkunen (2000). Considering this theoretical foundation, I have focused on the two relationships: between FFs and SICTCs' entrepreneurs and between the novice and experienced FFs.

My intentions as researcher in employing a participatory design approach in the DLWs design was not to fully eliminate the prevailing tensions but to create a reflective process (Schön, 1983) and provide an environment that allowed participants to develop new ICT knowledge. Using Engeström's (1987) triangles as modeling tool, I analyzed specific actions, instruments, and relationships in the DLWs activities. I also examined how participants went beyond the challenges of the ICT infrastructure limitations and their lack of ICT competence, given opportunities for reflection which my DLWs design offered them.

Through this mutual learning process during the seed session, participants could implement their tools and knowledge about SICTCs to achieve their key objective to build the capacity of marginalized, rural peoples during the follow-up *Basis*, *Enhancement*, and *Evaluation* sessions of the PD DLWs. All participating FFs sought to increase their ICT capabilities and their orientation toward rural community development. Fig. 6-3 graphically represents these efforts.

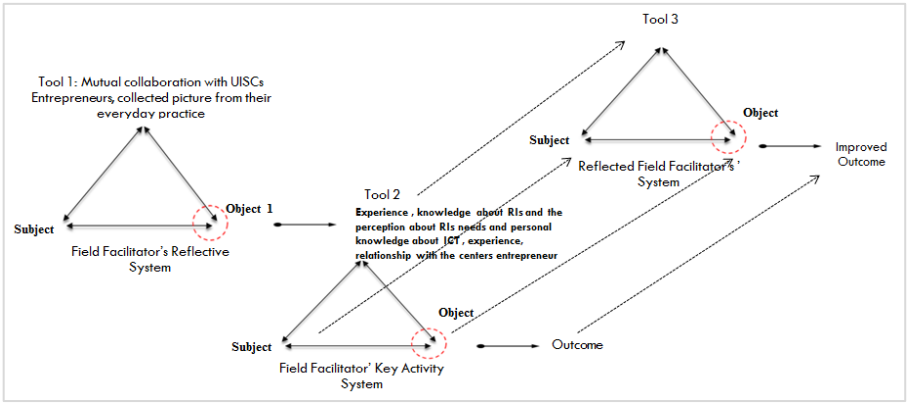


Figure 6-3 Model of FFs' expansive learning.

FFs engaged in their key work process (i.e., community development activities), labeled in Fig. 6-3 as FFs' *key activity system*. In this system, FFs are the subject, the rural community groups is the object, and FFs' experiences and views of RIs and other physical and psychological tools/materials for RIs' capacity development are tool 2.

In the mutual collaborative activity with UISC, the mediating tools of UISC and the entrepreneurs became the object of understanding for FFs (object 1 Figure 6-3). In this process, the participatory design activity materials, such as mutual collaboration with UISC entrepreneurs and FFs' everyday experiences from their everyday practices, became Tool 1 (Tool 1 Figure 6-3) for stimulating ICT knowledge. As a result, Tool 2 in FFs' key activity system was improved and revised into the new tool 3. Thus, a new improved outcome with the same object and same subject as the FFs' key activity system emerged.

This process of mutual learning was repeated during the follow-up episodes of *Basis* and *Enhancement*. The FFs' groups and object was changed into a tool through a process of reflection which I consider the instrument of expansion. I present a graphical representation below (in Fig. 6-4) of the transformation (from object to tool) areas in the mutual collaborative learning by the SICTCs entrepreneurs and group of FFs. I did not analyze the division of labor, community, and rules in systems 1 and 3 for the sake of simplicity.

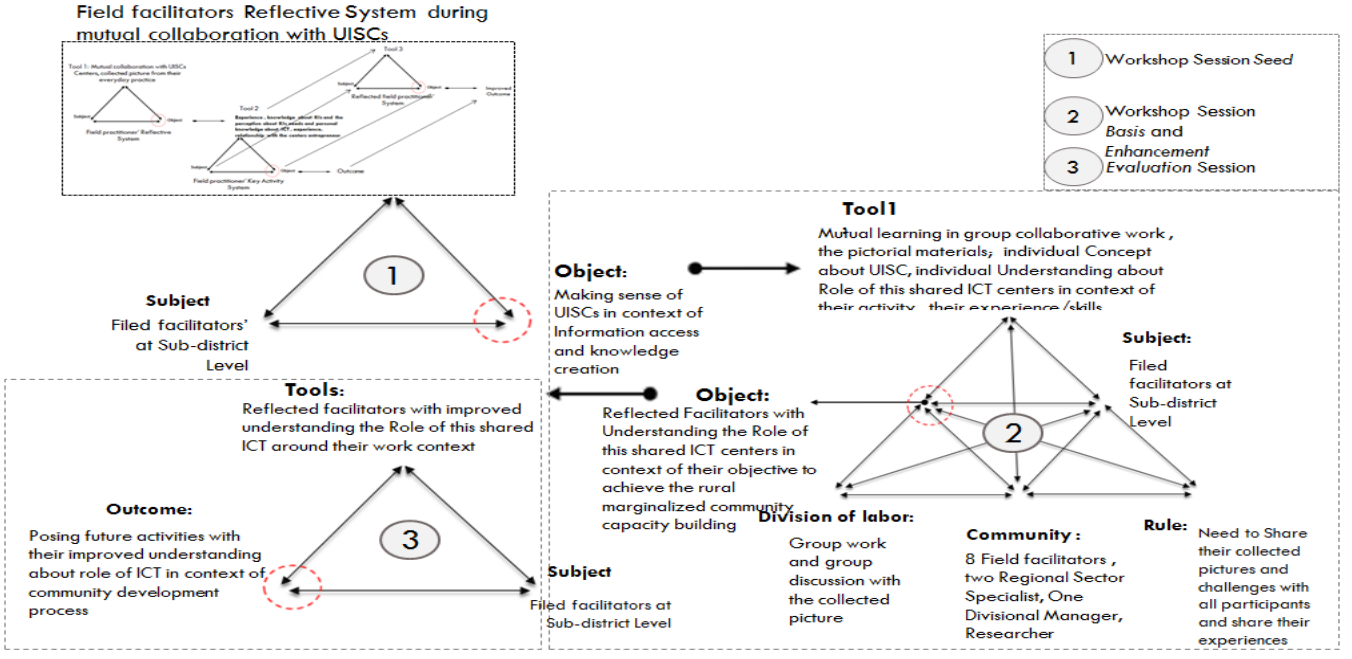


Figure 6-4 FFs' reflections analyzed in expansive learning categories

Using collected and created materials stimulated FFs' engagement. In this process, reflective considerations emerged, and FFs revised their existing practices through the group activities and discussion. The participatory design activity materials, such as the photo-voice, stimulated the discussions.

In another reflective system, *basis* and *enhancement* in the DLWs was considered. Looking at the events from the perspective of FFs as the subject of the workshop, participants' improved understanding of ICT's role in their development work again become the *object* through the mutual collaboration of participants. Here, the participatory tool (tool 1 Fig. 6-4) is mutual collaborative learning among a group of participants with motivational tools to elaborate on their ICT activities and skills and to eliminate their individual weakness about ICT tools. Consequently, the new tool was improved and revised during the enhancement session, and the FFs' system after group collaboration had a new outcome but the same object and subject. This reflective system concept is used to understand the improved outcome of FFs' ICT learning activities. Hence, through dynamic reflective approaches, this mutual learning improves the' outcomes from FFs' ICT learning.

EXPANDING THE OBJECT THROUGH MUTUAL LEARNING

In this section, I dig deeper into the circumstances around the expansion my analysis reveals. In particular, I focus on the mutual learning activities between the FFs and entrepreneurs. The goal when I designed these workshops was to find a new way to teach FFs about the benefits of using ICT. In other words, I wanted to make them begin to appropriate ICT. Now, in my analysis, my key question is what role the tensions I identified during my ethnographic work played—a springboard for or a hindrance to FFs' learning about ICT. I seek an answer by analyzing FFs and UISCs entrepreneurs' comments on what activities were challenging for them and when the SICTCs models facilitated or interfered with their activities. Perhaps my most important finding is that the mutual learning seemed to support a process of reflection and experimentation that highlighted various pieces of knowledge about ICT among the participants.

In this section, I focus the relationship among knowledge creation, contradictions, and transformation. Analyzing how FFs transform their object of activity shows that the object is transformed into a tool for expanded activity when ICT is appropriated. Furthermore, I found that the FFs created a shared object to achieve their goal of collaboration with ICT center entrepreneurs. This finding supports my theoretical understanding of the strengths of mutual learning.

The object in FFs activity system is *RIs' capacity building*. However, when FFs started their mutual interaction with entrepreneurs' activity system in the seed episode of the DLW, they soon realized that they needed to achieve different object for the successful use of ICT in rural community development. For example, one

participant explains that she changed her mind when she visited the centers: "*I have realized that I need at least some technical skills, such as searching for a specific category of information using the Internet. … But I am sure that, if I had skills and access to a computer, I could find information for RIs more easily than the entrepreneur because I have an idea what information is needed for the marginalized people at this moment. The marginalized people don't know how to explain their needs" (DLW-Ev-13).*

These two expressions '*I need at least some technical skills*' and '*I could find information for RIs'* show that, when the FFs started mutual interaction with entrepreneurs in order to understand the facilities of shared ICT centers, they soon realized that they needed new ICT skills to use these centers. This realization is an outcome of secondary contradictions between the tool and object of FF and eventually created a dilemma and demand for a change in FFs' existing practice. This secondary contradiction in the FF's activity system forced her to think about the new object to include RIs in ICT-enhanced information services.

Another participant focuses on the object of the entrepreneurs' activity system: "*When I talked with an entrepreneur of the UISC, the lady entrepreneur of UISC said that she didn't know how to serve the marginalized groups as her consumers because the rural marginalized groups don't have much literacy, even don't have money, and moreover, they don't have any idea about the purposes of this computer-enhanced information center.… She also mentioned that, if I helped her, then she could visit one of the RI general meetings and could explain her activities in this center with the RI groups" (DLW-En-4).*

The entrepreneur also realized that she needed to achieve the different object of including less-privileged communities, along with her previous object to give ICT service to rural communities, in order accomplish her mission in this rural reality.

As the workshop progressed, different themes were revealed in RIs' perceptions, which influenced the object of the entrepreneurs' activity system to work with marginalized, rural groups of people. The following tension themes seemed to influence entrepreneurs and make them deviate from the perceived object:

1) Assessing their information needs "*Entrepreneurs need to understand their need. … RIs can't even explain it in detail*" (*DLW-En-10*).
2) RIs' knowledge and learning capacity: "*We first assess why they need this information. Then we clarify how they could use this information and the further steps to take with this information. We have to follow up in communication with them*" (*DLW-En-5*).
3) Levels of relationships: *"They might face difficulties make relationships with entrepreneurs. Entrepreneurs need more time to work with rural marginalized*

groups. It's hard to say that entrepreneurs have enough time and resources to help the RIs." (*DLW-Ev-11*)

In Fig. 6-5, I show how these two activity systems were rebuilt and new tensions arose through the mutual learning that took place.

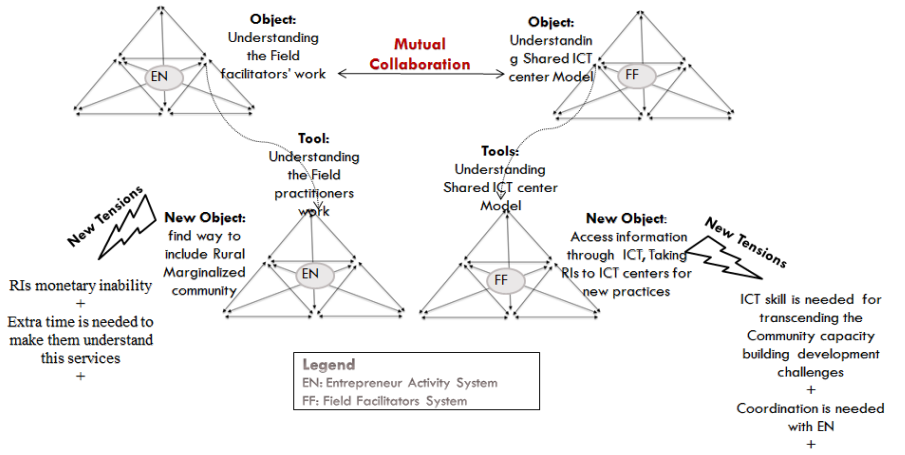


Figure 6-5 Graphical representation of mutual learning.

The entrepreneurs and the FFs wanted to create a shared object—'include less-privileged rural communities in ICT-enhanced information service activities'—by collaborating in their future work activities. We can find the idea to creating this shared object in the following comment by a lady entrepreneur: *"It would be fine if you [FFs] came here and gave me opportunity to learn about RIs' need since they have an institution. So if I can participate in one meeting with you, then maybe they will be familiar with me, and I will get the opportunity to give them ICT service as well" (DLW-S-E1*). This statement shows how the entrepreneur has identified her new problem area—the new object to include less-privileged communities in ICT-enhanced information service activities. Her statement might be the result of a struggle with this concept of ICT-enhanced information services in rural contexts.

The object in the FFs' activity system focuses on the purpose of the activity in the workshops with RIs and represents the problem area in the RIs' capacity building. The tensions '*highly geographically distributed information resource systems' and 'collective level of work for knowledge creation'* around the FFs' object can form alternative forms of a shared object with the entrepreneurs. It can also enable the success of the FFs' workshop and meeting with RIs through receiving information services from local SICTCs' entrepreneurs. As the conceptual principal of activity, the contradiction is viewed as the driving force of change and the motivation for learning.

These tensions between these two activity systems tends to obstruct but also boosts collaborative change efforts in the collaborative activity system of FFs and entrepreneurs' intervention effort. The following excerpts show the synergy of collaboration. A FF describes the outcomes of the basis workshop: "*I have used the leaflet and the list of ICT facilities of the UISC which I visited during the RIs general meeting last week"(DLW-B-10).* Which claim that FFs have taken steps to seek a way to *"include the RIs in this ICT initiative"*.

Thus, FFs started collaboration with UISCs and soon realized that they needed to accomplish a different object for successful meeting and workshops, creating a new problem space or object for them, such as ICT skills development and include less-privileged communities in ICT-enhanced information service activities. The objects seen by the FFs are different than their earlier object when they were sent to UISCs with a mutual collaboration aim. FFs' objects differed during the DLWs, which might lead to different practices based on their new knowledge of shared ICT facilities.

From the above statement, we can see that the activities of FFs and entrepreneurs are interdependent and overlap in the wish to include less-privileged communities in ICT innovation in rural areas. However, FFs and entrepreneurs require different work practices for their different main objects and respective rule systems. The elements of each activity system and their overlapping objects are identified in Fig. 6-6.

