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An Information Technology Therapy Approach to Micro-enterprise Adoption of ICTs

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Abstract

The advent of Information and Communication Technologies (ICTs) has opened up new opportunities for micro-enterprises to improve their businesses. However the challenges to using ICTs are impeding these businesses from growing into the drivers for development that they can be. This suggests that a potentially important driver of development needs to be supported. This paper investigates the adoption of ICTs in eight micro-enterprises in an underserved community of Omaha, Nebraska. Following an action research study, this research provides insight into the key challenges and opportunities facing micro-enterprises in their use of ICTs to create value for their businesses. Its contribution is in the methodology for implementing ICTs in micro-enterprises.

Keywords: Micro-enterprise, Information Technology, IT adoption.

Introduction

The use of Information and Communications Technology (ICT) by Small and medium Sized Enterprises (SMEs) is a challenge in both developed as well as developing countries (Schreiner and Woller 2003, Sanders 2002, Lichtenstein and Lyons 2001, Hyman and Dearden 1998, Honig 1998). Small and medium sized businesses are seen to be organizations that employ less than 500 people and typically have problems adopting IT due to competitive pressures and underestimation of time taken to implement IT (Riemenschneider et al 2003). A form of small business being investigated in this paper are micro-enterprises which are tiny businesses with fewer than 10 employees - often just one - and micro-enterprise development programs make loans and or five classes to poor people to help them start or strengthen their businesses (Schreiner and Woller 2003). A review of micro-enterprise programs in the US by Schreiner and Woller (2003) of micro-enterprise programs started in the US, suggests that micro-enterprise development is much more difficult in the U.S. than in the developing world. This is because, compared to the micro-enterprise sectors in Bangladesh, Bolivia or Indonesia, self employment is not as easily pursued in the US as it is in international contexts.

In particular a key barrier to micro-enterprise development is also the barrier to the use of ICTs. According to Grosh, B. and Somolekae (1996) barriers to growth of micro-enterprises are access to capital, educational level of the entrepreneur, legal barriers and start-up financing. In their study of information systems for rural micro-enterprise in Botswana, Duncombe and Heeks (2003) suggest that the role of ICT in enabling information and knowledge is important for both social and economic development. They found that there was a reliance on localized, informal social networks for their information for rural micro-enterprise. Information from these networks was of poor quality and not readily available; it appeared to fail the poorest and most disadvantaged entrepreneurs. ICTs represented an unaffordable addition to costs and the benefits of using them were not apparent. Duncombe and Heeks (2003) suggest that there is a role for the ICT intermediary in providing the needed information on markets, customers and suppliers. In their study of 1000 small business enterprises in the US, Riemenschneider et al (2003) found that businesses were prepared to overcome obstacles to IT adoption in the case of web presence. This is because pressures to keep with the competition and promote services to customers are greater than the obstacles to setting up websites.

At the same time, community-building activities of micro-enterprise programs and the creation of networks that build social capital do enable ideas and experiences to be infused to micro-enterprises. Servon (1998) suggests that social capital is an important ingredient in the adoption of new technologies in micro-enterprises. There is a sense that small and medium enterprises hold the promise of building development incrementally on existing national capabilities, and providing a seedbed for the emergence of dynamic and efficient larger national firms (Levy 2001). It appears that in assessing the potential value of ICTs in supporting micro-enterprise development requires us to address 1) the extent to which ICTs can enrich people's lives by bringing ideas and experiences; 2) the technology's record with respect to achieving specific objectives; and 3) its contribution to overall development and sustainability (Steinberg 2003). A key issue is not unequal access to computers but the unequal ways that computers are used (Warschauer 2003).

This paper considers the challenges faced by micro-enterprises in adopting ICTs to improve their businesses. It investigates a set of micro-enterprises in the underserved communities of Omaha through a service learning course on Information Technology for Development. The micro-enterprises had received hardware and software through a grant from the eBay Foundation administered by a micro-enterprise development program called the New Community Development Corporation. Through a series of action research steps carried out by the researchers, the ICT challenges faced by the micro-enterprises were diagnosed through a process of “Information Technology (IT) Therapy”. This process involved providing individualized IT solutions to pressing problems and opportunities and the development of a longer-term IT project plan, customized for each of the businesses.

