The Digital Divide: Focused Research Results On Peer Mentoring, Scalability and Occupational Self Efficacy In a Home-Based Technology Integration Program

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Introduction

The existence of a "digital divide" in which portions of society do not have sufficient access to technology, nor to the information and skills that technology use imparts, was of concern for educators and policy makers even before home computers were easily connected to the Internet (NTIA 1995, 1998, 1999, 2000; Resmer, Mingle & Oblinger, 1995; Riley, 1996; Annie E. Casey Foundation, 1998). As new technologies (such as broadband Internet access), and new uses for technology (such as interactive websites for homework) are developed, new levels of the divide will appear, certainly to the extent that children in low income homes do not gain access to the same level of information at the same rate as other children (c.f. Hundt, 2003; Digital Divide Network, 2003). In an era in which funding may be difficult to obtain, the development of tested, scalable, affordable solutions should therefore be a mandate for educators.

Research in the digital divide field is still in the critical early stages; consequently, much of the research has focused on demographic information and on documentation of participant benefits (cf. Chow, Ellis, Walker & Wise, 2000). As it is now well established that participants do benefit, and that those who would not otherwise have access to technology do take advantage of such opportunities, more focused research is called for. In addition, much early digital divide research has been based on solutions developed in conjunction with community technology centers (Chow, Ellis, Walker & Wise, 2000); the notable exceptions (e.g. Apple Classroom of Tomorrow, 1995; Pinkett, 2000, 2002) were largely based on partnerships with specific institutions and on highly funded pilot programs, so that conclusions drawn may be limited in the extent to which they can be used to plan larger programs and fiscally reasonable solutions. Moreover, as Secretary of Education Rod Paige has pointed out (US Dept. of Ed., 2003a, 2003b, 2003c), access in schools and in other institutions such as libraries does not substitute for access to home computers with Internet connectivity. Projects designed to test home-based technology programs are thus seen to be a priority (Andrews, DiGangi, & Jannasch-Pennell, 1999, 2000; Stock, 2001).

This paper reports on a seven-year project that was specifically designed to generate scalable and affordable solutions to the digital divide in a participatory research setting, and on a briefer study based on the project; one year was allocated to data collection in the study, and a second year was devoted to completing the analysis. The paper offers an overview of results of the study, and of the means by which the results were obtained. While more detailed papers are planned, it is hoped that this overview will draw attention not only to the divide, but also to some solutions, and to the efficacy of a grassroots-oriented means of generating such solutions.

In the seven-year project, computers were placed in low income homes as well as in non-standard dwelling places (e.g. shelters and vehicles) via a participant-led grassroots technology program, Floaters.org. Outcomes regarding disposition and use of the computers were tracked largely via a peer mentoring process in which previous recipients introduced new members to the computers. Mentors in particular, and mentees as well, were invited to bring their experiences and suggestions to a participant research group and in so doing to serve as a bridge to trained researchers. The participant research group met weekly and functioned as a consensus-based decision-making body with regard to the evolution of the project. Participants thus shaped the program to their needs in an exemplary participatory action research project (c.f. Moser, 1977; Fals Borda, 1995; Sohng, 1996).

Five years into the project, a mixed-method study was begun that would focus on specific aspects of home-based technology integration. Methods were chosen, with participant input, to maximize the amount of information gained. Thus, discourse analysis was selected as the appropriate method to examine transcripts of taped peer mentoring sessions; grounded theory was used to identify changes to the program that emerged as

the program was scaled up in size; and a standard self-efficacy scale was used to examine participant self efficacy with regard to technology occupations. Finally, the program looked back at itself via the process of participatory action research, used in the project in order to generate and evaluate digital divide solutions from the bottom up, that is, with maximum input from the people most affected.

Purposes of the Project and Study, and Research Questions for the Study

Participant-chosen goals for the project, and therefore for the participatory aspect of the study as well, were to investigate how best technology could be integrated into the homes and lives of low income populations; and, consequently, how technology could be used to improve these lives. From the beginning, the project sought not only demographic information and information about participant benefits, but also information about how those benefits could be accomplished.