Based on the third generation of activity theory (Engeström, 2001), I draw this analysis in which a shared object driven by the existing tensions and mutual learning emerges from these two activity systems. The third shared object (see Fig. 6-6) is interactionally founded during the mutual learning process, in which traditional conceptions of RIs' capacity building through information literacy and ICT-driven information and knowledge creation practices are contested.

The analysis shows that these two activities are interdependent and have a shared object, but each requires a different work practice to accomplish their object and outcomes because they have different rule systems and tools to support their various communities. These activity systems share the object of RIs' capacity building, so their interrelations produce new relationships of entrepreneurs with RIs and local resources person and create new networks between FFs and ICT-enhanced information providers and tools. Although this mutual learning outcome shows that these two systems are mutually supportive, FFs still face the challenge to understand the ICT centers as a shared ICT tool for both themselves and their target groups of RIs. The following section describes some tensions as contradiction from the perspectives of both FFs and RIs.

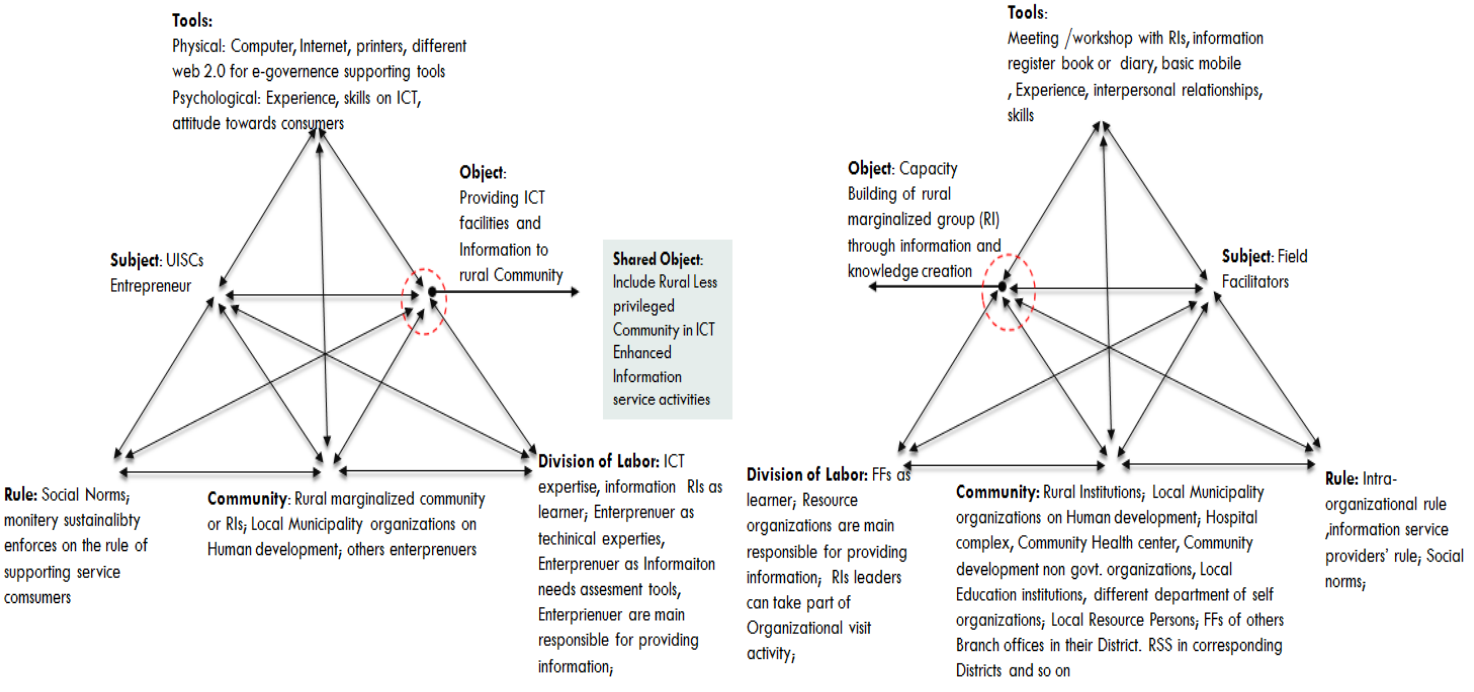


Figure 6-6 Constructing a shared object while mutual learning takes place.

Different levels of contradictions of the shared ICT center's activity system and FFs' intermediary activity system

ICT-enhanced, information-driven, rural-community capacity building takes place not only by placing rural marginalized people in a SICTC but also through the various activities to which the RIs are exposed within the CEP program. Engstrom (2001) explains how contradiction/tension can lead to innovation through the expansive transformations in activity systems: 'As *the contradictions of an activity system are aggravated, some individual participants begin to question and deviate from its established norms. In some cases, this escalates into collaborative envisioning and a deliberate collective change effort. An expansive transformation is accomplished when the object and motive of the activity are re-conceptualized to embrace a radically wider horizon of possibilities than in the previous mode of the activity*' (Engstrom 2001, p.137). The capacity building of community less-privileged groups is object of FF. These community groups are having information access problems- which are constantly changing with the change of their information seeking tools or rules or others conditions. Any change of their information access and assess artifacts/mediators changes also the demand changes of FFs' object. This transformation is constructed from an effort when they faces different tensions and have an opportunity to analyze the possibilities of new historical object and that object works as an expansive solution to their existing tensions. Engeström (1987) explains this object projection as a *zone of proximal development* for a collective activity. This zone is not the goal of any activity; rather, it is an invisible battleground for contradictions and objects which separates present and future practices (Engeström, 1987).

In this section, I demonstrate that my findings are at a different level of contradiction, which indicates that the FFs have learned and developed a sense of the zone of proximal development, as described by Vygotsky (1978) the zone of proximal development is 'The distance between the actual level of development as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers' (Vygotsky, 1978, p. 76). In DLWs, the case of mutual learning between the FF and Entrepreneur, made this progress possible. Prevailing disturbances or contradictions are crucial to possibilities for change and to the zone of proximal development (Vygotsky, 1978).

In this part of analysis, I consider the FFs' community capacity building to be a system and the SICTCs to be an activity system. However, comments came not only from FFs but also from SICTCs' entrepreneurs, describing their impressions of

how these systems struggle to achieve sustainability in rural environments and of trying to fulfill the objective of community capacity development. The object of the entrepreneurs, the subject position of SICTCs system, is to provide information services to rural communities, and the desired outcome SICTCs system is the sustainability of these services in the rural context. The tools could be entrepreneurs' technical experience and skills, learning tools and materials, and guidelines for finding information on the Internet. The entrepreneur belongs to the rural community and serves as its technical support and information-providing organizations. These tasks must follow certain rules in order for the activity to sustain itself in the rural context. Therefore, I investigate i) what the tensions are between these two systems from FFs' point of view, and 2) how the elements in each system shape the object of community capacity building to access the actionable information.

I focus on analyzing the findings by using the activity system as an analytical tool and identifying the contradictions and similarities between these two systems' roles in information-driven capacity building in rural community. This lead to the crucial question of whether the SICTCs are sufficiently prepared for rural communities' ICT-enhanced, information-driven capacity building approach?

Secondary Contradictions

No activity system is static; a change in any corner of an activity system results in changes in other parts of it (Engeström, 2000). In FFs' intermediary activity system (Fig. 6-7) where FFs are in subject position, the SICTC is considered a new tool (such as UISC) and force a secondary contradiction between object and tools. This contradiction leads to crisis and eventually demands re-organization of FFs' practices, the acquisition of knowledge and skills, changes in the division of labor between FFs and ICT center entrepreneurs. This contradiction also has consequences for the outcomes and rules of the work. For example, FFs and the RIs can find available information services from UISCs without direct communication with government and non-government institutions.

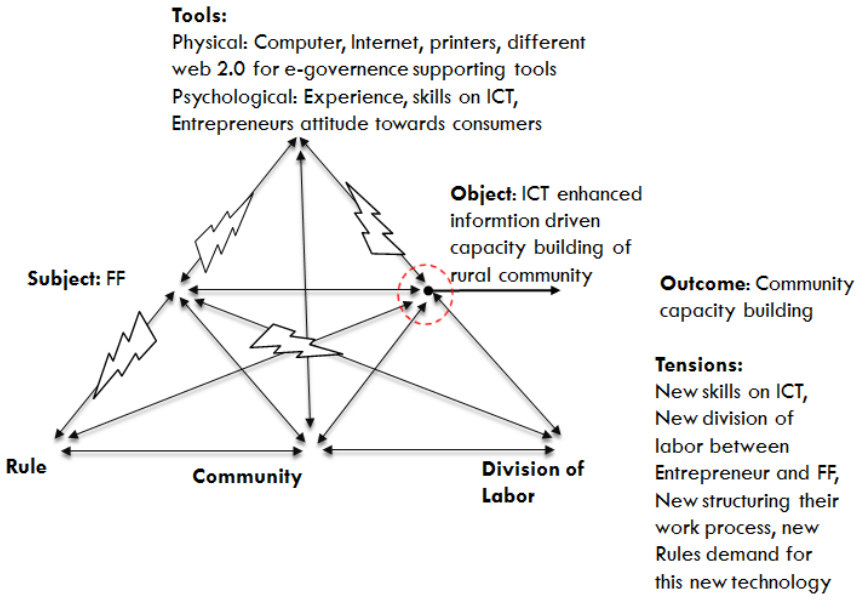


Figure 6-7 Secondary contradictions of FFs' intermediary activity system with a SICTC as a tool.

The tension between the subject FFs and the new tools requires that FFs gain new knowledge and skills for reporting to the head office and collecting information online. These changes also demand re-organization of FFs' work processes and organizational rules, which is a central concern in this ICT intervention process, according to notes from meetings with high-level CEP officials:"…*Our field workers are highly geographically distributed and it is huge challenge to provide computer and internet support to all of them.*" (FV3-I-1)

The following section discusses the different tensions that arise when SICTCs are perceived as tools for rural marginalized community (RIs), in other words, when RIs are in the subject position of the FFs' activity system and SICTCs are perceived as intermediary tools.

Different human and material factors are involved in accessing information from ICT-enhanced information centers. Workshop participants pointed to different dilemmas in this system when they perceived it as tool for marginalized, rural people. Fig. 6-8 illustrates these tensions.

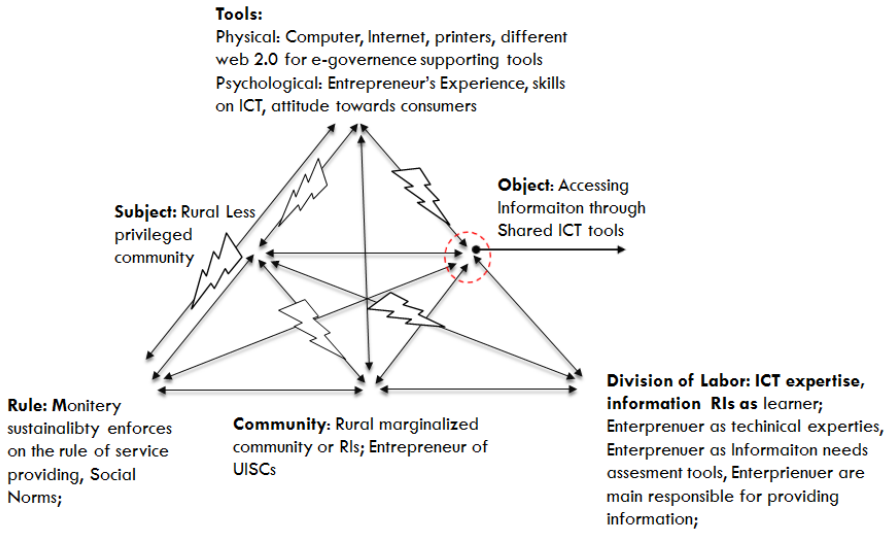


Figure 6-8 Secondary contradictions of FFs' intermediary activity system when the SICTC as a tool and the RIs are in the subject position.

Tensions between Tools and Subject

FFs mostly mentioned tensions in relation to human factors/conditions;

i) Marginalized, rural communities' experiences
ii) Knowledge and skills to understand the tool's facilities
iii) Knowledge and cognitive power to understanding printed materials provided by the entrepreneurs

Tensions between Tools and Object

FFs highlighted the material factors involved:

i) Language of online contents which are highly formatted and not illustrated according to RIs' need
ii) Monetary ability to use printing services

Tensions between Subject and Community

SICTCs' entrepreneurs hold the community position. FFs long engaged with marginalized sections of the community identified tensions:

i) Understand the needs of the marginalized, rural communities
ii) Motivation to support marginalized, rural communities for a long time

iii) Need for an awareness program about the new e-governance information service

Tensions between Tool and Rule

i) Limited ICT infrastructures, such as slow Internet speed and disrupted power supply, which affect the rules of service
ii) Demand for subsidies to ensure the provision of ICT services for marginalized, rural people.

Tensions between Subject and Division of Labor

i) Difficulty for entrepreneurs' to understand RIs' needs because of the limited time and motivation to work with less-privileged communities
ii) Relationships with an entrepreneur solely responsible for justifying RIs' information needs

Tertiary Contradictions

FFs have significantly different views on information services for marginalized, rural people, in particular what constitutes information-driven capacity building and how SICTCs' entrepreneurs should interact with rural women's groups. FFs view information as a means—but not the sole one—for RIs' capacity building. The entrepreneurs of the SICTCs' activity system view the time and costs of services as components of sustainability. They perceive providing services to the rural poor as a threat or intimidation in ICT center's sustainability. Consequently, the rural SICTCs are underutilized. The adjustments to the roles of the FFs' and the SICTCs' activity systems develop contradictions and tensions (see Figure 6-10 and Table 6-3 for details). This information was collected through semi-formal interviews when I visited UISCs along with FFs in two sub-districts. DLWs' others episodes data and the field visits data are considered here for data triangulation.