Theoretical Background

In recognizing the importance of SMEs in ameliorating poverty, Grosh and Somolekae (1996) address the question of whether micro-enterprises can serve as the seedbed of industrialization. In examining this question, they propose two ways in which this can be achieved: first, micro-enterprises could graduate to become larger, and second, owners of micro-enterprises could accrue capital to be passed onto the next generation to start bigger businesses. Grosh and Somolekae also identify a number of hindrances such as lack of savings, lack of education, limitation in target market size and technology that obstruct SMEs to rise to their potential. A review of micro-enterprise programs in the US by Schreiner and Woller (2003) suggests that micro-enterprise development is more difficult in the U.S. than in the developing world. This is because, compared to the micro-enterprise sectors in Bangladesh, Bolivia or Indonesia, self employment is not as easily pursued in the US as it is in international contexts. Table 1 gives examples of the types of micro-enterprises that exist in the United States as compared to the developing world (Schreiner & Woller, 2003). It is seen that most micro-enterprises in the United States produce non-traded services such as childcare, haircuts, retail sales, transport, or home, car, or office maintenance and that the average consumer in the United States does not spend a large share of his or her budget on purchases from micro-enterprises. The scenario is quite different in developing countries. Micro-enterprises in developing countries tend to produce both services and manufactured goods, for example, selling cooked food from the sidewalk or food staples from a small store and it is also seen that the average person in the developing world, unlike in the United States, does spend a large share of his or her budget on purchases from micro-enterprises.

Table 1 Examples of types of micro-enterprises in the United States and the developing world (Source: Schreiner & Woller, 2003)

United States	Developing world
—Care for children or pets	—Plant crops and fatten livestock
—Cut hair or polish nails	—Do odd jobs, especially on farms
—Cook food and sell drinks at festivals	—Cook food and sell drinks on the street
—Sell Avon, Amway, or Mary Kay	—Petty trade in food, clothes, or toiletries
—Clean homes, cars, or offices	—Take in laundry
—Trade and/or repair clothes or cars	—Make and/or repair clothes or cars
—Paint or repair houses	—Build or repair houses
—Cut grass or trim branches	—Collect and sell wood, charcoal, or water
—Kill pests	—Carry loads or messages
—Repossess cars	—Drive a bus or truck
—Work with wood	—Work with wood or metal
—Rent video tapes	—Show movies from video tapes
—Deejay parties	—Play in a band
—Drive cabs	—Run a rickshaw
—Quilt or knit blankets	—Husk rice or shell peanuts
—Sling newspapers or brochures	—Sell newspapers or lottery tickets
—Make and sell arts and crafts	—Scavenge for things to recycle
—Make and sell fake jewelry	—Make and sell baskets or rope
—Buy and sell drugs	—Shine or repair shoes

While many problems faced by micro-enterprises are not fundamentally related to technology, selective use of technology can be beneficial. In her model of information technology for development Qureshi notes that ICTs can help businesses gain better access to information and expertise, reach new markets and customers (or more generally, stakeholders), administer the business more efficiently and effectively, and grow in the knowledge and skills needed to run the businesses better (Qureshi 2005). With rapid new and innovative technological advances of today, businesses need to be abreast if not very close behind large organizations in being able to reap the full benefits that new emerging technologies have to offer. But traditional methods of IT adoption in big organizations fail to comply in the context of micro-enterprises due to inherent characteristics of such small businesses. Levy *et al.* (2001) formulated an analytical framework (focus-dominance model) to examine the potential for SMEs to realize value from IS capabilities. The framework shows where SMEs would fit in terms of the trend they show in IT investments and market strategies. The model is shown below in figure 1. The framework may be viewed as

providing four different approaches to ICT adoption. The *efficiency* quadrant may comprise SMEs that exploit simple systems such as word processing and trivial accounting processes (Naylor and Williams, 1994). The *co-ordination* quadrant is composed of those SMEs that have a need to increase market share and their customer base. The *collaboration* segment then attracts SMEs that attempt to incorporate emerging technologies to manage relationships with the businesses' major customers. And finally the *innovation* quadrant comprises of those SMEs that actively seek to adopt new information and communication technologies to help achieve competitive advantage. In a follow-up study, Levy *et al.* (2002) investigated 43 SMEs to observe their positions in the focus-dominance model. The results revealed that most of the 43 SMEs make only one move, from *efficiency* to *co-ordination*, or from *efficiency* to *collaboration*. SMEs taking either one these routes tend to avoid losing control and so opt to stay within their current markets. It was also seen that only 17 of the 43 SMEs wanted to move to the *innovation* quadrant possibly due to an environment scan whereby they become aware of "best practices" and strategies that would assist them to manage business growth. While the Levy *et al.* (2002) shed light on trends in growth of SMEs, it fails to highlight the barriers or drivers that would enable the business growth to take place by moving it from one quadrant to another within the focus-dominance model.