Goals of the study, as contrasted with those of the project, were chosen in participant-driven focus groups in which members learned research methods. These goals focused specifically on a set of particular research questions:

What took place with regard to teaching and learning in the peer mentoring sessions?

How did the structure of the program, designed over time by participants, change further as the program was scaled up in size?

Did participant self efficacy change during the study with regard to occupations, especially with regard to technology occupations?

About the Floaters.org Project

Working with university researchers, a community group designed and implemented the Floaters.org project, in which older computers were and are recycled into low-income homes and then monitored. The Floaters.org project itself is a participatory action research project, wherein all participants have an equal voice and goals are set by group members working together. The project was designed to integrate technology with those who are least likely to otherwise attain it: specifically, those living in poverty, those who have been homeless and later, people with disabilities who could not otherwise afford technology. The project simultaneously was designed to identify and put into practice the highest pedagogical and research practices. This does not imply that mistakes were not made, but rather that learning from mistakes was a built-in part of the process.

An examination of the nature of the project, undertaken as the two year study began, showed that participants took on three roles: peer mentors or mentees; shapers of the program; and co-researchers. Each role corresponds to one of the research questions stated above.

The monitored study was designed with input from participants, and participant approval was gained for all aspects of the study. As part of their work as co-researchers, participants learned about ethics standards, including the right to withdraw from the study without having to withdraw from the program. Each participant chose a screen name or alias, and data were recorded for these aliases. Where privacy dictated, the academic researcher occasionally chose to use an additional naming convention as well. Those participants who did leave the study have given their permission to continue using their data.

Discourse Analysis

Discourse analysis, a qualitative research method used to examine the peer mentoring sessions, consists of a number of approaches to analysis of verbal interactions. Discourse analysis was agreed upon as a method for the study by the participants, who saw this method as a means of investigating empowerment. This view is consistent with the literature: in *Language and Power*, Fairclough (1989) invited both researchers and lay people to investigate the uses of discourse strategies to take and consolidate power.

It is the branch of discourse analysis known as conversation analysis, or CA, that was primarily used in this study. In conversation analysis, audio or video recordings are transcribed, and the transcriptions then analyzed, with structural details taking precedence over content. That is, rather than interpreting data and assigning motives, conversation analysts seek information about the structure of the conversation. Intonations, pauses, interruptions and grammatical structures are among the features typically coded for.

Conversation analysis was pioneered by sociologist Harvey Sacks in the 1960's; his work, edited by Gail Jefferson and Emmanuel Schegloff, was not published until 1992, as the *Lectures on Conversation* (Sacks, 1992). However, long before this publication date, Sacks, Jefferson, and Schegloff had began a collaboration

that resulted in a series of works that defined conversation analysis. These works included the *Semiotica* article "Opening up Closings" in which Schegloff and Sacks proposed the concept of the adjacency pair to explain conversational structures such as questions and answers (Schegloff & Sacks, 1973) as well as the *Language* article, "A Simplest Systematics for the Organization of Turn-Taking for Conversation" (Sacks, Schegloff and Jefferson, 1974). Working with Sacks' material, Gail Jefferson originated a set of notations for marking up text that was published with the 1974 article, and that has remained standard among conversation analysts.

In addition to Sacks' pioneering work, Sacks, Schlegloff and Jefferson built on the work of Harold Garfinkel, founder of the ethnomethodology school of sociology. Ethnomethodology focuses on the study of everyday actions, including language use, and takes for granted that ordinary people understand what they are doing; thus it is by nature well suited to a participatory action research project in which participants are co-researchers. Garfinkel presented the principles of his approach in *Studies in Ethnomethodology*, citing transcripts of conversations to show how people organize their shared realities using "common understandings" (Garfinkel, 1967, p. 38). In other words, ordinary people can and do understand their own actions. Like the conversation analysts, Garfinkel relied on observable data, using only as much context as was necessary to understand the data and expressing a belief that only those involved could understand the whole situation (Garfinkel, 1967).