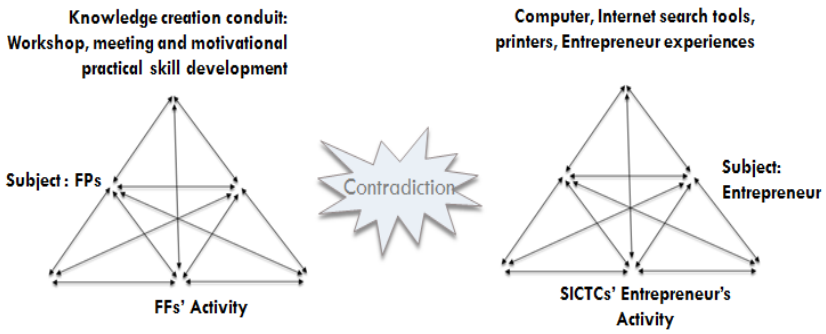


Figure 6-9 Tertiary contradictions

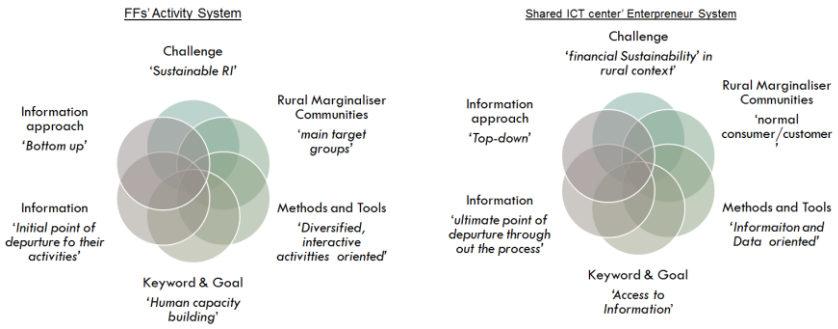


Figure 6-10 Dichotomy of these two systems FFs intermediary system and the SICTC System.

These contradictions can be considered an example of a tertiary contradiction. The FFs refuse to accept the SICTCs as independent systems for information finding, especially for RIs. Moreover, FFs see these centers as a tool for themselves, instead of an independent system for rural communities' information driven capacity development. FFs experience frustrations and tensions while finding detailed information from government agencies and NGOs and believe that ICT can reduce this anxiety. FFs think that SICTCs could work as a tool for community capacity building because they view information-driven capacity building as a process of intermediary tool selection. Fig. 6-10 summarizes the dichotomies of these two systems.

Table 6-3 Dichotomy of these two systems FFs intermediary system and the SICTC System

FFs' Perspective	Entrepreneurs' Perspective
Information a**pproach** is ***bottom-up.*** "*We are focused on community needs. We don't give whatever information we [happen to] have. ... We always try to investigate their current needs." (FV3-I-8)*	**Information** a**pproach** is ***top-down.*** "W*e have some instructions from the UNO office. ... We try to give the available information. We are not fully aware of the community's needs." (DLW-S)*
Less-privileged, rural communities viewed as the s***ervice/information owner.*** *"After a long time relationship building, we can understand their needs and their skills, so within a short time, we can*	Less-privileged, rural communities viewed ***service consumers.*** *"We are here to give them a service, but we also need to be sustainable, so we need to think about electricity costs, Internet costs. ... So we can't give*

identify how we need to interpret the information and need to explain it so that they are motivated to search for the information."(DLW-Ev)	*subsidized services or extra time to poor communities because of their financial condition." (DLW-S)*
Information is the initial point of departure. *"If we provide any specific information on vaccination, we have to also find who can understand the need for this, so we try to contact our local community health worker and invite her to the community group meeting." (DLW-En)*	**Information** is the ultimate point of departure throughout the process. *"If we think we have some new oneline forms or circulars, we try to inform them by posting them outside our door, but the problem is most people are not aware of this because they have a lot of limitations." (DLW-S)*
The keyword is *human capacity building*.	**The keyword** is *access to information.*
Methods and tools are diversified, interactive, and capacity-building oriented. Following are FFs' excerpts during the workshop period: *"We used different kind of methods and tools, such as workshops meetings, and popular theater and we try to understand their needs first." (DLW-En)* *"They have to familiarize themselves with the problem situations, so we try to involve them to help them find information themselves with the help of their leaders or any resource person in their community." (FV3-I-8)* "*The experienced group members share their success stories with other group members to increase their motivation to work by themselves. They have opportunities to assess their information needs and ways to find a solution during the workshop or meeting." (FV2-I-3)*	**Methods and tools** are information and data oriented. One FFs' excerpt: "*They have some sort of methods to disseminate information about available ICT facilities and tools, such as postering outside their doors,—who will read those things? ... RIs have difficulty accessing this kind of information. Maybe after long practice, they can access these facilities." (DLW-Ev)*
The challenge is making sustainable and	**The challenge** is economic

independent RIs. "*Its huge challenge to make them sustainable without our long time work with them."(DLW-Ev)*	sustainability. "*The challenge is to include on a large scale the poor, marginalized people in rural areas." (DLW-S)* *"We have to run our business. ... Most of the time, we cannot spare extra time and provide services to marginalized people. Although we want to help and support them, but as you know, Internet costs are high, and it usually takes time to understand their needs. Moreover, most of the time, they don't know how they can be benefit from this technology" (DLW-S).*

CONTEXTUALIZING ICT KNOWLEDGE IN MUTUAL INTERACTIONS: THE PREVAILING TENSION AS STIMULI

In this section, I attempt to determine what elements constitute the core knowledge-creation activities in FFs' community capacity building and what prevailing tensions related to the *collective level of work for knowledge creation* and *communication level of work for knowledge creation* act as springboards for ICT knowledge creation. FFs' comments are supplemented with entrepreneurs' impressions of the problems and dilemmas in sustaining ICT centers in rural environments and fulfilling their objective of giving ICT facilities to rural communities.

Collective Level of Work for Knowledge Creation

For FFs, it is important that RIs understand the goals of the meetings and workshops because these activities can enable them to see the bigger picture of their current problems and information needs. For example, the practical experience of visiting an organization with FFs advances RIs' understanding of accessing information and knowledge about their information need. These visits also help develop RIs' knowledge of various means of knowledge acquisition and cultivate their information-access practices which they need in real-life problem situations. RIs still need help to recall the process or relate the information in order to find the

way to access information because of their lack of literacy or limited cognitive power for memorization.

A participant describes ICT centers helps RIs in this context of collective work: "*You can see from this picture, the educated adolescent from their community is helping to manipulate their information and writing their next steps of work for acquisition of any information. Here, I can see the entrepreneur has a significant role in helping them to find the needed information, but I have doubt about this. They might not have enough time to give them because there are survival questions for the entrepreneur in this rural area. If they come together in this UISC or we can bring them in this center, then maybe they will be able to understand the value of this ICT-enhanced information service" (DLW-B-10).*

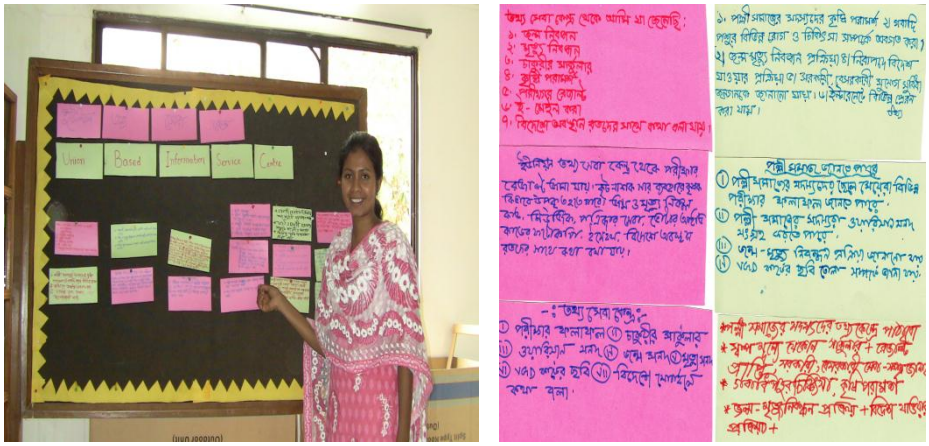
Communication Level of Work for Knowledge Creation

Collaboration and communication are the main activities for knowledge creation and learning for both FFs and RIs. However, the findings (see Chapter 5) indicate a persistent tension for FFs to maintain coordination and communication with resource organizations and local resources persons and the ICT-policy-driven changes have affected information searching policy as well. FFs have doubt and questions about the new technologies and their services and concerned about RIs' capacity. This situation leads to a new tension between the subjects and the new object to create new collaborations with ICT entrepreneurs. Another tension between FFs' object and tools also emerges. FFs demand new kinds of help to access information based on their previous tools, which creates a new division of labor with the ICT center entrepreneurs. This demand leads to a tension and ultimately demands re-organization of FFs' practices or their existing plan of work, such as conducting meetings and workshops with RIs for knowledge creation. However, during DLWs, FFs also realized that this change also opened a new possibility to expand their objects and adopt new activities. Instead of feeling harassed by this ICT innovation, they realized that they could find new ways to search for information and cultivate RIs' information needs. For example, during the workshop, each participant used flash cards to share her knowledge gained from visiting the UISCs and identified the need for collective use of UISCs to mitigate the tension of coordination and communication with resource organizations:

"We don't need to think about the new person in any organization or to start communication with organization again. We don't even need to make a lot of effort to make relationships for smooth communication with the person anymore. ... We can get agricultural information or skill development circulars from computer" (DWS-EV-4).

Another comment on the tension of FFs' skills and experiences: *"It is difficult to manage information and to conducting meetings or workshops with all the participants. ... It requires a lot of information from participants. It requires managing a lot of documents. As well as, it demands a lot of constant*

communications with our senior FOs or RSS. Hence, UISCs can help us in this regards by providing instant information." (DWS-EV-13)



Picture 1 (Right): flashcards displayed by FFs during the DLW regarding informaiton that are available from SICTC for RIs:
Picture 2 (Left): One participant is highlighting some ICT-enahanched information services from displayed flashcard

The above flashcards (**Picture 1)** displayed by FFs during the DLWs' sessions depict some services and informaiton that are available from SICTC :

- Information about govt. and no-govt. organizations' services
- Procedure of registering birth and death and Printed 'Form' for birth and death certificate, Warish certificate and voter ID card
- Information on agriculture and farming especially about the use of pesticide and fertilizer
- Information about the diseases of poultry and dairies

Constant communication and practical demonstrations are vital aspects of FFs' workshops and meeting sessions with RIs. The following quotation shows how FFs understand the need for ICT: "*I think internet supported mobile or computer can easily help us to conduct workshop/meeting with RIs' members/leaders, as well as with the local government representative" (DLW-Ev-4).*

Highly geographically distributed information resources organizations and persons

In overlapping, dynamic activity systems which work as local, historically formed, tool-mediated networks, local resource persons (e.g., health care advisers, community health care workers, education advisers, lawyers, other communal facilitators) and local information resource organizations are urgent information and knowledge resources. To counter their challenges, FFs are involved in a community engagement system (see Fig. 6-11). Several activity systems participated in different ways as sources of information and knowledge and are oriented to different individual perspectives and interests. Consequently, they contribute to the success of FFs' work in RIs capacity building, which is the object of their activity.

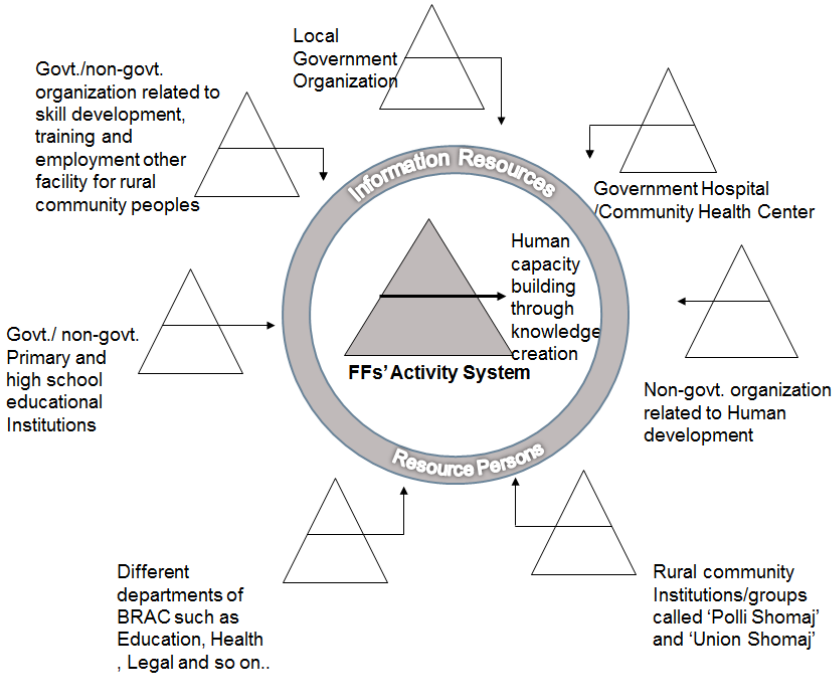


Figure 6-11 Embeddedness in multiple activity systems of FFs.

The outcome of the activities of the local government representative systems whose object is to support rural community development is not always directly related to empowering the rural community. Rather, local government systems only provide public support with related information. To support community development, other agencies FFs have to adapt and situate the information to the needs of the RIs. Engeström's (1987) argument that any activity is not simply a division of labor but a division of different perceptions of different activity systems applies to this

situation. Following comments of participants during the DLWs show the different perspectives and clearly identify the ICT needs in their work context. These comments also demonstrate how FFs' prevailing tensions can be used to stimulate participants' (*expanded) learning about ICT.*

"It is challenging for us when we deal with the people in government organization or NGO offices. Although people in some offices sometimes are very cooperative and helpful, others are always reluctant to provide us with the required information and help. Sometimes, they don't accept us easily or don't pay enough attention to our needs. I can give you one example here. Last month, I visited the local office of … where I met the local representative to discuss some issues. The lady in charge of the office was nice and cooperated with me, and I got some information from her. However, the lady I met moved to another sub-district after some days—and when I visited the office again last week—I met another lady representative who was not as cooperative as the previous one. I found her a bit reluctant to cooperate. … It was apparent from her behavior that these public officers don't show always positive attitude towards us and our grassroots social work" (DLW-En-13).

Other participants express their problems as follows:

"I would say that it is also difficult to arrange the information after collecting from the sources. It is not a problem to note down some short parts of information from their offices, but when it comes to getting a photocopy of a long government circular, the officers do not always cooperate with us to get that copy. However, some offices are very helpful in this regard, for example, the [government youth development directorate]" (DLW-En-4).

When participants were asked about the UISCs' activities, one shared the following viewpoint:

"I think they can help very much. If we have access to UISCs, we can get detailed information instantly. We don't need to make multiple visits to those organizations for necessary information. For example, if we need some particular government notices like human skill development circulars or detailed guidelines on different social benefits, we can get all our required information from one place. That will eventually create a positive impact on our efforts to serve the rural people" (DLW-En-10)

FFs are usually motivated by their object to cover all the agenda and quickly communicate with RIs about all their current issues. Although there were no visible tensions during FFs' routine work and efforts to cover all the issues, the following statement by a FF' suggests an emerging tension. Additionally, FFs struggle to accomplish their task within the limited meeting time. This contradiction plays itself as a tension between FFs' work experience and their knowledge about the needs of the RI group. FFs' work routine demands that they cover all issues within a limited time span during meetings and workshops. This tension is evident in the

following statement and also the computers and internet can work as intermediary tools to mitigate the tensions.