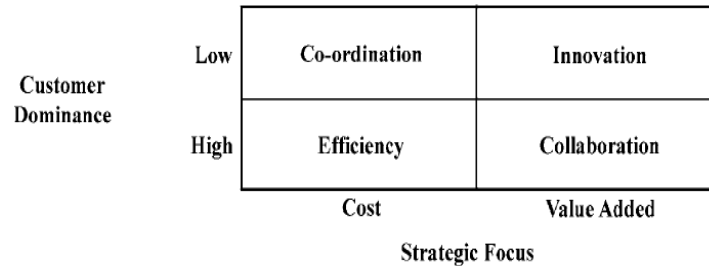


Figure 1 The Focus-Dominance Model (Source: Levy et al., 2001)

In a longitudinal study over a span of 10 years, Furuholt & Ørvik (2006) investigated the issues involved in the implementation of ICT into a management college in Africa. The study is important to the focus of this paper in two basic ways. First, the setting for the study takes place within a small sized enterprise and the second is that it provides meaningful insight into specific factors that might come into play in investigating some of the challenges to the failures of small & medium size enterprises to adopt IT. Furuholt & Ørvik (2006) identified that the main reasons for the limited development of IT usage and implementation resulted from the following: 1. lack of top management engagement, 2. knowledge barriers and staff resistance, 3. lack of utilitarian value and other personal incentives, 4. the symbolic value of information technology, 5. poor organization, 6. poor infrastructure, and 7. different concept of time. Warschauer (2003) provides a rather different perspective in helping to understand why ICT adoption and implementation efforts may fail in one setting yet succeed in another. He says that the key issue revolves around "not unequal access to computers (IS/ICT) but rather the unequal ways that computers (IS/ICT) are used." Warschauer (2003) also highlights an important point whereby he states that "Technology does not exist as an external variable to be injected from the outside to bring about certain results. It is woven into social systems and processes...the goal of bringing technology to marginalized groups is not merely to overcome a technological divide but instead to further a process of social inclusion." Warschauer's statement has strong policy implications that should be kept in mind in going forward with any IS adoption and implementation. As is evidenced in the above discussion, SMEs, in particular, micro-enterprises face a number of challenges on various dimensions and there is a dire need to address such issues. In this paper we focus on ICT adoption of micro-enterprises to help them survive and compete in the rapid IT and knowledge-based economy of today. The contribution of this paper is in the revelation of an "IT therapy" approach to help mitigate some of the IT adoption issues highlighted in earlier studies.

Methodology

The research methodology followed for this study is that of Action Research. Action research involves the application of tools and methods from the social and behavioral sciences to practical problems with the intention both of improving the practice and of contributing to theory and knowledge in the area studied. Action researchers participate directly or intervene in a situation or phenomenon in order to apply a theory and evaluate the value and usefulness of that theory (Checkland, 1981, 1991; Galliers, 1991). The action researchers in this study were local university students of an *IT for Development* (IT4D) course partnered with Techquity Grant recipients to facilitate the application of the technology acquired with the grants to the development of these enterprises. The Techquity Grant Program offers small grants, typically around \$2000, to be used for purchasing hardware, software, and training that would promote the development of micro-enterprises. The anticipated benefit to the micro-enterprises would be more effective utilization of technology, improved thinking about technology and the role of information, and, in general, economic and human development. In return, students would gain valuable insight into the challenges and realities facing micro-enterprises. Action research is a change oriented research methodology that seeks to introduce changes with positive social values, the key focus being on a problem and its solution

(Elden and Chisholm 1993). Action research is typically carried out as part of an attempt to solve problems by allowing the researcher to become a participant in the action, the process of change itself becoming the subject of research (Checkland 1981).