Also related is the work of Erving Goffmann. In *The Presentation of Self in Everyday Life*, Goffman showed how, whether consciously or not, conversationalists act out roles and create a "front"–"that part of the individual's performance which regularly functions in a general and fixed fashion to define the situation for those who observe the performance" (Goffman, 1959, p.22). Conversation analysis draws from the work of Goffmann in that both reveal the ways in which relationships are constructed and roles created.

Transcription in itself has come to be viewed as a theoretical process, a viewpoint introduced by Elinor Ochs in "Transcription as Theory" (1979) and by Carole Edelsky, in "Who's Got the Floor?" (1981). Central here are the realizations that the raw data are not the same as the transcribed data; that, rather, the transcription is a representation of the data; and that the infinite multitude of decisions made during transcription are actually theoretical decisions reflecting the relative importance of particular discourse features. Two researchers working independently would not make the same theoretical decisions; and a single researcher, writing about the same text at different times, may make different coding decisions.

It cannot, therefore, be assumed that reliance on observable data over inference in conversation analysis implies that the data are wholly objective. The ongoing development of software applications that can be brought to bear on the transcription process (for example, software that measures pauses) does not change this, as researchers will continue to make the important decisions: for example, pauses in a technology mentoring session may have to do not with hesitation but with mentee concentration on a technology task. Where there is reason, a second researcher may separately transcribe audio or video recordings, and the two versions can be compared; or, a group of researchers working together may listen/view and transcribe as a group, as is recommended procedure in ethnographic inquiry and interaction analysis (Jordan & Henderson, 1995). However, neither process is necessarily indicated if it is accepted that transcription decisions are properly the domain of the researcher (c.f. Ochs, 1979; Edelsky, 1981; Lemke, 1998).

A second branch of discourse analysis useful in a participatory action research study is critical discourse analysis, or CDA, in which discourse is examined for underlying relationships of power. In the European countries, Foucault is thought of as the father of discourse analysis (e.g. Fricke, 1999; Diaz-Bone, 2003), in part for work published in his *Archeology of Knowledge* and in his *Discourse on Language*, published together in English in 1972. Elsewhere, Foucault might be thought of at least as the godfather of critical discourse analysis: Foucault began the *Archeology of Knowledge* by declaring that in order to understand any discourse it would be necessary first to get rid of all preconceived ideas in order to begin anew, and then to examine relations, including relations of power.

The Floaters.org study is closer in its approach to another critical discourse analyst, Norman Fairclough. Fairclough's use of close readings of text resembles that of conversation analysis, although his intention is to identify and uncover power relations. In *Language and Power* (1989), Fairclough not only identified discourse structures that give and take power, but invited others (including those with no prior academic background) to do so as well.

Participatory Action Research

The term “action research” has several meanings. In educational research, action research might be classified into two major branches, practitioner research and participatory action research or PAR. In both, research is carried on at least in part by people who have not been formally trained as researchers, but who have

the advantage of being directly within the research situation and so have access to an unusually high level of information. Practitioner research in education rests on the belief that teachers ("practitioners") can participate in research, generally via self study, rather than being consumers of research only. In "participatory action research" on the other hand, the object is goal-oriented social justice, as guided by those affected. In PAR, a researcher or researchers may enter the situation with the intent of forming a participatory research group. The Floaters.org study utilizes the PAR approach: the initial impulse came from a researcher, who invited a counterpart in an affected community to join together in investigating technology integration by distributing donated computers.

Further confusion as to the nature of action research arises because participatory investigation or participatory action research has been used widely by such entities as the World Bank (Narayan, Patel, Schafft, Rademacher & Koch-Schulte, 2000). Such entities generally have an a priori interest in showing immediate financial gains for participants, whereas true participatory action research centers on the identification of participant values prior to the taking of action (Fals Borda, 1995; Sohng, 1996).