"I work devotedly for the target groups. It requires a good relationship with them to understand their circumstances. … If we have access to a computer or at least a good mobile phone with a camera, then we can bring different photos of various events and motivate them to get involved in this information dissemination. Usually, they can be very motivated to see the real pictures of any events or any success story of other RIs group. I think they have seen computers at different shared ICT centers, but they don't know the utility of them. I can provide them with information instantly by printing out different materials if I have services to access a computer or the Internet. Motivation is a vital issue when we work with this rural marginalized group of people" (DLW-Ev-4).

SUMMARY AND MUTUAL COLLABORATIVE FUTURE

My findings indicate that the role of researchers and participatory design approach is not to eliminate prevailing tensions but to balance their relationships with the creation of new knowledge about ICT among participants. For example, I constantly observed that understanding of the UISCs model (as an *object* of activity) or usage of the UISC model as a *tool* to visualize FFs' ICT-enhanced community-capacity building model (as an object) provided a learning environment in which FFs could learn about ICT.

In summary, I have explained the core knowledge-creation activities of FFs to contextualize the prevailing tension with ICT knowledge creation in previous section. The analysis of the mutual learning between FFs and entrepreneurs makes clear that there is a connection between the ICT development systems, such as the SICTCs' entrepreneur system and the FFs' system. However, here is ambiguity in how these systems individually prepare RIs to properly access information. The research shows that the both systems work when they mutually interact to provide service to RIs and adequately prepare RIs for information access and knowledge acquisition, in other words, we can say that these both system mutually supportive for RIs' capacity building.

In other words, through mutual collaboration with the entrepreneurs of SICTCs, FFs' new objects are created, along with new tensions. Based on third-generation activity theory (Engeström, 2001) and on the interactive activity system with a particular shared object, community development organizations or institutions can be characterized as boundary organizations that create an emerging shared object between the SICTCs' activity system (where the rural community is exposed to the digitization of government services) and FFs' activity system. This mutual learning can serve as mediating system between less-privileged communities and the ICT-policy-driven change activities of information domain communities. This mediating

system can also play an interesting role in building an ICT-mediating culture in order to support ICT transformation and digitization processes at the rural level.

The combination of these activities for ICT development at the rural level is clearly important. In this analysis, I have examined data on the shared ICT centers for RIs. This mutual learning attempts to cross the boundaries between FFs' and entrepreneurs' activity systems and to identify emerging tensions from RIs' perspectives because tensions are always embedded in a change situation (Engeström & Sannino, 2010). These tensions can be categorized in three levels, as shown in Fig. 6-12.

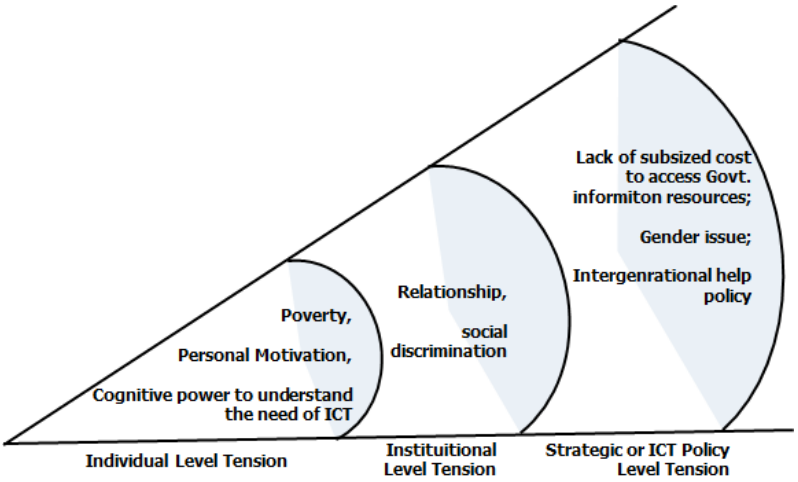


Figure 6-12 Challenges for ICT intervention on the ground level

This illustration shows the central outcome of ICT capacity building: ICT knowledge creation among FFs in order to bridge the consideration of ICT changes at the macro level of policy and strategy and the micro level of individual skill. Top-down changes evoke in FFs feelings of tensions, such as a lack of individual ICT skills and ICT facilities to do their community development activities. Thus, there is a risk that these shared ICT centers for accessing government and non-government information and services will not reach the level of the less-privileged, rural community where multiple contradictory tensions take place (see Fig. 6-12). These tensions can be categorized on the individual, institutional, and strategy and policy level. The tension lies in the utilization of ICT centers when they are considered a tool for RIs' capacity building. However, for participation in a digital community, the ICT centers must be able to support the less-privileged, rural groups. In this perspective, FFs should be seen as brokers between the ICT entrepreneurs' and the RIs' activity systems. FFs should learn which ICT services to access to the center.

CONCLUSION

In this Chapter I analyse FFs' process of expansive learning and the conceptual framework of the DLWs. This chapter shows how mutual learning is forced by contradictions and how attempts to overcome these contradictions become springboards for the further facilitation of learning about shared ICT. I answer the question of how to improve the FFs' digital competences by showing how they move *from* rejecting the appropriation of ICT (because the adoption of a new technology is too difficult in their pressed situation, given their lack of equipment, time, space, and confidence) *to* a state in which they begin to see ICT as a potential source of help. I analyse that this movement is caused by the DLWs' activities and mutual learning, through which they—despite all objections and obstacles—begin to see the SICTCs' entrepreneurs as their more capable peers. This is a role they also begin to see for themselves with regard to ICT, and they envision how they can become mediators of expansive learning

Much research has shown that we are still far from understanding the ICT appropriation process by which ICT development initiatives can flourish and be sustained at the ground level (Heeks 2014,2010, 2005, 2002a; Walsham, 2013). Within ICT-related research, such as Computer-Supported Cooperative Work (CSCW), the World Summit on the Information Society (WSIS) initiatives, and ICT4D research, the concepts of knowledge sharing, community building, and learning communities have gained increasing interest among researchers (Huysman & Wulf, 2004). In this chapter, I have tried to conceptualize ICT appropriation in rural community development activities as a mutual negotiation and learning process, in which various contradictions are synthesized or minimized through mutual capacity building and dynamic interactions among FFs and their more capable peers. Knowledge creation transcends the boundaries of the old self by acquiring new knowledge (Nonaka & Toyama, 2000) and initiating an expansive learning process which synthesizes tensions or contradictions for development (Engeström, 1987, 2001).

This participatory design DLWs process creates the new conceptual mediating tool of mutual learning, which provides possibilities for ICT knowledge expansion in consequent knowledge-creation cycles. It can be assumed that the concept of a reflective system of mutual learning construction is very close to re-mediation as proposed by Lektorsky (2009). Lektorsky (2009) argues that the creation of a new activity or practice is a process of reflective re-mediation which replaces an old mediation by a new one. This mutual learning space is interactionally constituted by re-mediation, in which FFs' prevailing practices and the tensions between RIs' capacity building and SICTCs' mediating practices are contested and replaced with forms of ICT literacy that privilege changes in participants' existing practice. This concept of mutual learning mediation through reflection raises new questions: How can RIs be potential consumers of this ICT intervention at the rural level? How can

ICT tools be a mediating tool for developmental organization at the local level? This concept also gives rise to new activities (e.g., new collaborative work with SICTCs' entrepreneurs) and new objects (e.g., including RIs in this ICT development community). Although the DLWs did not produce any concrete learning goals for FFs at the beginning of their design, Lektorsky's (2009) claim supports a proposition: "The need to change collective activity arises as a result of the existence of inner contradictions in a system, a certain degree of inner tension. Reflection is a mode of comprehending these contradictions and understanding possibilities of changing activity within the framework of the same system by way of a new mediation." (p.86). Lektorsky (2009) also mentions that the reflective mediation is not the goal-rational model. The goal-rational mediation model can lead to new paradoxes—how can you create new [things] if you know ahead of time what they are? (Engeström, 2009) The FFs gained from the workshops new ideas and visions of how to appropriate ICT tools to benefit their work in capacity building of RIs, while the ICT entrepreneurs got a feeling for the potential for their business if the RIs became users/consumers of their services. However, more specific objects and learning goals have to be worked out in new workshops addressing these visions.

This analysis investigated two propositions: (i) Mutual learning is useful and supports prevailing tensions and contradictions directed to ICT knowledge creation; and (ii) prevailing tensions act as springboards for contextualizing ICT knowledge at the ground level of capacity building activities.

These findings are in line with the knowledge creation perspectives advanced by Mwanza and Engeström (2003).

i) Learning is driven by genuine developmental needs in human practices and institutions and manifested in disturbances, breakdowns, problems, and episodes of questioning existing practices.
ii) Learning proceeds through complex cycles of learning actions in which new objects and motives are created and implemented, opening up wider possibilities for participants involved in that activity.

This view of expansive learning highlights the potential impact of this mutual learning tool and the participatory design workshops as vehicles for transforming FFs' existing community-development practices and procedures and shared ICT center entrepreneurs' promotion of ICT. The shared ICT tool becomes the boundary object for shared visions.

CHAPTER 7. THE CONTEXT OF ICT KNOWLEDGE CREATION AGENCY

After nearly two decades of discussion on ICT for development and ICT for rural community development, researchers still seem to fall short of a deep understanding of what it takes to lead and appropriate ICT in ways that can be integrated in sustainable innovation in rural community development. Although the research and community development societies are aware of the potential of ICT in their developmental work, ICT deployment and implementation still represent a bottleneck, rather than a tool (Dada, 2006; Heeks, 2009, 2010). Against this background, this chapter will now address the role that the setting plays in the dynamic process of ICT knowledge creation.

I begin by analyzing the practical circumstances of the ICT appropriation process and the enablers of knowledge creation. I seek to determine how the knowledge creation setting and its enablers serve dynamic ICT knowledge creation.

As already described, I employed various PD tools and techniques in the DLWs in order to investigate the FFs' ICT capacity building in their collaborations with the SICTEs. Speaking in activity theoretical terms, I hoped, through my design of the workshop settings, to make the appropriation of ICT the object of the FFs' activity in the workshop, so that the outcome would be that they understood the role of the SICTEs in the context of their own practice. Under my guidance, they used digital cameras, pictorial materials, ICT center leaflets, and their own and each others' experiences, as well as their existing strengths of collaborative work at the community level.

Suchman (1987) states that knowledge creation is not context-free; rather, it is situational. She also emphasizes that knowledge cannot be understood without understanding the situation in which cognition and action happen (Suchman, 1987). In the same vein Nonaka et al. (2008b) argue that 'the knowledge-creating process is necessarily context-specific in terms of who participates and how they participate' (p. 8). They propose the concept of the knowledge creation setting 'Ba' (Nonaka & Konno, 1998) and the 'middle-up-down management model' (Nonaka, 1988; Nonaka & Takeuchie, 1995).

As I already discussed in Chapter 3, I use Nonaka and Konno's (1998) term 'Ba' to denote the context in which knowledge is created and shared. In their definition, Ba provides the energy, place, and quality to move knowledge along the knowledge conversion from explicit to tacit—and, further, back to explicit (Nonaka & Konno, 1998; Nonaka et al., 2000a; Nonaka, et al., 2000b). The middle-up down

management model presents middle managers as leaders in knowledge creation, using a spiral conversion process involving both the top and the bottom management levels. Nonaka and Takeuchi (1995) propose that the middle-up-down management model is the most appropriate knowledge creation setting under which organizational knowledge can grow or flourish. They also emphasize that middle managers work as knowledge producers to remake reality, or 'produce new knowledge,' according to organizations' higher authorities' vision (Nonaka et al., 2000a). I employ these two concepts of Ba and the 'middle-up-down management model' to analyze the DLWs. Since Bangladesh is viewed as a hierarchical society, I find it interesting to evaluate how a business organization model building on Nonaka and Takeuchi's (1995) principle of 'middle-up-down management' can be applied, as well as how the DLWs were enabling energizing processes at both the physical and the virtual shared context level.

Here, in this Chapter, I move up one step in abstraction to analyze the DLW in this rural community of Bangladesh in its developmental context—not at a policy level, but as a 'setting.', where 'setting' denotes theorized entities 'ba' and 'middle-up-down management model' that help to explain the relationships between individuals and their social and physical environments. The purpose of this analysis is to be able, in my concluding Chapter 8, to inform the field of participatory design in the context of ICT4D.

The chapter is divided into five parts. First, I discuss the core knowledge creation elements of FFs and how these elements relate to the knowledge creation context. Secondly, in sections 2, 3, and 4, I analyze the 'digital literacy' workshop sessions from the perspective of ICT knowledge creation enablers to see how they energize and give quality to ICT knowledge creation work. In order to fully comprehend the role of FFs, section 5 develops the middle-up-down management model view to inform the potential of the intermediary work setting in ICT knowledge creation. Finally, I explain how the DLWs worked as dynamic knowledge creation configurations.

KNOWLEDGE CREATION ENABLERS AND AGENCY IN INTERMEDIATION WORK

By introducing the concept of Ba into my analysis of the FFs' knowledge sharing activities, I intend to show that the FFs' existing knowledge sharing elements worked as a dynamic arrangement of knowledge creation for the continuous growth of ICT knowledge at the ground level of their intermediation work.

This section describes how the notions of the knowledge creation context Ba—that is, the physical and virtual shared context, the relational context of sharing, and the spiritual shared context—serve as means for understanding the FFs' intermediation

process and for intensifying the interactions between the community group and the mediators.

While considering FFs' structural opportunity of sharing information and knowledge, I observed, in my analysis in chapter 5, two significant opportunities: namely, the organizational set-up of RIs and their community engagement through face-to-face meetings, workshops, and popular theatre. I find that FFs act as information and network brokers. When they contact external organizations to collect information in detail or to contact resource persons (e.g., village leaders or health workers), they continuously expand their networks and the creation of a shared context. Whenever they receive any community needs-based information from external organizations though external bonds or ties, these are transferred to the rural community via an intra-organizational structure of internal bonds and ties. Moreover, when helping RIs' leaders or members' resources, FFs act as network brokers and boundary spanners. An important aspect of this activity is to create new opportunities for sharing community needs with resource persons or governmental and non-governmental organizations through ICT.

Since knowledge is context-specific and depends on particular times and spaces (Nonaka et al., 2000a; Nonaka et al., 2000b), physical or virtual exchanges and adaptations are needed for knowledge to be created. FFs' structural platforms for knowledge sharing spaces and actions (e.g., meetings, workshops, popular theater, formal and informal face-to-face communication, and mobile phones) (see Figure 7-1) offer a physical and virtual Ba in relation to how RIs' and FFs' new knowledge can grow and innovate.