In action research, the researcher has a remit for action (Checkland 1981). This means that the organization in which he or she is doing research has given him/her the go ahead to solve their particular problem or help manage change processes. Action research is best seen as an iterative cycle in which the researcher begins with a **plan** of how to carry out the activity, then **act** to intervene to solve the immediate problem, **observe** the results of the intervention and **reflect** on the impact and next steps (Zuber-Skerrit, 1991, Avison et al. 1999). Carried out as part of an academic service-learning course, the action research was supplemented by the **absorbing** of knowledge through classroom lectures and discussion. In this study, the plan was to assist the micro-enterprises through partnership with New Community Development Corporation (NCDC). The cycle continued to action or intervention, to solve the problem or manage the change process; this is where the researcher collects data. On location at the micro-businesses, students worked with business owners to understand the business and existing technology, implement technology-based projects, and train business owners as appropriate. This process was referred to as "IT therapy" in which assistance was given to the micro-business owner to solve their immediate IT needs. Additional data on the situation or phenomenon being studied were gathered through observation while implementing the IT therapy. The following reflection entailed interpretation of the data, and consequences of action that then fed into the planning stage to modify the methodology or model that then determine what action would be taken in the next cycle. On their own time, students maintained a reflective journal, worked on assigned class exercises and readings, and prepared a technology plan for the micro-businesses. The class served as a sounding board for issues and proposed solutions, offered advice or relevant information, and offered constructive criticism of proposed courses of action to address any IS/ICT adoption/implementation issues specific to any of the micro-businesses. Further cycles of activities continued until a desired end-state is achieved (Zuber-Skerrit, 1991, Avison et al. (1999, p.96). Figure 2 shows the action research approach followed in this study.

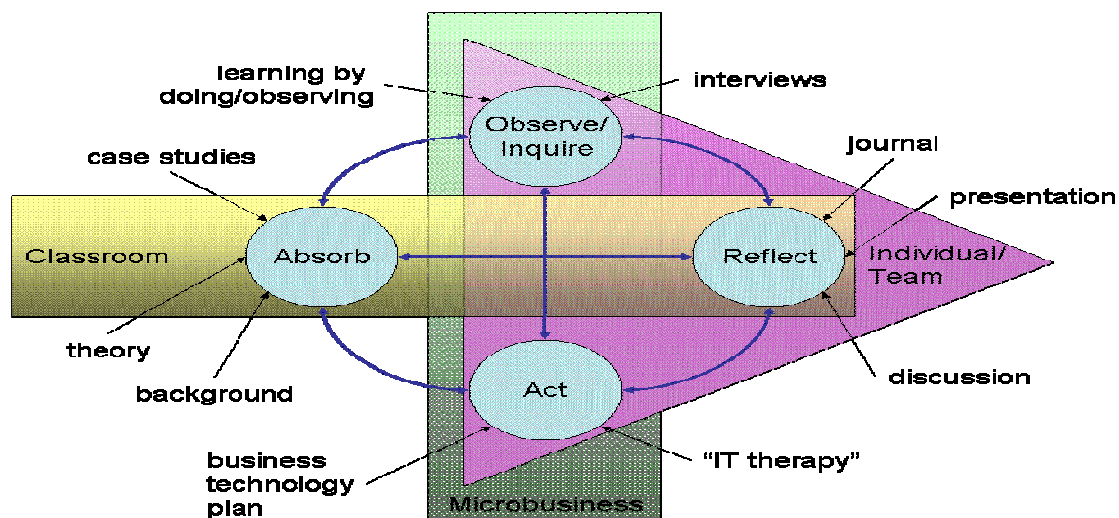


Figure 2 Applying the Action Research Methodology

This study investigated eight micro-enterprises. Following are brief descriptions of each. Each business has been given an arbitrary name for the purpose of this study and also to maintain confidentiality of the businesses. All of the businesses are located in Omaha, Nebraska.

1. LD specializes in high quality soups and sandwiches. During the period of this study LD moved its deli from its original location to a better one that could serve local businesses and students.
2. FD specializes in the design of elegant, conservative women’s clothing. The owner has aspirations of being a player in the global fashion market.
3. CZ is a franchise that pairs individuals of all ages who need tutoring in any subject with tutors who can provide the service.
4. HH offers a structured residence with treatment and support services to individuals who are transitioning from a treatment program back to society.
5. HE offers massage therapy services. The owner is seeking to diversify into the retail sale of a variety of natural health products.
6. EP is a modeling agency that provides models who reflect the diversity of “normal” (non-glamorous) Americans.
7. HC This on-line business sells wedding cake toppers that reflect the ethnic diversity of customers.
8. CC provides pet grooming services.