Participatory action research has been used in the United States in the establishment of support groups for sufferers from AIDS (Glasser & Bridgman, 1999) and in the investigation of the efficacy of prison education. (Fine, Boudin, Bowen, Clark, Hylton, Migdalia, Missy, Rivera, Robers, Smart, Torre & Upegui, 2001). In education, the work of Paolo Freire can also be seen as participatory action research, in that Freire mobilized participants to take control of their education (Freire, 1970, 1994, 1998).

In participatory action research, participants are co-researchers, with an equal voice in all decisions. The method itself therefore is also open to further refinement. Before the Floaters.org study began, five years' of group work on the project had resulted in three principles against which all decisions were tested: equality of voice; consensus-based decision making; and revolving authority, in which those who are expert in a particular area may step forward and take charge, so long as those who are interested in the area may also participate.

In interactions outside of the group, "Nothing about us without us" is the credo of grassroots participatory action research, as documented on the Homeless People's Network, the sister website and mailing list for the Floaters.org project (c.f. also Charlton, 2000). "Speak truth to power," is a related imperative, implying that participants must at every step of the way open to stating their opinion rather than, for example, avoiding the situation (Carey et al, 1955; Kennedy Cuomo & Adams, 2004).

With these guiding principles in participatory action research, project members take an ethical stance that is every bit as difficult to implement as the most rigorous of quantitative methods; in both, at the end of the study, the researchers know that their findings are trustworthy to the extent that the method has been properly followed.

Self Efficacy

"Perceived self efficacy" refers to people's optimistic beliefs about their ability to reach their goals (Bandura, 1977, 2001). Hackett and Betz have stated that one of the most useful concepts in modern psychology is Albert Bandura's concept of self-efficacy expectations, for self efficacy has been shown to affect human development (Hackett & Betz, 1981; Betz & Hackett, 1981; Bandura, 1977; Bandura, 2001). Changes in self efficacy have four sources, according to Bandura: mastery experiences, vicarious experiences modeled by others, verbal persuasion, and people's own physiological indicators or somatic and emotional states resulting from the attempt to achieve. Investigating these four sources, Bandura found, for example, that verbal dissuasion is easier to accomplish than verbal persuasion; that both positive and negative moods may affect self efficacy, as can pain; and that, in a learning environment, teacher self efficacy can negatively or positively impact student self efficacy (Bandura, 1994, 1995, 1997, 2001). Bandura's work with self efficacy was a part of his pioneering work that made a place for cognition, rather than adhering to the older "black box" theories of psychology. In thus allowing for the thought processes of the individual, Bandura created a concept which is more appropriate to grassroots PAR investigation, which also places emphasis on the individual participant, than earlier theories.

Self efficacy is domain specific. Bandura states in his *Guide to the Construction of Self-Efficacy Scales* (2001) that is important to use a domain-specific measure rather than a general measure of efficacy, as general measures are too ambiguous to be meaningful. Self efficacy can transfer across domains, and powerful experiences, in particular, can effect changes across many domains (Bandura, 1994, 1995, 1997, 2001).

With regard to the study of self efficacy with low income populations, early research conducted by CTCNet (CTCNet, acc. 2003) identified a number of benefits to users, one of which was personal efficacy (Mark, Cornebise & Wahl, 1997). In subsequent CTCNet studies, this benefit was dropped as a concept of interest (Chow et. al., 2000), but a more domain-specific self-efficacy concept may be worth a closer

examination.

While career goals are not the only objective of technology integration, they are a concept of interest among the Floaters.org population, as determined by the participatory research group. "Work self efficacy" or "Occupational self efficacy" refers to the belief that one can succeed in a particular job. The concept of occupational self efficacy itself was introduced in pioneering work published in 1981 by Gail Hackett and Nancy Betz (Hackett & Betz, 1981; Betz & Hackett, 1981). In these works, Betz and Hackett applied the concept of self efficacy to career counseling and discovered gender differences among with regard to traditionally gendered occupations, in particular, men had much stronger self efficacy scores for traditionally male careers (Betz & Hackett, 1981; Hackett & Betz, 1981.)