The study of FFs' activities (for a detailed analysis, see Chapter 5) shows that the conditions of the rural environment, poor infrastructure, and uncertainty about appointments in public offices take their toll on the FFs. However, despite unfavorable circumstances, many FFs find satisfaction in their work because they can see the positive effect it has on the rural communities in which they operate (e.g., the RI). This is also mentioned several times in the informal interviews or discussions (see Chapter 5). In the words of one FF:

"*My knowledge level was very poor when I joined on this work. I was thinking, how I will manage to communicate with these less-privileged groups, as well as people in the organizations? But I can do it better now, and I like to help those RIs because I know that, with a little help from my side, it would benefit them in their life." (FV3-I-13)*

FFs' relationships with local government officials, other information sources, and their RIs determine how well they can do their jobs and how well they can maintain their formal and informal interactions. Many FFs mentioned that government officials were not always willing to share information—or, sometimes, were even

reluctant to meet with them. Since they represented the only available source of information (which was sometimes the very reason the information was being withheld), FFs were compelled to build good interpersonal relationships with them. One FF mentioned how she accomplished the relationship-building job:

"*Officials of local organizations are more cordial than before because they know why I come to them, and they also aware about the RIs' need from our frequent visit and relationship." (FV2-I-4)*

Thus, the mutual trust and reciprocity between FFs and organizations create relational opportunities to share knowledge.

The key concept in understanding Ba is 'interaction'. As Nonaka et al. (2000a) suggest, 'Knowledge is created through the interactions amongst individuals or between individuals and their environments, rather than by an individual operating' (p. 15). Hence, the first level of the physical Ba facilitates the emergence of a mental space for knowledge creation, whereas this second level, 'relational Ba,' incorporates more results-oriented knowledge sharing. Therefore, FFs' mutual trust and reciprocity with their structural shared community create the 'relational Ba.'

The example of digital birth certificates and digital voter ID cards described in Chapter 5 illustrates the fact that only information about the available government service is not sufficient to RIs. The people concerned need to learn how to apply this information, what conditions must be met to submit the form for a digital birth certificate, what criteria are needed to be eligible for certain free services or social benefits, etc. Among other things, this is a matter of finding a balance between making complex information easy to understand and supplying an explicit and contextual level of explanation to make the information both accurate and understandable to RIs. Furthermore, it is a question of having the cognitive and cultural skills to interpret the information and relate it to the realities of someone's life.

For this reason, FFs learn to build knowledge through experiences in their daily practices. FFs develop their cognitive and cultural skills from both their formal training and their experiences of interacting with relevant actors and participants over time.

The physical or virtual Ba is conceived as a frame in which knowledge can be activated as a resource for creation. The use of this intangible resource occurs at a specific time and in a specific place (Nonaka & Konno, 1998). It does not have any value if it is used at the wrong time or in the wrong place. One of the main jobs of FFs is to find contextual information for RIs and to present that information at the right time and in the right place. As part of their intermediation work practices, FFs are involved with a network of knowledge/information domain experts, such as

local government officials, local community health workers, women associations and officials, who are involved in providing skill training or income-generating work for rural community RIs. These interactions extend the FFs' cognitive and cultural abilities and help them overcome some of the cognitive and cultural barriers presented by different information domains and sources.

The knowledge practitioners claim a need for great mental clarity, along with time and space for knowledge creation (Nonaka & Konno, 1998; Nonaka et al., 2000a). Nonaka and Konno (1998) argue that, if we can successfully ensure the first two levels of Ba (physical and relational), then the second level of Ba facilitates the emergence of the third: the spiritual essence of place (Nonaka & Konno 1998). This level of Ba takes the knowledge creation level one step ahead. FFs' cognitive and cultural abilities regarding different information domains and sources create their spiritual Ba to share their tacit knowledge with their stakeholders, as well as with their target groups' RIs.

From the analysis of the data on mutual learning in Chapter 6, it was observed that, when FFs accessed ICT centers and interacted with the shared ICT centers' entrepreneurs (during the DLWs' seed session), they soon realized the need for information service facilities through the Internet. Moreover, they could easily relate the RIs' needs with these shared ICT tools' facilities. It was clear that the skilled FFs become more self-sufficient because of their cognitive and cultural skills and extensive experiences in dealing with various information sources in a collective manner.

The following Figure 7-1 exemplifies the three levels of Ba of FFs' intermediation work and shows how these three levels synergistically correspond with core elements of intermediation practices.

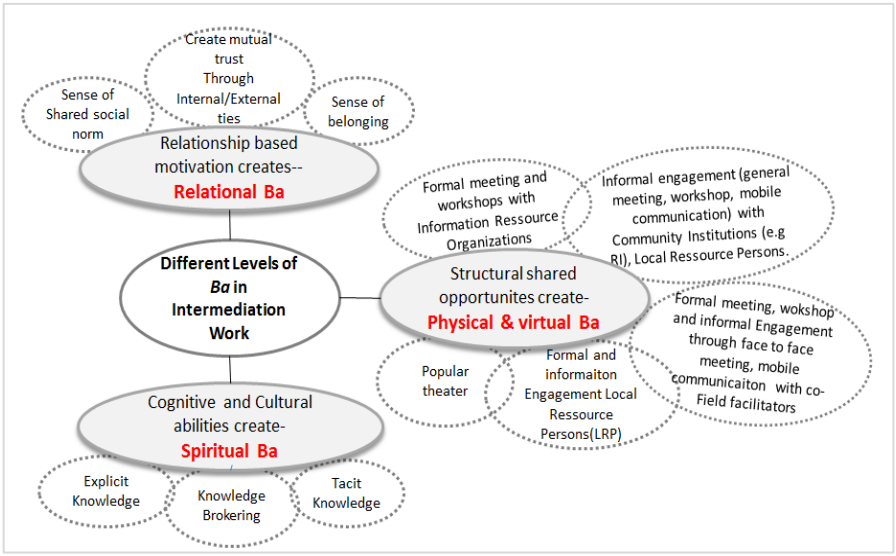


Figure 7-1Different levels of Ba in FFs' intermediation work

KNOWLEDGE CREATION ENABLER: INTERWEAVING BA

Selected FFs took part in different PD activities in DLWs 3 and 4, which were conducted for two groups of talented FFs. In this section, I analyze the context of the first episode of the DLW seed. As the phenomenological method of 'letting the reality emerge' often plays a vital role in the creation of new knowledge (Nonaka, Toyama & Scharmer, 2001), this first DLW session was combined with the FFs' existing work processes. It was designed in such a way that, after finishing the first step of the workshop, as explained in Chapter 6, all participants were equipped with a digital camera and went back to their normal activities for one week. This collaboration invoked a context in which the FFs, together with the SICTEs, stepped outside their usual methods and tried to find new knowledge about ICT. This boundary-crossing movement offered a platform for *originating ba* (Nonaka & Konno, 1998) to share tacit knowledge between FFs and SICTEs. The originating Ba is the shared context in which an individual shares feelings, emotions, experiences, or mental models with others. It is a primary Ba, in which ICT knowledge begins to be developed by FFs through face-to-face experiences with SICTEs.

However, the seed episode was not limited within the boundaries of one step of work; rather, these mutual interaction sessions were merged into the participants' usual patterns of work for a one-week time period. Thus, this session resulted in various platforms for the knowledge creation of the interacting Ba within various organizational boundaries and rural community groups and among fellow FFs. The

interacting Ba is the place where tacit knowledge is shared through explicit ways, such as dialogue, which is the key process for the externalization process, where the creation of a mental model and reflecting process are in concert and stimulated through the externalization process. The open linkages among various shared places, such as FFs' meetings and workshops with multiple stakeholders and RI groups during that stipulated time, created tendencies for FFs to interact in new ways because of their new knowledge about shared ICT facilities (see some interactions in the knowledge creation product section).

The *originating Ba* (i.e., the collaboration with the SICTEs and the training session on shared ICT tools) offered a context that provided the energy, quality, and place for individual tacit knowledge about ICT to develop. Thus, ICT knowledge creation activities by FFs were synergistically networked through constant involvement in learning processes, such as meetings, workshops, or formal and informal communication with different stakeholders, RI groups, and intra-organizational colleagues. This process was greatly supported by the FFs' own ethnographic work of taking and critically selecting photos (see some photo-voices listed in the knowledge creation product section).

Thus, the *originating Ba* and the *interacting Ba* were facilitated by the FFs' existing knowledge sharing dimensions and emerging knowledge conversions that occurred through the sharing of interacting activities. Such activities helped the FFs build a learning network and advance the ICT literacy effort. In this regard, Nonaka argued that the organizational knowledge creation should be understood in terms of a process that organizationally amplifies the knowledge created by individuals and crystalizes it as part of the knowledge network of the organization (Nonaka, 1994, p. 17). The FFs' shared structural opportunities helped to build a learning network and advance the ICT literacy effort at different social interaction levels. Figure 7-2 shows how the FFs' knowledge sharing Ba existed at many ontological levels and formed an interweaving Ba.

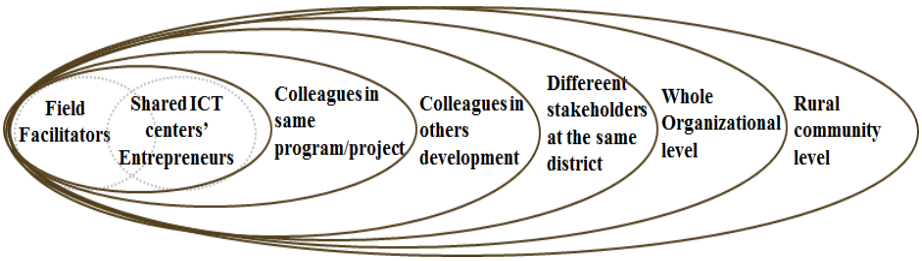


Figure 7-2 A greater Ba of ICT knowledge creation

The mutual collaborative learning sessions (DLW episode seed) with entrepreneurs formed an originating Ba and an interacting Ba between entrepreneurs and

individual FFs—which, in turn, formed a Ba with fellow FFs in the same and different departments, with different stakeholders in the same district, with whole organizations, and with community groups' RIs. Thus, the originating Ba between the FF and the entrepreneur transcended the boundary between the micro and macro levels: that is, between FFs' individual learning (micro) and community RIs' learning (macro). Thus, the results of mutual learning created a greater ICT knowledge creation space through the help of interacting participants and the invocation of a 'greater ba' (Nonaka & Konno, 1998; Nonaka et al., 2000a), in which knowledge was created, shared, and utilized. This transcending process for creating a greater Ba amplified the knowledge creation process and context (Nonaka et al., 2000a).

This interweaving Ba needed to be supported by relational and trustful sharing (Nonaka et al., 2000a; Nonaka & Konno, 1998) for continuously growing and energizing knowledge creation. This interactive coherence of different Ba manifestations (see Figure 7-2) is supported by the FFs' cognitive and cultural abilities and their relationship-based motivations, along with the existing parameters of structural opportunity that they share.

KNOWLEDGE CREATION ENABLERS: PHOTO-VOICE TECHNIQUES

The DLWs were designed based on two instruments of knowledge creation: mutual learning and the photo-voice technique. There were two conceptual ideas behind this choice of instruments: (i) novices' learning from experts through mutual learning and (ii) the photo-voice technique's ability to the voices of participants and to stimulate learning and sharing.

However, the DLWs episode seed was followed by episodes basis, enhancement and evaluation in order to form a greater context of ICT knowledge creation. Relying on visual materials and mutual learning strategies, these DLWs stimulated participants' voices, understanding, and knowledge of ICT.

The second episode, basis, included the participants' ethnographic analyses of the pictures and notes they collected. The participants had recorded challenging events of their practice using digital cameras, and they willingly presented their reflections of their own ICT learning by combining pictures taken during their usual work. The participants reflected upon the meanings of the pictures based on their own intermediation tools and actions and then put these meanings into stories and words. In this reflective work, all participating FFs were encouraged to ask questions to the presenters—a process that eventually helped them learn from each other.

Iner-subjectivity and Trans-subjectivity Role

I selected the photo-voice technique because of its explanatory power (Wang, 1999) to illustrate different situations or events of participants' everyday practice. This technique helped the participants share their experiences. Their photos told about different aspects of their challenges, and their selections of motives illustrated their different approaches to practice. It was remarkable how difficult it was for the participants to explain the whole processes of their work, concepts, or challenges in the beginning. However, being asked questions like, 'What is the fact or context of the event in this picture?' or 'Why do we do this?' allowed the participants to see things by themselves—both from viewpoints rooted deep in their own knowledge and values and from other participants' viewpoints.

Pictures: Some examples of photos taken by participants from SICTC

In 1923, Martin Buber wrote the most essential and well-known text, *Ich und Du* (translated as *I and Thou*) (Morgan & Guilherme, 2012). In Buber's (1970) popular philosophical view of dialogue, he argues that dialogue is a way of being, and he stresses the holistic and mutual existence of two entities as being equal, such that one human being confronts another. For me, this idea of Buber's provided an interesting philosophical background for the use of photos during the DLWs while working with rural development practices. Mutual discussion was needed to justify the knowledge that appeared in the images concerning the SICTEs, as well as the perspectives of the community development practices. The participants used the pictures to reflect upon their own views and to share their views with others, thereby achieving *trans-subjectivity*. Different participants had different roles: For example, those who brought specific pictures on certain events or issues acted as the inventors of their events, since they already knew the background of their shared realities. Other participants played an *inter-subjectivity (*Varela and Shear, 1999) role by interacting with the pictures' inventors, thereby enabling the researcher to get a sense of the differences in viewpoints. Varela and Shear (1999) discussed the *inter-subjectivity* view, which makes new realities understandable and

explicit to other participants. Thus, the sharing of pictures and mutual interaction created a way to achieve synthesized knowledge among those participants who brought various viewpoints to the workshops through various pictures. Pictures taken for the workshops were based on specific content related to the pictures taken; thus, the events were not separated from the participants. The photos generated a flow in the communication among the participants about their ideas regarding ICT and existing practices. Thus, the photos helped the participants uncover additional requirements and unseen problems of ICT usage in their practice, while simultaneously creating a narrative with which not all participants were already familiar. (Some examples of photos taken by participants are provided in Knowledge Creation Product section)

Role of Creating Self-Transcending Coherence

This photo-voice-based workshop session allowed the participants to hold viewpoints of both existing and future practices at the same time. The collaboration with SICTEs during the DLWs' episode seed provided a shared context for the participants. The pictures on existing practice served as boundary objects between the RIs and the participants by limiting the ways in which they could view future practices through the lenses of their existing practices. At the same time, they transcended their prevailing practices by projecting their future motives in the third episode DLW, 'enhancement,' the participants echoed deeper meanings of the usage of the shared ICT tool. These meanings created a particular situation of group collaboration, which inspired the creation of new knowledge, together with the use of ICT. The reflective discussion allowed the participants to contemplate their own views and to share with each other to achieve a *self-transcending* coherence (Nonaka et al., 2000a; Nonaka & Konno, 1998)—an example of Ba working. Participants showed their ability to bring about future perspectives and to go beyond their limited perspectives of thought (see some examples in Knowledge Creation Product section). The episode 'enhancement' enhanced the participants' work through their own future viewpoints for looking at daily challenges, thereby externalizing their personal knowledge with that of other participants and allowing them to view given phenomena of 'the usage of ICT in existing practice'. This work episode focused mainly on stimulating dialogue related to the participants' experience-based knowledge, which was not directly observable, in line with findings by participatory design researchers. For example, Elovaara et al. (2006) noted that experienced-based knowledge and knowing are not directly observable. Mörtberg and Studedahl (2005) emphasized that skillful techniques are needed to develop to illustrate ideas through the creation of tangible things.

