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Technology Perceptions in an Autism Program

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Introduction

Working as a Graduate Assistant (GA) for Dr. Behrmann at George Mason University (GMU), my main project has been testing and evaluating the Kellar Handheld Data (KIHd) System. Teachers use the system to collect the results of Discrete Trial Teaching (DTT), a method used primarily with students on the Autism Spectrum. Since I am using the Instructional Design iterative model for innovation design, the KIHd System has had many phases. Each phase consists of a testing period with subsequent design revisions. To date, the KIHd System has had Alpha testing (phase one) and Beta testing (phase two). Each phase has built upon the last, gaining understanding of the users and knowledge about data collection along the way. This study, baseline implementation (phase three), explored the reasons some teachers use technology and others do not. Investigating teacher perceptions and barriers in regard to technology usage was the research topic.

Experiential Knowledge

I knew I was interested in teaching when as part of a class in high school, I had to volunteer at our local elementary school. Getting students excited about learning was an arena I wanted to explore. I was particularly fascinated by students who had trouble learning. Having applied to an educational teaching program, in the fall after graduation I found myself a freshman at the University of Hartford in Connecticut. A part of all special education major's requirements was a foundations class which included a practicum. The professor, a seasoned veteran, had a policy of determining placements based upon geographic location as opposed to student interest. I thus had a life altering

experience that inextricably changed the course of my career path, at least in the short term.

My assignment was to the Hartford Extended Care Facility (fictional name). My charges consisted of three very "low functioning" non-verbal students with Autism named Chris, Susan, and Derek ages 12, 9, and 15 respectively. Chris was best known for his high-pitched, self-stimulatory vocalization. Susan was the only girl in the program and Derek was famous for having broken his former instructor's left kneecap in a rage of violent behavior. My job, four days a week from 4-6 PM, was to teach hygiene and eating skills. Unfortunately, my five minutes of training and no support left me feeling overwhelmed and totally incapable of working with special needs children. Hence, for my sophomore year, I transferred to SUNY-College at Cortland and switched my major to elementary education. Now on the surface, transferring universities may seem a familiar story, but for me, there was an accompanying internal shift that temporarily shut my mind off to a very important population.

Fast forward eight years, to my own child's diagnosis with Autism shortly after his second birthday. The years to follow were tumultuous at best and led to my learning about special-needs individuals first hand. In a sense, I believe I was reawakened to the very population I was always meant to work with and service. I had gained significant insight in the years between my freshman placement to the birth of my little boy, on negotiating life's twists and turns. Therefore I began a new journey, this time with confidence, of partnering with a colleague to open a private practice to assist families and children diagnosed with Autism. I continued in this capacity for a decade while gradually finding fascination with emerging technology, especially assistive technology tools.

In the late spring of 2003, I meet with Dr. Behrmann who was beginning work on the Kellar Instructional Handheld data (KIHd) System. Here, I was given the chance to contribute to a project that could affect many teachers of students with Autism by using technology to graph discrete trial data. Knowing that I couldn't turn down this opportunity, I chose to reduce my caseload over a year and a half period, finally closing the doors of my private practice in 2004.

For some time now, I have been involved in the evolution and the iterative design of the KIHd System with Dr. Wang and Dr. Behrmann. I summarized some of the work previously completed to give some background in further understanding the current study. In the spring of 2004, Alpha testing was conducted on the KIHd System to determine the performance problems and identify areas in need of revision for the KIHd prototype. The study encompassed four steps: training video, discrete trial session, questionnaire, and interview. Eight individuals were tested, four parents of children with special needs and four teachers of children with special needs. All individuals had experience and prior exposure to one-on-one discrete trial work and a variety of types of data collection. The findings indicated that while the majority of participants were positive about the system, navigation concerns and term clarification were identified as areas in need of revision. These modifications were completed in late spring 2005 so that Beta testing could be conducted.

Beta testing was concluded in the fall of 2005. The major challenge of this phase was to implement data collection across a variety of disabilities. The data types collected included: accuracy, duration, fluency and frequency. Data was collected during a two week period consisting of baseline, treatment, and maintenance phases. Data was

collected during the following classes: communication-technology, consumer or practical math skills, independent living, and graphic design. A significant finding was the reluctance of instructors to use the technology. It was this finding that led me to want to further study about teacher perceptions about the overall concept of technology.

Conceptual Framework

Everett Rogers' theory of diffusion of innovations provides a basic framework on which to view the adoption of technology. The process can be viewed across the four elements of innovation, communication channels, time, and the social systems. Innovation is defined as an idea or practice that is perceived as new by the individual. Communication is the process by which ideas are shared and the channels are the means by which those messages get transferred. Time refers to the phases of introduction to the innovation though the ultimate rejection or adoption of the innovation and social systems consist of a support network (Rogers, 1995).