Following Bandura's model, Hackett and Betz created the Occupational Self-Efficacy Scale (OSES) in the form of a Likert scale from one to ten for 20 occupations; respondents were asked to select their answers based first on how certain they were of being able to complete the education or training for each occupation, and then on how certain they were of being able to carry out the job duties (Betz & Hackett, 1998). A revised version of their 1981 *Manual for the Occupational Self-Efficacy Scale* was made available online in 1998 (Betz & Hackett, 1998). Typically the scale is revised by the researcher to offer relevant occupations for the population of interest (Hackett, personal communications, 2001, 2003); in this PAR study, the participants themselves chose the relevant occupations. The scale can be administered in terms of the training aspect, in terms of the job duties aspect, or with both aspects included.

Method

Participants

Participants in the group (n=184 at the time of the study) comprise a “snowball” sample (Babbie, 1998) in that new participants were recruited by project members, each of whom was asked to choose someone else to teach. For the study, 37 primary participants were lent recycled computers, standardized to the extent possible. Data were collected over the course of a year for each of the 37. Each primary participant represented a different family except where there were two or more computers in a family; in these cases, each primary user of a computer was also a primary participant in the study. All of the 37 volunteered for the project, and all were over the age of eighteen.

Each section of the study drew on a different subset of participants as appropriate:

Fourteen of the 37 took part in the taped peer mentoring sessions. The taped sessions used for the study were theoretically sampled, that is, they were chosen in order to provide as wide a range as possible in terms of age, level of experience in the program, gender, and level of education.

All participants were invited to optional weekly research meetings, where data were collected in the form of field notes and observations regarding changes in the structure of the Floaters.org project during the study.

Twenty-two members agreed to take part in the self efficacy portion of the study; of these, seventeen took part in both administrations of the self-efficacy scale, at approximately four-month intervals, while five took part only in the first administration. The 22 were self-selected from the 37 primary participants.

While research decisions (e.g. aspects studied and methods) were made by the participants after group study of research methods, and while participants took part in other aspects of the research as appropriate (e.g., participants selected the careers to appear on the Occupational Self Efficacy Scale), a trained researcher conducted the analysis, with constant member checks wherein participants were asked to comment on portions of the analysis.

Data Sources

Data sources included the following:

- Records of the computers and the work done with them
- Field notes, observations, and qualitative memos
- Eight videotaped mentoring sessions, theoretically sampled so as to provide the widest possible variety of mentors and mentees
- Field notes and observations from focus group sessions
- Scores from the two administrations of the Occupational Self Efficacy Scale
- Responses to followup questions asked of those who took part in the mentoring study

Procedure

Recycled Macintosh computers with a standard set of applications were distributed to thirty-seven primary participants, along with self-study materials and resources for feedback.

Eight peer mentoring sessions, theoretically sampled to provide the widest possible range in education, experience, age, and gender, were videotaped by the researcher.

The Occupational Self-Efficacy Scale was administered at approximately four-month intervals to a subset of twenty-two self-selected mentors and mentees in order to determine any changes in attitude towards computer-related jobs. Seventeen of the twenty-two were available to take the self-efficacy instrument a second time; five took it only once.

Weekly focus group sessions/research group sessions were held, and follow-up interviews were scheduled during the last three months.

Figure 1. Timeline for the study. The equivalent of the recommended year for ethnographic data collection was allotted to data collection for the study, along with a second, also recommended, year for analysis and writing.

Analysis

Peer Mentoring Sessions: A Discourse Analysis

The first of the three aspects studied was that of the mentor/mentee relationship. For the discourse analysis portion of the study, eight theoretically sampled peer mentoring sessions were taped, transcribed, and coded for discourse features in order to examine the participant roles of mentor and mentee. The sessions were selected via the theoretical sampling process in order to provide as wide a range as possible regarding age, level of experience in the program, gender, and level of education. The mentoring pairs were videotaped during sessions, and the sessions were transcribed and marked up, then coded, using modified conventions based on the work of Gail Jefferson (Sacks, Schegloff & Jefferson, 1974; Jefferson, 1984). It is standard practice for the researcher to adjust the transcription conventions to the requirements of the researcher's interests and of the text at hand, so the conventions given here vary from those originated in 1974. Data were coded line by line, in constant comparison analysis (Glesne & Peshkin) until categories were found and then saturated, that is, until all new data fit into already discovered categories. Transcription conventions used for marking up the text can be found in Appendix A.