This third episode of DLW also created an atmosphere in which each participant found that the photo-voice method was an easy way to overcome the limitations of explaining their recently gained ICT knowledge. One of the FFs said, in relation to the photo-voice sessions: "*It was really challenging to explain to you and my*

colleagues our activities and challenges, but the pictures helped us to present to you the real scenario of our work and challenges." (*DLW-Ev-5)* This remark demonstrates to me an example of the self-transcending process. Photo-voice became a shared context that reduced the participant's tension in relation to sharing knowledge and ideas that were no longer tacit. Self-transcendence is fundamental to sharing tacit knowledge (Nonaka & Konno, 1998).

Role of Creating a Rich Ba

Here, in the third DLW (the enhancement episode), the group worked on selected pictures, which served as physical and mental spaces for knowledge creation by allowing the participants to acquire their own experiences and/or reflect on the experiences of others. As Nonaka and Konno (1998) argued, the meaningful shared space '"ba" is the world where the individual realizes himself as part of the environment on which his life depends' (Nonaka & Konno, 1998, p. 41).

The mutual interactions also supported the conversion and internalization of knowledge. Thus, the meaningful Ba facilitated the conversion of tacit knowledge to explicit knowledge, the conversion of explicit knowledge to explicit knowledge, and the conversion of explicit knowledge to tacit knowledge. For instance, in photo-voice example 6, the participant is talking with community groups about the facilities of the UISCs (during the DLW seed session). She also brought one printed list of available services of the UISC with her to the meeting. The participants were not instructed explicitly to share the UISC information with their community groups. Here, I can say that her tacit knowledge was produced by her practical consciousness about the community needs, along with her recent knowledge of shared ICT tools' facilities. The printed service list she brought included explicit knowledge produced by her through her discursive awareness. Thus, tacit knowledge is produced by their practical consciousness, and explicit knowledge is produced from their discursive consciousness (Nonaka & Takeuchi, 1995).

Mutual negotiation with senior and mentor colleagues provided rational foundations for the participants' knowledge of the photo-voice technique as a strong tool to create a context of a rich Ba. For example, during the third DLW enhancement session, one participant claimed that, when she visited one governmental organization, it was very difficult for her to get complete information or any authentic documentation on certain issues. Another participant suggested that she could help her because of her longtime relationship with those organizations. In a rich Ba, dialogue among participants with different viewpoints is

essential (Nonaka et al., 2000a). A good Ba allows a participant to see things from a viewpoint that is deeply rooted in his or her own beliefs and values, while simultaneously seeing the situation from others' perspectives. Thus, it allows participants to find ways to assist and help others to realize their deeply rooted beliefs.

Enabling knowledge creation assets: autonomy, creative chaos and information redundancy

Building on, finding, and connecting different contexts are not enough to manage the dynamic knowledge-creating process. It should also be 'energized' (Nonaka et al., 2000a, p. 25) to give energy and quality to the creation of new knowledge (Nonaka & Toyama, 2003). This section depicts how mediation tools and actions provided dynamic energy and quality in the PD workshop sessions.

The autonomy given to the FFs to work with their existing practices during the one-week seed session helped them find valuable information and motivated them to utilize their new ICT knowledge. During the basis session, all participants were encouraged to create their own individual posters using their collected pictures. Because of the abundance of information in these pictures, the session generated a high degree of creative chaos. This creative chaos further forced the participants to find their geographically distributed boundary-spanning works and to interact with one another in their endeavor. Each participant availed his or her autonomous right to present his or her own ideas. The participants also pursued a new goal of utilizing shared ICT tools. This autonomous work with the selected pictures involved a broad, cross-sectional organizational setting and created an effective and innovative process for the following sessions.

The group work of the DLW enhancement session demanded more interaction in the form of collective, reflective work, such that participants put their tacit mental model into words and phrases, ultimately crystallizing it via explicit concepts through abduction, employing figurative language. The information shared during the DLW basis and enhancement session helped the participants rethink their challenging premises and allowed them to focus on what information was valuable, considering their different perspectives. Since the redundancy of information enabled the participants to create and understand the figurative language better, it also facilitated the crystallization of participants' shared interpretations (Nonaka & Takeuchi, 1995, p. 45).


DLW episode

The boundary-crossing activities, such as the mutual collaborative work with the SICTEs, stimulated interaction between the FFs and the RIs. Although this

interaction resulted in partial disorder in the participants' normal routines, it was an intentional chaos, forcing the FFs to contemplate the challenging goal of using shared ICT tools. FFs transcended their normal discussion topics with the help of new knowledge about ICT tools and, thus, tried to redefine their existing work. Some of the examples in the knowledge creation product section demonstrate how the participants' realizations about ICT tools changed their regular meeting and workshop patterns. Moreover, this breakdown of their routine work led to various questions. As a result, the participants had the opportunity to re-evaluate their work with experienced peers. All in all, the creative disorder helped participants reevaluate their knowledge and energize their learning context and environment.

ICT KNOWLEDGE CREATION PRODUCT

Using my own photo-interpretations, I will now reflect on the outcome of the DLW seed session. I begin with concrete representative examples from the workshop activities. Each case begins with a brief interpretation or description of the context of the selected pictures. These illuminative examples also show how the FFs shared their ICT knowledge and experiences consciously with their workshop participants and with the multiple stakeholders of their activities.

Photo-voice 1: Sharing an innovative story about ICT implementation in rural areas

This example concerns the sharing of the story of a young girl who recently received basic computer training under a Millennium Development Goals (MDG) project in a rural area. One of the participating FFs brought this photo, which sparked a discussion about the idea of giving computer and internet services to rural people at home. The FF who brought the photo shared the young girl's innovative idea with all of the workshop participants and mentioned that he had also shared this idea with the community, as well as with his target RIs (in order to make them aware of this facility in their village). He remarked that 'this is an initiative which can play a vital role for implementing digital Bangladesh vision in rural areas' (PO presenting in basis session).

Photo-voice 2: Sharing ICT knowledge among different levels of stakeholders of community development activities

In this picture, one of the participants is seen sharing his email address with the regional office staff.

Photo-voice 3: Highlighting UISC usefulness and gender issues in ICT implementation in rural areas

While showing a photo of a female entrepreneur, an FF noted that she found a female entrepreneur working along with a male entrepreneur in the UISC center. She shared this information with all participants and remarked that "*It would also be nice to have a female entrepreneur in every shared ICT centers, as it will create a good opportunity for the rural less-privileged women group, as well."*(DLW-B)

Photo-voice 4: Younger generation support is vital in rural areas

One of the participants shared a photo showing an adolescent playing a key role in a meeting of RIs. She remarked that it would be really helpful if members of the young generation could help RIs access information from UISCs.

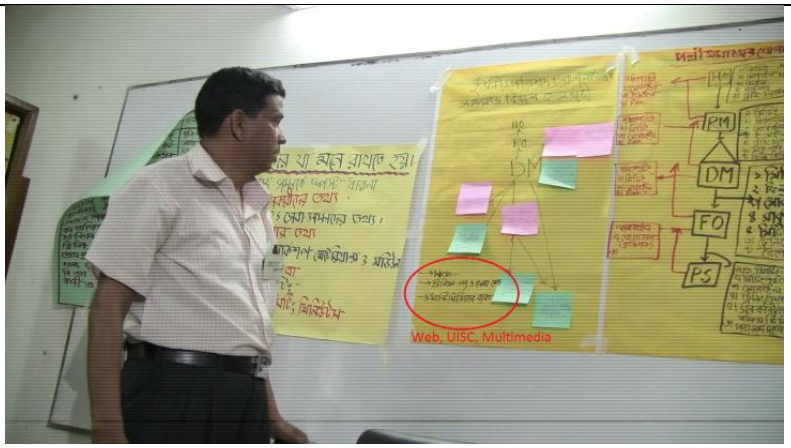
Photo-voice 5: Sharing ICT knowledge at the intra-organizational level.

In this example, a participant shared the content and his experience of participating in the DLW seed session with his colleagues during their monthly general meeting in the divisional office. He also shared his email and Facebook account ID.

Photo-voice 6: Sharing UISC facilities at an RI meeting

One FF shared UISC information with her community group. She shared this photo with other participants during the follow-up workshop session. One of the participants confessed that she did not share the same information with her RIs during her last weekly visit, but promised that she would share it during her next visit.

Photo-voice 7: Emphasizing multi-media workshops and meeting with different stakeholders and RIs



One participant emphasized a multi-media utility for a workshop session. Specifically, he emphasized that such a multi-media utility could reduce physical exhaustion during workshop sessions with local government representatives, as well as with RIs (e.g., enhancement session with FFs at the district level).

Photo-voice 8: The need to transform existing practices

The above picture was used by a participant to portray the existing situation and to explain the importance of transforming existing practices of using ICT. Questions were asked regarding how the participant viewed the significance and relevance of this picture in the DLWs. The picture illustrates that, in the village that the participant visited, the old transportation system is still being used. The participant suggested that there was a need to change information and communication systems through ICT usage, since the transportation systems required development.

My interest in collective ICT knowledge creation has involved me in a detailed study of the particular ICT knowledge creation activities that the participants embraced, as well as in the use of the activity data to support a process of reflection through photo interpretations.

In the above examples, the participants reflected on their own views and shared them with other participants in order to achieve greater insight. The photo-voice techniques and the mutual learning work as enablers and instruments of the knowledge creation context helped to identify the participants' collective knowledge creation in relation to ICT, such that their self-efficacy stimulated collective learning. Hence, I argue that the FFs fulfilled a significant role in embodying and spreading their tacit knowledge. Their self-efficacy crosses both their individual boundaries and the organizational boundaries.

Generally, the level of the FFs' desire for ICT capacity or competence was less clear, since ICT literacy or skill level includes the ability to use a variety of ICT tools and applications based on the Internet and the computer. In the context of this case, it is defined differently based on the needs and demands of the situation. ICT capacity building defines ICT competence as involves FFs' confidence in using ICT in their real work context, since they must evaluate the needs of the ICT tool usability and define the tensions that emerge from these ICT tools. ICT literacy skills depend on the availability, opportunity, type, complexity and time context of ICT infrastructure and tools. OECD (2005) defines a competence or skill as the

ability to meet complex demands in a particular situation or environment, suggesting that it covers knowledge, skills, attitudes, and values. The relation between competence and skills is defined in an OECD project as follows: "A competency is more than just knowledge and skills. It involves the ability to meet complex demands, by drawing on and mobilizing psychosocial resources (including skills and attitudes) in a particular context." (OECD, 2005, p. 4).

Based on this definition of ICT skills, I have structured the reflective FFs' views based on their attitudes towards ICT, considering their value and knowledge in the context of their specific use of available ICT tools in their photo-voice examples.

Some examples of the vertical traversing of ICT knowledge among FFs are shown in Figure 7-3.

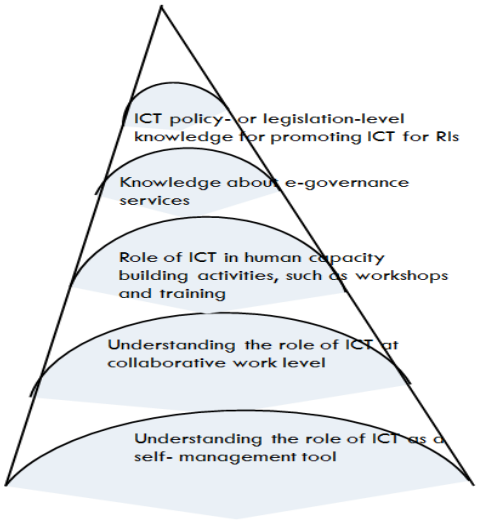


Figure 7-3 Vertical movement of ICT knowledge among FFs

⇓ **Understanding the role of ICT as a self- management tool**
"*Computer can reduce paperwork load*" (DLW-En)
'An Internet-accessible mobile can help us to give all information in more detail and correct ways during RIs meetings and workshop time' (DLW-Ev)

⇓ **Understanding the role of ICT at the collaborative work level**
Shared ICT tools can provide access to new collaborations with new organizations or new resource persons, as well as to new collaborations among FFs (DLW-Ev)

⇓ **Role of ICT in human capacity building activities, such as workshops and training**

Multimedia can reduce physical exhaustion during workshop sessions with local government representatives, as well as with RIs (DLW-Ev)

'ICT facility can give our stakeholders more capability to access information instantly' (DLW-Ev)

⇓ **Knowledge about e-governance services**

UISCs can reduce tensions related to receiving authentic and detailed information; entrepreneurs can expand their networks through the creation of new relationships with FPs (Enhancement session with FFs at the sub-district level)

⇓ **ICT policy- or legislation-level knowledge for promoting ICT for RIs**

Involving intergenerational activity in ICT knowledge expansion; gender issues at the shared ICT access point (DLW-B; DLW-En)

FFS PLAY A KEY ROLE IN VALUE CREATION

Throughout my research, it has been apparent that FFs play a key role in ICT appropriation by people in rural Bangladesh. I use the middle-up-down management model to grasp the potential of FFs in knowledge creation regarding ICT. Nonaka and Takeuchi (1995) propose that the middle-up-down management model is the most appropriate knowledge creation setting under which organizational knowledge grows or flourishes. The first section of this chapter builds an emerging view of the intermediation work and presents an illustrative knowledge creation platform for FFs in a rural community developmental context. My analysis shows how FFs play a vital role in the ICT introduction process through their social communications as mediators in their internal and external organizational structures—while, at the same time, playing the same role among the bottom-level rural community RIs, who are the main beneficiaries of their activities.