Another conceptual framework for adoption of technologies is the Concerns Based Adoption Model (CBAM). Last year, a case study of a school district's adoption of a science program focused on the using CBAM. Data collected concentrated on the CBAM Stages of Concern Questionnaire (SOCQ) which encompasses a 35-item questionnaire using a Lickert scale and free response section. Interestingly enough, even after two years of implementation, the majority of the teacher concerns still focused on time to prepare, execute, and teach the enormous amount of vocabulary and content. The research also reported the fact that administrative support was not sufficient to facilitate full implementation of the program (Kelly & Staver, 2005). This confirms a comparable response (Malone, 1984) to a 1984 science implementations study conducted by Malone.

Both results emphasize the importance of teacher attitudes, perceptions and especially support when adopting new innovations. I expect teacher attitudes about technology to have a large impact on the implementation of the KIHd System. In fact, my own research with the Beta testing, as noted earlier, showed a significant finding (Behrmann & Graff, 2005) which was the reluctance of instructors to use the technology.

My personal experience with technology can best be described as an "approach with caution" mentality. This manner tends to appeal to my guarded nature. In an optimal situation, I would be given time to look and read about an item, preferably using a written manual. Then I would spend some time experimenting with the technology. Finally, with sufficient practice I would gain confidence and comfort. Furthermore, I would need to see a reason for using the given technology. Under the guise that this innovation will enhance or simplify an area of my life, I am much more apt to want to try it.

A good example would be the new Palm Pilot I received. When I first was approached about getting one, I wondered if the Palm would be worth the effort to change from my current system. But when I was shown that this would be a substitute for maintaining my calendar with backup synchronization to my computer, I was hooked. I realized that with some active learning, in the end, this arrangement would be a better schedule system. When the device was first handed to me it stayed in the box for a day while I tried to decipher how it worked. Unfortunately there was not a written manual, only on-line help, which did not seem to be very helpful. I finally found the assistance I needed by seeking out a colleague who gave me some hands on training. I knew that once I has gained enough skills with the device I would leave my paper pencil method behind. For now, ever cautious, I will use both.

I believe my attitude is not universal, but a "middle of the road" type approach. I have found by conducting expert reviews and focus groups with the immersion research team; I am not alone. It seems that many individuals take a period of time to establish a comfort level with new devices. For me, reading a written manual and trouble shooting with peers seemed to be necessary steps in my innovation adoption process.

Research Questions

In this light, my first question I wanted to answer with this study was "What were teacher perceptions about technology?" Another question that piggybacks the first would be "How was technology currently being used?" Lastly, "What were some perceived barriers to technology adoption?" I believed the answers to these questions would directly impact how I created the training tools for the KIHd System.

Research Setting and Relationships

The Green School (fictional name) was chosen because that is the site for the formal implementation (phase four) of the KIHd System in August of 2006. This happened primarily due to their "gold standard" of data collection. I addition, I have known the former director and founder of the Autism Program at the Green School, Dr. Steele (fictional name), on an informal basis for several years. Furthermore, Dr. Behrmann knew the current Program coordinator and my gate keeper.

Our relationship began in August of 2005, with e-mails and calls to the Program coordinator. After much discussion and exchange of grant narratives, a meeting was set to tour the school and pitch the idea to the administrators. By October of 2005, everyone was on board with the idea that the KIHd System's full phase four testing would begin in August of 2006.

However, having just conducted phase two of the research with the Beta testing, I realized that I would need an ongoing relationship with the Program coordinator and her staff if I was to really begin full testing in the fall. Therefore this project came at a perfect time and was an immense catalyst to open that dialog and forge ahead in gently letting my presence be know in a non-threatening manner at the Green School.

With some of my analysis underway with the Beta testing, I began to believe that teacher perception of technology was a critical factor in the adoption of the KIHd System. What better way to continue to dabble with this theory, then to start to ask questions at the Green School? After discussion with Dr. Behrmann, I contacted the Program coordinator by e-mail. I knew from our previous dealings that her number one priority was to protect her staff from intrusions. I also knew that she completely loved technology and believed that eventually the use of data collection devices in her program would reduce the teachers' workload.

Keeping her biases in mind, I e-mailed her with a very minor request of some observation times and one interview (see Appendix A). I thought that I would be able to increase my expectations as I continued to see her and talk about short term and long term goals. At each school visit the Program coordinator and I were able to meet to further confirm what I needed and what she would be comfortable in supplying in terms of teacher's time. She was especially clear at our first meeting on February 22nd that if I was to need more time with any teachers that Wednesday was their half attendance day for students and I could use up to an hour of teacher preparation time for this project. That was all I needed to hear, it was almost like giving me the green light to push further.