Scalability/Changes to the Program

The second aspect studied was that of scalability of the project. At the beginning of the study, the project was scaled up in size. Rather than accepting new members one at a time as mentors became available, twenty new families were accepted at once. As the program was modified in order to accomplish this expansion of the program and to provide ways to collect data, the opportunity arose to track answering changes produced by the participants responsible for the program structure. Most important of these changes was the establishment of a weekly focus group that any participant (n=184) could attend and that served as a means of communicating concerns as well as to continue the work of shaping the program. Field notes of these focus group meetings were collected by the researcher and analyzed, again via coding and constant comparative analysis, in order to investigate how the role of shaper and developer of the program played out during this time.

Occupational Self Efficacy

To examine occupational self-efficacy, the Occupational Self-Efficacy Scale or OSES was revised in accordance with guidelines set by Bandura (2001) and advice given by Hackett (personal communications, 2001, 2003). The OSES is typically revised by the researcher, who selects occupations that are relevant to the group under study; here, the participants were asked to choose the occupations. Rather than limit the list of

occupations, they chose to use them all, adding eight more technology occupations and the occupation of President.

For this aspect of the study, four smaller questions were formulated:
1. Will there be a significant difference between means for technology-related occupations and non-technology related occupations within the first administration of the instrument?
2. Will there be a significant difference between means of technology-related occupations and non-technology related occupations within the second administration of the instrument?
3. Will there be a significant difference between means of non-technology occupations, between the two administrations of the instrument?
4. Will there be a significant difference between means of technology-related occupations, between the two administrations of the instrument?

Scores on the self-efficacy scales were analyzed for each of the four smaller research questions by running a paired samples t-test to test for difference of means. Follow-up questions were generated based on a pattern analysis of the results, and participants were contacted and interviewed.

Results

Peer Mentoring Sessions: A Discourse Analysis

Analysis of the peer mentoring sessions showed that peer mentors developed and used sophisticated teaching strategies and that these strategies were similar among experienced mentors, regardless of education levels. Coding yielded two sets of mentor discourse strategies that had to do with verbal contributions of the mentee to the session. Differences were found in the use of these strategies between experienced and beginning mentor discourse: expert mentors alternated the two types of strategies, thereby encouraging mentee contributions while advancing the instruction. On the other hand, features found in the discourse of experienced mentors were similar regardless of educational level: members with and without a high school diploma were equally expert in mentoring if they had an equal amount of mentoring experience.
One set of strategies encouraged mentee participation: these strategies included such features as questions, problem statements, and off-topic remarks. This problem statement by the mentor, for example, is followed by a mentee response:

→Mentor:	30.	I've never seen the mouse
	31.	connected to the cord before.
Mentee	32.	(.) Then nobody can steal them.

The second set of strategies included such discourse features as interrupting, ignoring mentee contributions, and speeding up the rate of mentor speech. Here, the mentor interrupts, thereby retaining control of the instruction:

→	Mentee:	23.	Let me show [you ( )
→	Mentor:	24.	[And then you can, now if you want to do.
		25.	° Let me show you.°

Scalability/Changes to the Program

Participants modified the Floaters.org program further during the study, primarily increasing communication opportunities. The first modification, in which participants requested that the focus and research group meet weekly, and that it be immediately opened to mentors and mentees alike, provided a regular opportunity for participants to bring up their concerns and to suggest changes. Participants successfully maintained the basic premises of the program (equality of voice, consensus-based decision making, and revolving authority) throughout the mixed method study: no mean feat, for as the group learned, in a research situation methods can easily deviate from grassroots principles unless there is constant attention to the principles. A second major modification was that of the addition of a fourth principle to group interactions: speaking truth to power within the group (as well as outside of it) rather than walking away. This addition to the internal principles of participatory action research was needed since many participants (as documented in the self efficacy interviews) perceived of their power as limited in some senses, but strong in that they stated that they could always walk away from a situation in which they were not being treated fairly. Encouragement to speak out in the group over perceived slights was the solution to losing participants over such problems.