FFs serve literally as knowledge creation brokers, accelerating ICT appropriation. This role positions them at the intersection of the vertical and horizontal flows of information in community-based organizations. Nonaka and Takeuchi (1995, p. 127) argue that middle managers play the role of 'field builders'—and, more metaphorically, that they work as 'knowledge engineers.' The top management creates a vision, strategy, or theory, and the middle managers create a middle-level theory or concept to solve practical problems and transcend the contradictions that

grow from the gap between reality and what top management hopes to see. In other words, Nonaka and Takeuchi (1995) argue that the middle-range theory or concept developed by middle managers is tested across the whole organizational framework and plays a pivotal role in transforming the management strategy into a hands-on term for sense-making in the formal structural format or for statements by the lower level. They also argue that, without the effort of the middle management group, knowledge creation strategies could be 'just paper'—that is, formal statements to lower levels. Thus, the transforming work of middle management is much more visionary, while remaining realistic (Nonaka and Takeuchi, 1995). On this same basis, I argue that FFs play the role of interpreting rural communities' needs, which is crucial for appropriating ICT.

Nonaka et al. (2008) argue that middle managers have phronesis (i.e., practical wisdom) abilities to make judgments and take action in times of constant change. In one of the recent articles, Nonaka & Takeuchie (2011) emphasizes that phronesis enables middle managers to determine what is good in specific times and situations and to undertake the best actions at those times to serve the common good. Nonaka et al. (2008) present six abilities that constitute the phronesis to make judgments and take action through constant change:

1. Ability to make a judgment on goodness.
2. Ability to share contexts with others to create Ba (a shared sense).
3. Ability to grasp the essence of particular situations/things.
4. Ability to reconstruct particulars into universals using language, concepts, or narratives.
5. Ability to use any necessary means effectively to realize concepts for common goodness.
6. Ability to foster phronesis in others to build a resilient organization.

Thus, taking into account phronesis to measure the abilities of FFs, I find that FFs are 'the distributed phronesis'—or the distributed practical wisdom.

Looking at FF practice, I find that FFs show, in their photo-voice work, that they have the ability to judge RIs' needs and goodness and to share contexts with others to create shared senses. FFs have the ability to share context-relevant information. They are capable of grasping the essences of particular situations and of reconstructing particulars into universals using, for example, ICT legislation and policies for disadvantaged groups in rural areas. The photo-voice examples show how the FFs tried to stimulate their new knowledge and others' knowledge about ICT as an organizational asset. Mainly, FFs in community-based organizations and NGOs can use their competence to create value in three different directions: individual, internal, and external. In conclusion, FFs have the ability to foster

phronesis in others following three directions—individual, internal, and external—to build resilient, knowledge-based organizations.

CONCLUSION: A DYNAMIC CONFIGURATION OF ICT KNOWLEDGE CREATION

Based on the threads of the DLWs and the engagement within and across the multiple spaces of subject positions of FFs, I have pointed out some knowledge creation instruments or enablers, such as the key role of FFs' existing intermediation work, and the greater context creation with the help of photo-voice techniques. I also point out that this small-scale ICT knowledge creation cycle illustrates the potential for deeper or more dynamic forms of knowledge creation cycles with the help of these knowledge enablers or conditions.

This pushed me to think about the dynamics of knowledge creation. An analysis of FFs' work in workshop sessions highlights the FFs' multi-layered knowledge creation activities, which form various interconnected Ba that I refer to as the greater context (see Figure 7.2) of dynamic ICT knowledge creation.

The quality of place is critical for the quality of the performance of any technology or tool (Nonaka & Toyama 2003); thus, the quality of the ICT knowledge creation setting could ensure a dynamic knowledge creation process and sustainability. Therefore, I believe that one of the factors in the ICT appropriation 'setting' involves shaping the quality of knowledge creation regarding ICT.

When I look at how the DLWs work, I find a dynamic configuration of shared context, which leads to a question in my mind: What would determine the boundary of this ICT knowledge creation Ba at the bottom level of community development work?

To answer this question, I turn my attention to the FFs' existing knowledge-sharing elements, or the three core elements of knowledge sharing: i) structural opportunity ii) relationship-based motivation, and iii) cognitive power to share.

As discussed in section 7.1, FFs are involved in the creation of new knowledge on the basis of three core elements of knowledge sharing. The analysis shows that *relational Ba* is formed through the FFs' relationships and motivational levels of knowledge sharing; the *physical Ba* refers to the FFs' structural levels of work, such as their institutional engagements and communication structures; and the *spiritual Ba* is created through the FFs' cognitive power to share. Therefore, it is assumed that the strength of these three sharing elements is synthesizing and energizing the contexts and settings of ICT knowledge creation in DLWs. My new insight is as follows: *The boundary of knowledge creation activities is not as important as how*

this boundary synthesizes the various Ba (i.e., 'shared spaces') for dynamic ICT knowledge creation.

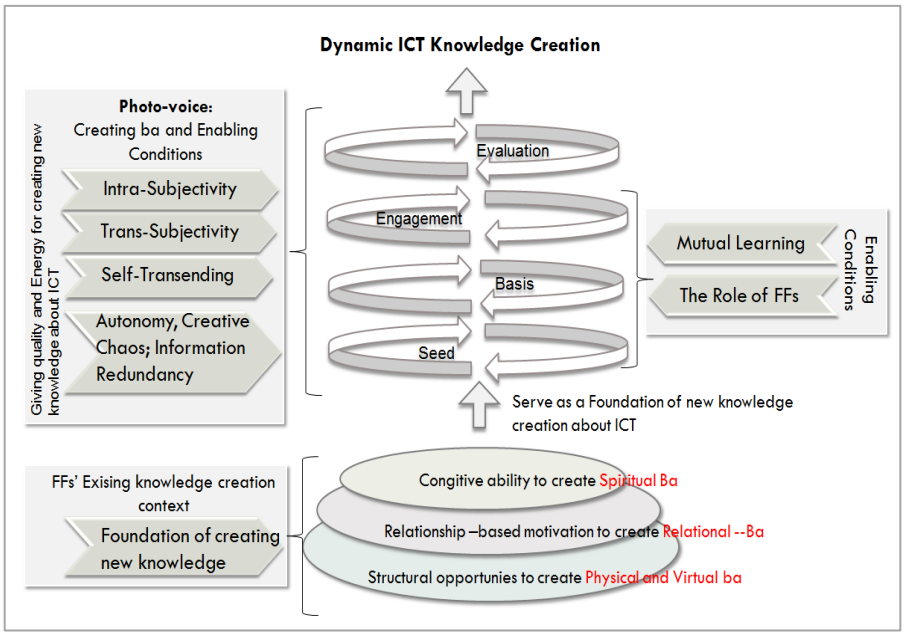


Figure 7-4 A greater context of dynamic ICT knowledge creation

Innovation always emerges out of existing configurations of Ba (Nonaka et al., 2000a). The relationship between the ICT knowledge creation context and the dynamic configuration of FFs' existing settings (see Figure 7.1) produces a shared context for creating dynamic knowledge about ICT (in which new knowledge about ICT can be continuously created) out of the existing knowledge on community development activities, as discussed in the section above. Nonaka et al. (2000a) argued that dynamic capacity is necessary for the continuous growth of knowledge.

Kogut and Zander (1996) claim that innovations are products of an organization's combined capabilities, which generate new applications from organizations' existing knowledge. Teece et al. (1990) define the term 'dynamic capability' as the capability to use an organization's existing specific capabilities to develop new ones. Dynamic capabilities create new knowledge and innovation out of existing knowledge settings, which can be accumulated only by engaging in knowledge creation activities. I have illustrated these reflections in the above model: Figure 7-4, which shows the greater context of dynamic ICT knowledge creation.

Connecting different contexts of knowledge creation is an important factor in determining knowledge creation rates and areas (Nonaka et al., 2000b). This study points out certain enabling conditions of ICT knowledge creation contexts (e.g., photo-voice techniques, and the mutual learning design for creating greater contexts of ICT learning, and the role potential of FFs' existing parameters of knowledge sharing), which create dynamic configurations of knowledge creation activities. Connecting different sharing and learning contexts to one another greatly affects participants' dynamic ICT knowledge creation processes.

CHAPTER 8. CONTRIBUTIONS AND CONCLUSION

How can I give a comprehensive, birds-eye synthesis of this apprenticeship-to-researcher journey of mine? As I have already said in the beginning, Tim Ingold's (2011) work—and, especially, his thinking of research as wayfaring—has been a great inspiration for me. His approach is very different from my professional training as computer program specialist, in which research is a matter of clever abstraction; however, it is perhaps not so different from my life experience of becoming an academic in a crossover between the culture of my homeland and the culture in Scandinavia, where I have now been living on and off for the past five years.

The concept of 'appropriation,' which is a key concept in the theoretical position I have outlined, seems also to apply to my wayfaring as a PhD student. The way that Wertsch (1998) describes how a word or an artifact is first somebody else's, but then, once picked up, becomes half one's own—but only when populated with one's own intentions, or one's own 'accent,' as one appropriates it—maps out the route I have taken in my academic wayfaring. Coming from another reality, I encountered the theory of knowledge creation and the learning models of Engeström (1987) and Nonaka and Takeuchi (1995), as well as the research practice of participatory design (Ehn & Kyng, 1987; Greenbaum & Kyng, 1991a; Schuler & Namioka, 1993). I took these theories and practices with me to the field in rural Bangladesh to my empirical case study, the culture of which was also somewhat new to me (although I spoke the language and was able to communicate).

Did I achieve my goals? Being awarded a PhD is, of course, not the complete answer to this question. However, as I shall re-visit in the following synthesis of my research work, apart from the goal of achieving my degree, my goal turned out to be 'a runaway object.[6]' I began by thinking that I could find a way—or maybe even *the* way—to implement ICT in rural Bangladesh. Gradually, I understood that I had to humble myself, and I began by trying to understand how the people of rural Bangladesh experience ICT. This changed my goal, and I began to look for ways in

[6] Giddens (1991) illustrates high levels of modernity and globalization as a complex 'runaway world.' Engeström invokes and labels these problems as 'runaway' objects, which call for collaborative and negotiated responses that may not be predictable (Engeström, 2008).

which I could expand from *implementing ICT* to *improving the way of living*—that is, remaining focused on ICT, but only as a means for a better quality of life. The most important aspect of this change was that my success criteria for my digital literacy workshops (DLWs) were no longer how many tasks the participants could solve using a computer, but how they were able to talk with each other about the ways in which they could reap the benefits of shared ICT in their practices in rural Bangladesh. My greatest achievement in this respect was when, during the workshop activities, I saw that the FFs had begun to see the local shared ICT center, not as a threat, but as a resource for success in their work.

A THINKING TOOL 'ICT APPROPRIATION MODEL' FOR ICT4D RESEARCH

This section reflects on the contributions of the thesis and offers a thinking tool for future research work in the context of ICT4D. In order to address the relations between rural community capacity building and ICT as practices and values, this research concerns ICT appropriation in rural community development process. In academic terms, this means that I set out with the proposition that people in rural Bangladesh must learn to operate ICT in order to have easier access to relevant information from the government. Upon arriving in the countryside, I realized that the people there first wanted to understand the information from government in relation to their situation; then, eventually, when their life conditions improved, they would feel ready to learn how to use ICT. The synthesis at which I arrived seeks to reconcile the seeming conflict between the truths of these two propositions: a) ICT before more information and b) better information before ICT. As a result, I formulated a new thesis: ICT can bring better information. I present this proposition in the form of the ICT appropriation model. This model is my answer to the research questions I have posed, in figurative form (see Figure 8-1), and I see the model as a potential thinking tool for researchers of ICT4D. The model comprises the empirical insights I presented in Chapters 5, 6 and 7.

Theoretically, the model is a superstructure on which I impose the activity theory triangle model with which I have worked throughout my PhD study. As the reader will recall, a basic activity theory model has three elements: The acting human is *the subject*, which is conceptualized in activity theory mostly as both an individual and a collective subject, since the interaction between the two constitutes the learning process of both the individual and the community surrounding the individual. Then, the *mediating instruments* are the tools, language and

organization, meaning that these instruments (or the lack thereof) are inevitably involved in all human activity. The third element in the basic activity theoretical triangle is the object, the conceptualization of which is quite tricky: From one perspective, the object only exists in the minds of the collective subject, while, from another perspective, it could only exist in the minds of the collective subjects if it also existed in the world independently of the subjects' minds. This double existence gives rise to many epistemological debates, which I will not explore here. I will only say: We can all visit a community's shared ICT center, but the images in our minds are different. Still, seeing the community's shared ICT center gives our minds directions, and these directions direct our actions. However, when asked what we do, our answer may be to simply refer to the specific act involved, such as 'I print my documents there,' or 'I teach there.'

Upon this already quite challenging model of human activity, I build yet another conceptual layer, addressing specifically how I see the relationships between subject, the mediating instruments or tools, and the object as being mutually related. I address three types of relationships: *appropriation*, *setting*, and *tension as contradiction*.

Before I explain these three types of relationships, I must give a short note on the difference between 'element' and 'relationship.' Elements have extension; they create images in our mind, like my example of a shared community ICT center: In each of our minds, the image is personal, but we can still communicate about the different images. It is different with relationships. Relationships have no extension; they do not create images in the mind. They invite reasoning and may come to us as intuitions or insights, which may be difficult to understand and even more difficult to explain (e.g., the quantum mechanics of atomic theory). However, we can communicate relationships through figurative models and descriptions. Hence, when I address the three key relationships, I use figurative modeling and description to explore the subject, the mediational instruments, and the object. I suggest that the most important aspect of the relationship between the subject and the mediation instruments or tools is *appropriation*, a concept I have already explained in Chapter 3 with reference to Wertsch's (1998) segmentation into (1) anticipation, (2) initial familiarity, (3) the development of repertoires of routines, and (4) the development of new forms of use, which are often cited and often applied (Bødker & Christiansen, 2012).

Regarding the relationship between meditational instrument and object, the most important aspect is the situational feedback that the subject receives—which is what Donald A. Schön (1992, 1983) has called, in design, 'the reflective conversation

with the materials of the situation' (Schön 1992, p.133) and the 'backtalk of the design situation.' (Schön 1983, p.79) This is also what Herbert Simon (1996), in his book *The Sciences of the Artificial*, addressed as 'situational feedback' when describing how the painting process is a process of cyclical interaction between painter and canvas, in which current goals lead to new applications of paint and the gradually changing pattern suggests new goals (Simon, 1996).

It is this process of the gradual displacement of goals that Engeström (2008, 2009) refers to when he talks about the 'runaway object.' So, I find—at least in theory, but also confirmed by my practical experiences in this case study—that just as situational feedback can push an object or goal in a new direction, so did the workshop collaborations between the workshops participants and me have an effect. That is, all of our goals were pushed in the direction of ICT bringing better (meaning-appropriated) information.

The most important aspect of the relationship between subject and object, which is, according to activity theory, always a mediated one, is the dynamic conflict inherent in the relationship, which I call 'tensions as contradictions' (explained in Chapter 5 and 6). The idea here is that learning occurs in a 'fight for fit:' that is, when there is a mismatch between what the subject wants to do and what the subject in the current situation can do. If this conflict is resolved in a positive way, learning happens and the object or goal is moved or expanded. This depends greatly on both the subject and object, as well as on the context of the mediation process. However, as a facilitator, I have some influence in choosing mediational/intermediary tools and situational feedback. It is here that I have used the tools and techniques (e.g. Mutual learning tool and the photo-voice techniques) from participatory design to maximize the chances of positive outcomes, meaning expansive learning.