Results and Analysis

Over the course of a semester, students of the IT4D class worked closely with their community partners on two inter-related tasks. The first task was to identify the technology-related issues that were perceived as immediate and significant by the entrepreneurs, and were amenable to short-term fixes. This analysis led to many of the short-term projects the students worked on during the semester. While there were some cross-cutting needs (e.g. development or enhancement of a web site), other needs varied greatly, ranging from learning to turn on and synchronize a PDA with a laptop, to learning to create effective PowerPoint presentations, to enhancing the search-engine visibility of a web site, to installing and configuring software.

IT Therapy Results

The IT Therapy component of the work was focused on the entrepreneurs' strongly perceived issues and problems: LD's Internet connection was very unreliable; HH needed to provide better statistics to stakeholders; FD wanted to be able to show potential customers a PowerPoint show of her fashions; HE had customer information scattered in many different places; EP was frustrated by having to maintain duplicate accounting systems at work and at home; HC had ideas for enhancing her web site; CZ needed a more effective means of tracking tutors; CC needed Internet connectivity. In addition, students applied their IS education and background to identify solutions to problems the entrepreneurs may not have been aware of. CC had junk software removed from the desktop; the visibility of EP's web site was poor in the major search engines; HE needed to upgrade software and install virus protection; HH needed to make backups of data. The list of tasks performed for each company may be found in Appendix B.

Table 2 classifies the IT therapy tasks performed by students in the major categories of IT effects on development as mentioned in Qureshi (2005). Overwhelmingly, the immediate needs were in the areas of administrative efficiencies and, to a lesser extent, access to markets. Access to information, knowledge, and expertise was a less pressing concern; the entrepreneurs understood their businesses quite well and in most cases had sufficient information and expertise to run them. Using technology to connect with, for example, other entrepreneurs or business development resources certainly offers great potential, but likely future benefit. The Learning and increased labor productivity category focuses on the use of technology to provide training and education. While the students provided on-going training and instruction in how to use the technologies or benefit from the solutions, this instruction was provided in a face-to-face context rather than using ICT to provide the training itself. The example of job creation observed during the semester was a halfway house guest finding a job by using the new Internet connection to post his resume on the web. In short, the IT therapy tasks tended to reflect the hierarchy of needs perceived by the entrepreneurs.

Table 2 Classification of IT Therapy Tasks

Effect of IT implementation on development (Qureshi 2005)	Number of IT Therapy tasks
Access to information, knowledge, and expertise	2
Competitiveness and access to markets	8
Administrative efficiencies	14
Learning and increased labor productivity	0
Contribution to poverty reduction (e.g. job creation)	1

The second task was to think systematically about how information could benefit the micro-enterprise and identify ways in which technology could bring about this benefit. This analysis led to the formation of a technology plan for the micro-enterprise that would identify a sequence of projects that might be undertaken, a prioritization and timeline, and an analysis of the resources and skills that might be necessary to carry out the projects. In developing the technology plans, students were able to identify some of the critical issues that existed within each business in being able to adopt and implement proposed ICT technologies.

This study provided a lens to investigate the extent to which specific, targeted, context-sensitive assistance and partnership can multiply and serve as drivers for the effectiveness of technology. In some cases, were it not for the involvement of the students, the technology would not have been used at all and have had no impact. The following testimonials from some of the micro-enterprise owners are evident of this fact.

- “I can’t tell you how much this has helped me out. This has been such a blessing.”
- “[The student] brought a lot of value.”
- “Sometimes it’s hard for us to conceptualize what we do. The [information] flow chart really helped us out.”
- “[The student] really motivated me. I really appreciated that little boost of adrenaline, knowing I had to get ready for our next meeting.”
- “I realized I’m afraid of the web. [The student] was really patient.”
- “I wanted you to know how happy I am with the partnership with these two students. I have met with them and I am very excited about the relationship and the changes that will be made to my website. They not only listened to my ideas, but have given me insight to new innovative options to make my website softer, more pleasing to the eye and the competitive edge I know I need to compete with other websites. I just wanted to touch base with you to let you know everything is going well and they are two awesome and caring people!”