Occupational Self Efficacy

Results of the self-efficacy questionnaire were inconclusive, though a major history effect may have had some impact on these results. The study was interrupted by the events of September 11, 2001, and in follow-up interviews as well as in focus group observations, some participants indicated that these events had changed their opinions.

One significant difference was found, for the exploratory question, Will there be a significant difference between means for technology-related occupations and non-technology related occupations within the first administration of the instrument?

For the difference between means of technical and non-technical occupations in the first administration of the OSES, the p value was .047. As the sample size is small, a non-parametric test, the Wilcoxon Signed Ranks test was also run, and here the p value was .049, leading to the same conclusion.
This difference disappeared in the second administration of the OSES, where scores for non-technology occupations rose, although not significantly. Standard deviations for technology-related occupations, particularly in the second administration, were higher than for non-technology-related occupations:

Table 1 *Standard Deviations*

Non-technology 1	Technology 1	Non-technology 2	Technology 2
1.6949	1.8254	1.6474	2.0261

These results are somewhat counter-intuitive as it might have been expected that technology self efficacy would increase after participants received their computers. In order to investigate this further, responses to the scale were first graphed and patterns of responses were analyzed, in order to generate follow-up questions. Open-ended follow-up qualitative interviews were then held.

Three types of typical patterns were found: one subset reached the ceiling in technology self-efficacy either in the second administration, or in both administrations: these scores either rose, or stayed the same.

Statements from this group in follow-up interviews indicated that these participants wished to make it clear that they could do anything if they had the opportunities for education and success that others have. These members felt that they were capable of completing the education for occupations requiring high levels of education, but felt others in society were unaware of their ability.

In another subset, scores fell, sometimes radically. Interviews with this group indicated that after September 11, some participants lost interest in their work with the computer, and some lost faith in their ability to prepare for computer-related jobs.

With a third group, response levels varied based on the specific type of computer career, either in both administrations or in the second, That is, a participant might score high on a career involving computer art, but low on a career involving programming. In follow-up interviews, these participants indicated that their greater understanding of technology careers had led them to give more precise answers, sometimes resulting in an overall lower score.

Looking at the Participatory Process

With regard to participant goals, localized best practices were found regarding technology integration. Financial goals remained problematic, but other goals defined by participants as pertaining to a better life were met to a degree. As one participant stated, “I will stay as long as it feeds my spirit.”

Also documented in the focus group sessions and noted in the Changes to the Program section is the refinement of the participatory action research process over the course of the study.

Participatory studies may more commonly limit methods to ethnography: in this study, other methods were used as well, but introduced with care and always with participant understanding and consent. For example, the research group voiced concerns that quantitative methods would be disempowering, and a

discourse analysis has been proposed to determine if the self-efficacy scale is less empowering with this population than an open-ended questionnaire.

As a method, discourse analysis was not seen as disempowering, as the group was introduced to it via Fairclough's call for lay attention to discourse as a means of taking power (Fairclough, 1989.) The origins of conversation analysis being to some extent in ethnomethodology, a field in which ordinary people are seen as able to understand their own discourse, further makes this method approachable to discourse analysis. Finally, the place of self efficacy in psychology as introducing the importance of cognition makes this concept also appropriate.

Discussion and Future Research

Generalizability in the traditional meaning of the word is not the purpose of a study that takes a qualitative perspective; instead, theory is generated in the form of hypotheses based directly on data. In such a study, sufficient detail is ideally presented for readers to be able to make the decision as to whether or not the findings may also generalize to particular situations with which the researcher is familiar. Such detail adds to the credibility of the study. In this brief paper, detail is necessarily necessity limited: further papers are planned, and in the meantime it is hoped that the detailed presentation here of the participatory process as used in this study will encourage the reader to entertain the assumption that the rest of the study may likewise be credible.