With regard to the question of how my activity relationship model can serve as a thinking tool to help future ICT4D researchers formulate research questions, I propose trying to establish a value chain: Whenever some change is planned at either a policy level or a micro level, the issue of the business case comes up. Specifically, one might ask: What is beneficial for the state of Bangladesh? What is beneficial for this agency or this governmental body? What is beneficial for FF or for RI? These questions are all weighed against costs in terms of money, time and effort. In such situations, it may help the reflection to use the model as an inspiration for discussion.

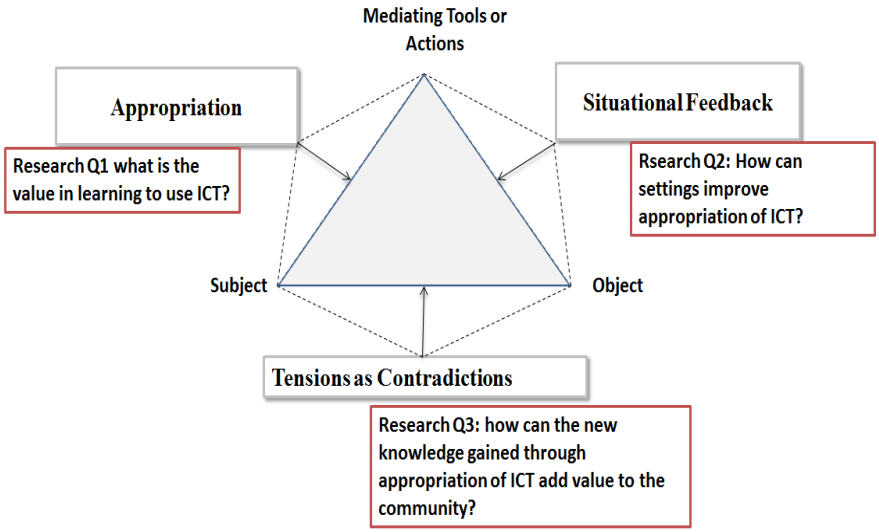


Figure 8-1 ICT appropriation model

Regarding the relationship between the subject and the mediating tool *appropriation*, it may be useful to ask: What is the value in learning to use ICT? Regarding the relationship between the object and the mediating tool *situational feedback*, I consider questions like: How can settings improve the appropriation of ICT? Regarding the relationship between the subject and the object *tensions as contradictions*, a question is: How can the new knowledge gained through the appropriation of ICT add value to the community? In the empirical analyses I have presented in Chapters 5 through 7, I have demonstrated that such questions tend NOT to be asked because, in cases like mine, the expansive learning cycle does not function by itself, without help.

The scope of my study is the interplay of FF practice, RI activities and the CEP. In order to formulate my insights to be directly applicable at meeting tables, where ICT strategy and planning are on the agenda, I will describe my synthesis in terms of *what*, *how*, and *why* ICT should be implemented as an instrument for government-citizen communication.

WHAT

Taking participatory design as the method of working: In my workshop activities, I have employed a technique called photo-voice.

i) The photo-voice technique, as I modified it, worked extremely well in helping the participants articulate their experiences and capabilities so that they became clear to both the speakers and their peers.
ii) The participants saw how ICT might be integrated in a wider community development process.
iii) Using the photo-voice technique, ICT knowledge can cross both individual and organizational boundaries, opening a participatory design venue to create agency and involve diverse stakeholders.
iv) The PD approach utilizes the local capacity in a rural community by resources that are otherwise too scarce. Hence, the participatory design approach is a sustainable means for ICT capacity building, as far as my analysis of this single case study goes.

HOW

Involving participants so that they become ICT catalysts: The 'mutual learning pattern' I staged for my DLWs let the participants feel more capable by gaining instant ownership of the transformations of their work processes. I have identified various strategies to make a participatory design approach work in a developing country context.

i) Existing knowledge creation models or human development infrastructures and structures must be considered before starting the ICT capacity building process.
ii) Considerable time must be devoted to finding those participants who can act in the role of mediators (similar to 'middle-up-down' management).
iii) The inevitable situational tensions or contradictions must be seen as energizers rather than show-stoppers; that is, they must be given space to unfold and be addressed.
iv) The approach must build on existing intermediary tools and actions.
v) The approach must help participants reflect on their existing intermediary tools and actions, which can be key motivators for learning about ICT.
vi) Workshop sessions must be free from unproductive tensions as much as possible.
vii) Sessions should overcome limitations in resources by making use of what is at hand.

WHY

Why use the participatory design approach? Why build on local tools, tasks, and knowledge? Finally, why do I want to expand ICT knowledge like that? These are questions of value. There is no blueprint strategy that will ensure the deployment of ICT, let alone ICT that will help governmental initiatives become understood and used locally in rural Bangladesh. Governmental formulated languages and local village languages are different, although they may have equal Bangla pronunciations, and we cannot reduce one to the other. Therefore, because of the urgency of the matter of introducing ICT in rural Bangladesh, the effort must be unfolded locally and slowly to allow for appropriation.

Am I fighting a scapegoat here? What is the strategy opposite to participation for appropriation? As I see it, the opposite of participation and appropriation is unification, meaning that many voices and life forms are included under one umbrella, dictated by the value of technology: that is, 'the more, the better.' In my opinion, such an approach is short-sighted. Thus, I want to end my concluding chapter by outlining how I see my future research unfolding within the field of ICT4D.

FUTURE RESEARCH: TOWARDS A RUNAWAY OBJECT

The notion of expansive learning refers to the formation of new practices for emerging shapes of activity. Engeström (1987) suggests that this expansive learning facilitates collaboration across national and cultural boundaries. Thus, expansive learning has become valuable for reforming new activities through the collaboration of multiple activity systems. In this research context, the activities in my DLWs support small-scale expansive learning cycles. As implemented, I found that the PD activities, although they exposed participants' vulnerability, played pivotal roles in creating new agency for ICT knowledge creation and boundary crossing between the participants and the different ICT capacity-building activities. Despite limited and unstable ICT facilities and the participating FFs being highly geographically distributed, the collaborative efforts with the UISCs accelerated the existing methods of community development and assisted the FFs in addressing information domain organizations and local resource persons.

In my future research, I will study *e-information services for rural, less privileged communities*, which is my label for new types of Internet-based governance services and different information services. I will continue to build on activity theory, expansive learning, and appropriation. My focus will still be on local FFs as

knowledge creation mediators, with regard to both ICT knowledge and what they see as their objects of activity, as well as how these two foci may be combined. This type of ICT knowledge expansion effort will cultivate field facilitators' collaborative work through information domain organizations and local resources. Moreover, this is a research agenda that may fit what Engeström (2008) has called 'the runaway object of activity.' From the activity theory perspective, an activity is part of a wider network of activity systems (Engeström, 2001). Today, all static collaborative work is increasingly being replaced by 'forms of fluid knotworking' around runaway objects, which require expansive learning and distributed agency (Engeström, 2008).

From my future research perspective, this 'runaway object' represents an understanding of agency with regard to what agency comprises and how it is achieved. To explore these issues, I shall study the mandates of cross-boundary collaborations, while working with *e-information services for rural, less privileged communities* as runaway objects.

Below, in Figure 8-2, I present a graphical representation of how I believe the runaway object could be modeled. This figure illustrates the notion of the distributed agency of the community development activity system as a single, shared object. From the activity theoretical perspective, these distributed activity systems need to take part in 'runaway objects,' which are large, shared objects (Engeström, 2008). It calls for collaborative and negotiated responses that may not be predictable (Engeström, 2008). This object-oriented interagency enables 'the "reaching out" that occurs when people operate across the boundaries of discrete activity systems to work on common objects in distributed activity fields' (Lektorsky, 2009, p. 199), such as across different departments of development organizations, government organizations, and non-governmental organizations around the collective human agency of community capacity development.

The runaway object is poorly controlled by any specific activity system (Engeström, 2008). Thus, the expansive learning theory is interested in the collective development of particular activities and the tensions they embrace, as well as the use of such data to support processes of reflection and experimentation (Engeström, 1987). Unlike social theory, expansive learning (Engeström, 2008; Lektorsky, 2009) concerns, not only description, but also intervention. Thus, this type of ICT knowledge expansion effort, through the thinking tool of the 'ICT appropriation model' (see Figure 8-1), could cultivate FFs' collaborative work with information domain organizations or local resource persons, which would be oriented towards the same runaway object—e-information services for less privileged communities in rural areas—for a period of time through a process of reflection and experimentation.

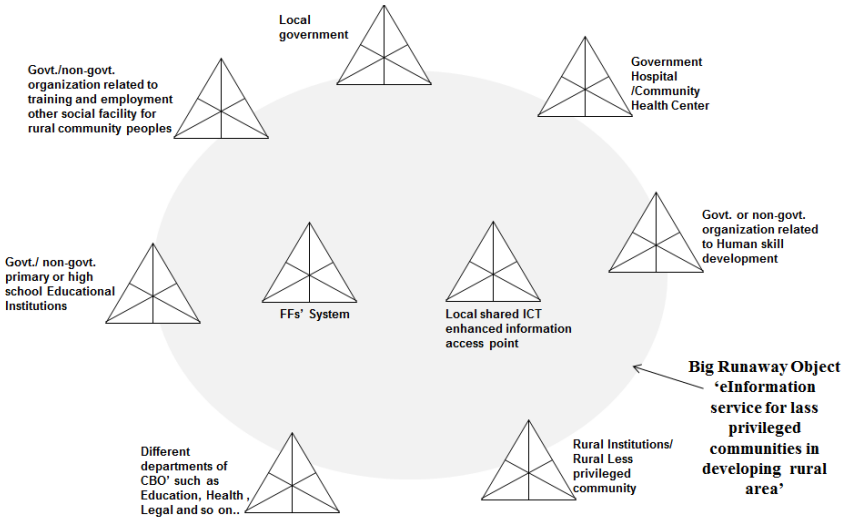


Figure 8-2 A runaway object for e-information services for less privileged people in developing countries

The conclusion I draw from what I have presented in this thesis is that the introduction of ICT will imply a paradigm shift at the community level. In fact, the ICT-related non-wellbeing I found is a result of the way that ICT has so far been sought and implemented in local settings. This makes me eager to research cases in which local people can design and implement ICT. I see mutual learning as the tool through which FFs will integrate opposing aspects of prevailing tensions into their dynamic ICT knowledge creation processes. I argue that the key to understanding ICT appropriation for community development activities is a knowledge creation process, which is enacted through a systemic, reflective view of mutual learning that synthesizes and contextualizes the prevailing tensions and contradictions. Such a synthesis (Engeström, 1987; Nonaka & Toyama, 2003) involves the integration of opposing aspects through a dynamic process of knowledge creation.

In the context of ICT4D, I want to show how the object of learning is expanded when two types of tension contexts are connected. The first context is related to emerging challenges for ICT introduction and implementation at the ground level of *ICT-related non-wellbeing vs. ICT policy-driven change*, and the second is the context of particular challenges related to FFs' activities, which are *highly geographically distributed in multiple information resource systems vs. the collective level of work for knowledge creation*.

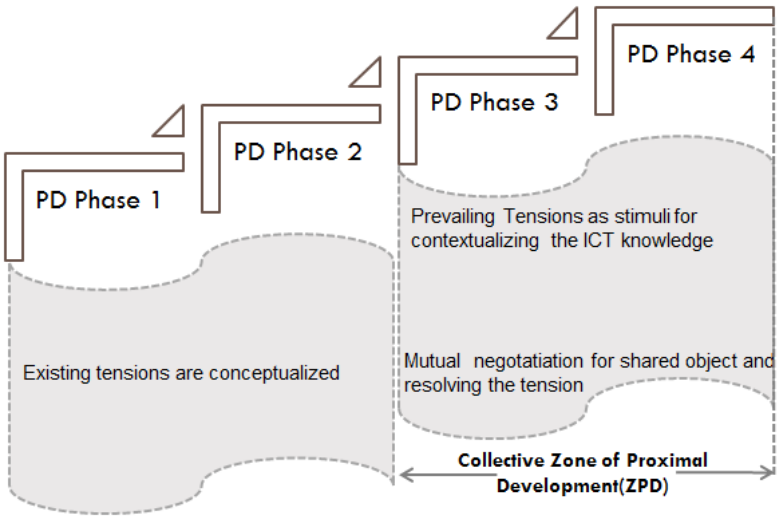


Figure 8-3ICT capacity building as a collective Zone of Proximal Development

This study explores the notion of a possible collective Zone of Proximal Development—which, in my workshop system, is located in Phases 3 and 4 (see Figure 8-3). In other words, I could say that the mutual learning resolves the prevailing tension and that the tensions, as stimuli for contextualizing ICT knowledge, are both conceptual vehicles for crossing 'The distance between the actual level of development as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers' (Vygotsky, 1978, p. 76). In the case of the PD DLWs, peers have facilitated the movement of the process towards the level of potential development. The workshops, as mutual learning sessions, made this progress possible.

This process of ICT capacity building is seen as a process of progressing in a collective Zone of Proximal Development (Vygotsky, 1978). The Zone of Proximal Development is defined as referring to those intellectual actions and mental functions that a novice or child uses in interactions and in which independent performance is insufficient (Chaiklin, 2003).

I argue that the focus on identifying approaches to develop ICT's capabilities to enable participation in e-society is another significant contribution of this thesis, which identifies certain approaches to achieving these objectives. A generic model should reflect that, in other developing country situations, other approaches based on the local situation and its inherent, contextualized understandings of tensions or contradictions may be required.

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SUMMARY

This thesis investigates information and communication tools (ICTs) as instruments of community development processes in the context of a case study conducted in collaboration with a community empowerment program (CEP) of the non-government organization (NGO) BRAC in Bangladesh by conceptualizing a learning theory-based model for ICT appropriation. The aim of this research is to understand the conditions of ICT appropriation as a collective knowledge creation process within rural community development projects—and, thus, to provide tools for perceiving and constructing local ICT development.

The theoretical basis of my research is Activity Theory, as developed by the Finnish psychologist Engeström on the basis of the Russian development psychologists Vygotsky's and Leontjev's research. This learning approach I have combined with Nonaka and Takeuchi's theory of the dynamics of knowledge creation in organizations. The study claims that ICT capacity building through a collective resource approach (participatory design) may sustain a knowledge-creation process based on hands-on participation and interaction among individuals, communities, and the sharing of artifacts and thereby offers an ICT appropriation model by addressing the relations between rural community capacity building and ICT as practices and values.

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