Challenges to ICT Implementation

While the comments above point to some very positive outcomes, the students faced a number of challenges. Some of the more significant included:

- Scheduling conflicts. The entrepreneurs were very busy running their businesses (micro-enterprises are typically run by one individual who has to tend to all aspects of the business). On numerous occasions they were unable to keep appointments. The students were also very busy and not always available when the entrepreneurs could meet.
- Miss-matched expectations. Some entrepreneurs presented students with a laundry list of technology wishes that easily exceeded the students’ ability to implement in a single semester. At other times, as work progressed, students realized that more effort was involved than originally anticipated. In either case, students spent a great deal of time and energy on expectations management.
- Lack of trust. While most of the entrepreneurs were very open and willing to work with the students, others were less so. Combined with some missed meetings and lack of communication over periods of time, lack of trust became a barrier that had to be negotiated before IT therapy could be carried out successfully.

Though more pronounced in some situations than in others, each of these issues may, to some degree, be considered a given when working with micro-enterprises. Based on an approach that is, by design, very attentive to the individual circumstances and constraints of each micro-enterprise and its context, “*IT therapy*” is suited to addressing each of these barriers. Students learned how to work through each of these issues with their partner entrepreneurs. By addressing small projects that entrepreneurs perceived as significant, e.g. troubleshooting an Internet connection, students were able to build trust which established a foundation for additional projects.

In their study of efforts to introduce IT into a management college in Tanzania, Furuholt and Ørvik identified a number of socio-cultural factors that limited development and use of ICT (Furuholt and Ørvik 2006). We examined the applicability of these factors to the cases examined in this study, and discuss how an IT therapy approach may mitigate some of the factors.

Lack of top management engagement

Since the entrepreneurs had applied for and received a technology grant and had chosen to work with the students, they were predisposed to being motivated and engaged in the process. However, even among this select group, there were differences in the engagement from the micro-enterprise owner’s side. Some lacked a willingness to learn and wanted everything done for them by the students. Others were willing, but lacked confidence, or were initially suspicious of the student partner.

Knowledge barriers and staff resistance

The entrepreneurs differed widely in their technical knowledge and skills. Some had many years of experience with technology and had taken various training classes. Others had almost no experience at all. In all cases, entrepreneurs had little time to devote to learning new technology and could easily become frustrated. Some feared new technology. Because they did not understand the technology, they feared making some technology-related mistake that would undermine their business. All carried a great deal of business risk and had little interest in adding technology risk to the mix.

IT therapy is well suited for overcoming resistance based on a lack of knowledge or a negative attitude towards technology. Students were able to teach entrepreneurs what was needed to solve the problem at hand, or clarify misconceptions about technology. They provided something of a safety net for entrepreneurs as they ventured into new technological areas. A major challenge for the students was to lead the entrepreneurs forward at a pace appropriate for the individual and not overwhelm them with technology options.

Lack of Utilitarian Value and Other Personal Incentives

By definition, IT therapy is utilitarian. It focuses on strongly perceived technology needs. As a result, students encountered very few cases in which the entrepreneurs failed to see the value in the technology. Those solutions that failed to address the perceived needs were not pursued.

The Symbolic Value of Information Technology

The symbolic value of information technology becomes a barrier when its value as a symbol exceeds its practical value. Technology may then be acquired for its symbolic value, but not used. Each of the entrepreneurs was passionate about his or her business first and foremost. In each micro-enterprise, technology was viewed primarily as a tool for getting business done. Some entrepreneurs were more eager to appear technologically competent than others; but competence was a function of ability rather than symbolism.

Poor Organization

Furuholt and Ørvik focus their discussion of poor organization on the Computer Center that provides ICT support services to the university. The general problem facing all of the micro-enterprises in our study is that there is no ICT support service for them. The businesses are too small to hire their own technology staff, and usually cannot afford to hire an IT consultant. For a semester, university students can fill this need. ICT support is an on-going requirement, however. Providing continuity and sustainability in technical support and IT therapy for micro-enterprises is a problem to be addressed in future efforts.