It is also important for credibility that rapport and "buy-in" on the part of participants can be shown. This study sought such rapport and buy-in by following participatory action research principles. As all participants are co-researchers with an equal voice in decision making, rapport was a natural outcome.

Credibility is further enhanced by triangulation, or the use of multiple methods and/or data sources, especially when the findings of the methods and sources converge, as they do here. In terms of the purposes of the project and of the study, a project using specific means of technology integration (participatory research, peer mentoring, focus groups, home-based technology integration) was examined in differing ways (discourse analysis, field notes, and a self-efficacy scale) to yield converging results.

The results point to the usefulness and potential for success of peer mentoring, a process that is eminently affordable as a means of instruction. The discourse strategies can be studied further; one next step for this project will be to incorporate the strategies into mentor training.

Within the participatory process, it is interesting to note that grassroots participants, after five years of work with the process, were able to transform the project to meet the challenges of scalability and indeed to further refine the participatory process. Further study of the nature of power and empowerment for such a group appears to be in order.

As mentioned earlier, participants themselves have suggested a close look at the discourse of those who are taking the OSES, in order to determine if the OSES is empowering or disempowering as an educational experience

Another direction for study, and currently underway, is the further development of the OSES in the direction of a Technology Occupational Self-Efficacy Scale, Important here will be the identification of sets of related technology occupations that are of varying difficulty, so as to satisfy Bandura's requirement that items on the scale present varying levels of challenges (Bandura, 2001). To take an example from the current version of the scale, "video game tester" and "video game designer" require varying levels of training or education. Since technology-related occupations exist across various subdomains–programming, networking, and art, for example–it will be important to identify the various technology-related domains. A related avenue of future research will be the further development of an instructional intervention that describes the technology domains.

Appendix A

Transcription Conventions Used in the Floaters.org Study

Markup is based on the work of Gail Jefferson (1974, 1984).

Markup	Definition/Samples
[	Left bracket: beginning of overlap or interruption
S.	Yah I was in one of those technology classes [or
A.	[Computer class?

] Right bracket (optional): end of overlap or interruption

= Equal signs: no break or pause.

== Two equal signs indicate no break between the lines. One equal sign may be lined up above the other; or, one may appear at the end of one line and one at the beginning of the next.

A. one day=
S. =yah (.)
T.

- Dash: speech is cut off.

A. All in the box. It all stays in the box-
no ! Get out! Can anybody hear me?

<u>yah</u> Underscoring denotes a louder voice or other stress, as in a slight rising inflection.

U. <u>Yea</u>::h, Pe:te!

dit Bolded text denotes an even louder voice or other form of exaggeration:

P. **dit dit dit dit**

F. That said it closed down (.) **i:m** properly=

:: Colons indicate prolongation of the prior sound. The longer the colon row, the longer the prolongation.

N. She lo::ves using the computer.

< Angle brackets (carets, greater than signs) surrounding text and pointing inward: speech is said more quickly relative to other utterances.

S. >very cool very cool<

<> Angle brackets (carets, greater than signs) surrounding text and pointing outward: speech is said more slowly relative to other utterances.

<and you ca::n't kill it>

( ) Empty parentheses or with the word "inaudible" indicate something not heard by the transcriber.

(yah?) Parenthesized words are guesses on the part of the transcriber.

° ° Degree signs indicate something said very quietly.

F. °Let me show you.°

{} Curly brackets indicate context.

{Context: mentor is looking at computer.}

(( )) Doubled parentheses contain descriptions of sounds other than speech.

Pauses are measured approximately.

New lines and micropauses (.) are about .1 second.
A number within parentheses, such as (2.5), is also approximate.
Some pauses were the result of engagement with the computer. Where this engagement was audible, it was transcribed with an explanation in double parentheses, as for example ((clicking)).
Silences longer than a few seconds were coded by approximate length or by an explanation within double parentheses: ((extended silence)).

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