Poor Infrastructure

Nearly half of the micro-enterprises had serious infrastructure issues. In each case, the entrepreneur had sought to acquire Internet connectivity, but was either experience limited, or had no connectivity at all. The infrastructure needed by most micro-enterprises is minimal, well within the capability of IS students to troubleshoot or implement. Since connectivity is fundamental to many ICT benefits, and a lack of connectivity is a strongly perceived deficiency, establishing connectivity was one of the first tasks students worked on.

Other Contextual and Culture-Based Reasons

Furuholt and Ørvik identify a number of factors that played a role in the Tanzanian context: hidden agendas, low salaries, differing concepts of time, and others. The entrepreneurs in Omaha, both male and female, exhibit a great deal of diversity in ethnicity, culture, the demographics of the neighborhoods in which they are located, and professional background. The students were a similarly diverse group. The pairing of students with entrepreneurs was based primarily on skill sets, student interest in the micro-enterprises' business, and gender¹, not on ethnicity or culture. As a result, in almost each case a student was paired with an entrepreneur who differed from themselves in one or more of these dimensions. Some of the issues identified above, expectations and trust in particular, may have had some basis in ethnicity or culture, but it is more likely that they reflected personal characteristics of the individuals involved. Whatever the circumstances, the IT therapy provided opportunities for students and entrepreneurs to communicate, build trust, achieve concrete results, and work through issues. Having an institutional partner, NCDC, with a longer history of involvement with the entrepreneurs served as a backup, should difficulties arise. Matters never escalated to this level, however.

Conclusion

While some technology needs arose in multiple businesses (e.g. establishing Internet connectivity, setting up a web site, learning to create more effective PowerPoint presentations), each business had its own particular nature and issues, which had to be understood before solutions could be implemented. Success depended not only on the quality of the technological solutions, but also on the enthusiasm of participants and the establishing of trust and communication between them. One major lesson that resulted from the IT4D course was that effective application of technology requires the effective involvement of individuals who not only understand the technology, but also the context within which that technology is to be used. A "technology-and-training-in-a-box" approach to promoting the use of IT4D in microenterprises will may not be as effective as a process that emphasizes individual relationships and customized projects. Future research is needed, however, to determine whether there may be a set of "patterns" or generic solutions that could serve as a starting point for developing the specific solutions needed by individual entrepreneurs.

¹ For example, a male student was paired with an entrepreneur who ran a halfway house for males; a female student was paired with a female massage therapist.

One of the most consistent similarities between the micro-enterprises was the constraints of time and resources that are part of each day for the business owners. While their attitudes towards technology varied greatly, from strongly positive to fearful, time, money, and energy spent on technology were time, money, and energy taken away from some other critical business tasks. A second major insight obtained from this study was that technology support—just as vital for a small business as for a large one—is unlikely to be provided in the traditional ways. The entrepreneurs usually do not have the time or inclination to resolve technology issues themselves, and are rarely able to hire dedicated technical staff or consultants who charge market rates. IT therapy provided by university IS students proved beneficial in addressing a variety of needs and mitigating some barriers to implementation.

The challenge for stakeholders is how to provide on-going technical support and guidance to the micro-enterprises who are not able to acquire it in the conventional way. The experience of the *IT for Development* course offers an example of a short-term solution. However, the needs persist beyond the end of the semester. The next step will be to build on current experience and draw together the institutional continuity of the university, the expertise and enthusiasm of faculty and students, the resources of larger technology savvy organizations, and the commitment of non-profit agencies into an on-going effort that can meet the technical support and development needs of micro-enterprises.

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Appendix

ME	Task	Impact	Commentary	Benefit Category
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LD	Evaluation of a point of sale system ordered for the deli.	The student researched registers and contracts and confirmed that the POS system selected was appropriate for the deli.		Administrative Efficiency
	Establish reliable Internet connectivity to the deli	After several hours on the phone with the telephone company's technical support, the student determined that the hardware had been installed incorrectly. When the hardware was corrected, the connection worked well.		Access to markets
	Evaluate hosting solutions for the deli	Student determined that the current web hosting provider was not cost effective and was able to recommend a provider that would reduce costs significantly and offer an easy upgrade path.		Administrative efficiency
	Researched options for wireless solutions for customers at the deli	Student has been able to identify options for the owner and cost them out.		Competitiveness
FD	Create a Powerpoint presentation of the fashion line that the owner could take with her to a show out-of-state. This task involved taking digital photos of the fashions, uploading them to the personal computer, and creating a presentation using them.	Owner won several contracts at the show, and attributes her success to the effectiveness of the Powerpoint presentation.		Competitiveness
CZ	Develop an alternatives matrix to evaluate options for acquiring the software necessary to support the management and scheduling of tutors.	The owner of the enterprise had struggled a great deal in trying to determine how to acquire the information system needed to support the business. The discussions and analysis the student presented brought great clarity.	The owner originally was fixed on purchasing commercial software. The student was able to exhaustively research current alternatives and provide a very solid framework for making a decision. The owner had a strong perceived need for "an IT friend."	Administrative efficiencies
HH	Taught owners how to create more effective Powerpoint presentations.	Presentations to stakeholders and funding groups using the new Powerpoint have been much more effective than in the past, according to the owners.	The inclusion of audio testimonials was just one of several very effective enhancements the student taught the owners to create.	Competitiveness
	Taught owners basic computer management skills	Owners are able to easily move files from one machine to another, make backups, etc.	The measures were simple, but very important: the use of flash drives for moving data between the laptop and the desktop machines	Administrative efficiency
	Established wireless network within the halfway house	Users are no longer tied to a specific location within the house.	The wireless functionality had been provided by the service provider, but the owners were unaware of simple configurations needed to make it functional.	Access to information
	Install new hardware in two houses, connected to the Internet	One guest of the halfway house was able to put his resume on-line and landed an interview and a job <i>much</i> more quickly than anticipated.	Two desktop machines were donated by the Peter Kiewit Institute at UNO.	Access to information; Job creation

	Taught owners how to use Excel more effectively.	Owners were able to present the statistics of their operation much more clearly and effectively than before.	Statistics are a critical success factor for the halfway house. Data about the effectiveness of the programs are critical to securing funding sources and complying with regulations.	Competitiveness
HE	Installed Microsoft Office 2003.	The owner is now able to improve her productivity and ability to create a variety of documents necessary for business, such as brochures.		Administrative efficiency
	Connected an external CD-burner to the desktop machine.	The owner is now able to easily create backups of critical files		Administrative efficiency
	Installed Zone-Alarm security on the desktop.	The computers are now much better protected against cyberthreats.		Administrative efficiency
	Opened and connected PDA, and synchronized it with Outlook.	The owner can now use the PDA to manage contact information in a way in which information is synchronized across systems.	The owner had had contact information scattered inconsistently across multiple platforms, digital and paper. The technology had previously not even been turned on. It now became useful.	Administrative effectiveness
EP	Updated software on computer.	Computer ran more efficiently and was better protected against cyberthreats.	The student ensured that the computer had the latest versions of the operating system and applications patches, and cleaned up software that was no longer needed.	Administrative effectiveness
	Installation of terminal services.	Owner is now able to log into the office machine from home, eliminating the need to maintain duplicate systems (including duplicate and rarely consistent accounting systems requiring duplicate data entry and reconciliation.)	This change not only enhanced the integrity of the data, but also saved the owner a great deal of travel-time, since she no longer had to drive into the office just for some data.	Administrative effectiveness
	Analysis and improvement of search engine placement.	The web site had rather poor visibility in the major search engines. The web site now is much more visible.	The student was able to employ free but effective techniques to better classify the site with the search engines.	Access to markets
HC	Create a completely new web site.	The new website has a much more professional look. It is more attractive, easier to navigate	The owner was extremely pleased with the new look to the web site.	Access to markets
	Provide technical training on web site maintenance.	The owner is now able to add/delete products on her web site herself		Administrative efficiency
CC	Remove junk software from the desktop.	The system takes much less time to boot up and runs much more effectively. In addition, the desktop is clutter free, making it easier for the owner to find the application she needs.	The manufacturer provides a great deal of software that a typical user is not interested in. This software merely slows the system down.	Administrative efficiency
	Fix Internet Connection	The office now has DSL connectivity to the Internet.	The owner had been paying for Internet connectivity for six months, but had failed to set it up properly and had been unable to connect to the Internet.	Access to markets

	Cancel ISP subscription	The owner saves money, because she was paying both an ISP and the local telephone company for redundant service.		Administrative efficiency
	Configured customer management software to Quickbooks.	The owner is now able to integrate her scheduling software with her accounting software.	The student spent time with technical support the customer management software vendor to learn how to integrate the two systems.	Administrative efficiency