At that point, I mentioned that depending on the information obtained that day, I may indeed need to be back. I assured her Wednesdays for any other week would be fine.

Given the precept that as administer of my former private practice I was an expert on Applied Behavior Analysis (ABA) and Discrete Trial Training (DTT), I definitely had preconceived notions on "best practices." My research at GMU has reinforced those concepts and so I was apprehensive as to what my first observation at Green School would yield. The Green School Autism Program serves 43 students in 6-7 classrooms at a 1:1 and 1:2 teacher to student ratio. Individualized education programs with a focus on functional life skills are developed following ABA methodology. Teachers collect and chart data daily. While I pushed the selection of this site based upon information presented from administrators at the school, I had not had the opportunity to view the staff "in action." I was especially concerned that the school would not live up to its responsibility of developing a unique program for each child to optimize their learning. I recognized that I can be a harsh critic and I wondered where the lines between "best" and "good" practices fall. So my biggest disadvantage was going into this study with pre-conceived notions of what I wanted or expected to see.

On the reverse side, one of my greatest strengths was going to this site knowing about the population served by the Autism Program. In addition, my familiarities with ABA and behavioral reinforcement systems have been a huge benefit. As I have consulted with various programs as a private practitioner, I can go into a school setting and immediately know what to look for in this environment. A person with a different background may want to know the answers to some basic questions. Why are the children separated? Who are all the adults in the room? Why does each child need their own

schedule? Why do the teachers use reduced language? What are communication devices? By having a strong knowledge base about teaching techniques and strategies for this population, I was able to observe each classroom with a seasoned set of eyes.

Participants

Of the six Autism teachers, I interviewed three participants for this study. The Program coordinator chose which classes I would observe and who I would first interview. All teachers' names were changed for this report. During our first meeting, I inquired how she made that decision. Of her six classes in the Autism Program, in the first class I observed Emily was the teacher. Emily was someone with whom the Program coordinator felt may not be apt to want technology in her classroom. The second class observation (which was the same person, Jean, as for my first interview) was someone she felt would welcome the change. So she wanted me to visit what she perceived were opposite ends of the spectrum. I can say without hesitation that the classes were a lot more similar than different in their current technology usage. My two other teacher interviews (Dawn and Allison) were arranged by whoever responded the quickest to the Program coordinator's e-mail request for assistance on this project.

The classes were a relatively homogenous student population and functioning level. For example, one teacher said "It's a class of five students almost completely male, only one girl. We're one-to-one student staff ratio, so there's one head teacher, one senior teaching assistant (TA) and three TAs. We rotate our work sessions, mostly focusing on functional life skills. A lot of hygiene skills, a lot of communication skills, and also getting them ready for some career or vocational in the future." That seemed typical for all the interviews.

As a whole, each teacher I interviewed had four or more years at Green School. “I started off as a teaching assistant, and got promoted to a senior teaching assistant, which involves a more paperwork and documentation type stuff. Then, I was a teacher.” This led me to believe that there is an elevated staff satisfaction as the typical turn over rate in this field is extremely high. In regard to the area of data collection, I noted that on average it takes the teachers 1-1.5 hours a day to graph data. “I would say at least 45 minutes, but I don't think it would be over estimating to say that mostly takes over an hour.” The teacher comments ranged from “We graph every day.” to “So we tally our data and graphs at the end of each day.” This charting is completed by hand using line graphs.

Data Collection

I have outlined the timeline (see Appendix B) for this project. The first time I arrived at Green School, I was extremely anxious about what my observations would yield and how well my presence would be accepted. After checking in at the main office, the Program coordinator escorted me back to her office. She and I reviewed the current study protocol and she had me sign a Green School visitor consent form. She then laid out the schedule for the day. In retrospect, I realize now that the schedule was far too much for me to realistically accomplish in one day, not physically but in terms of information overload. My overachiever mentality did not work in my favor but instead left holes in my memory regardless of the rigor with which I took notes. I vowed that all future interviews would be scheduled with just one on each day. With each observation and interview, I began with having the teacher read and sign the consent form. Prior to my meeting each teacher, the Program coordinator had briefed each participant on my

role and the topic. Both observations went very smoothly. The students barely took notice and the teachers seemed very comfortable and informed about the current study (as well as the future implementation). My first interview (questions and notes for each interview in supporting documentation) was with the same teacher, Jean, as my second observation.

Reflecting upon the first interview, I believe I may have had less to inquire about since I had spent an hour already that morning in her room. On the other hand, each of my other interviews got longer, more detailed and further in-depth, so it may have been a matter of my gaining experience with this medium as an alternative explanation. As mentioned, I was nervous and focused on the length of time for the first interview. However, after class consultation and reassurance that the time frame was fine, I was actually able to relax a bit. As a result, I was able to expand each subsequent interview, which in turn, led me to gain confidence. My third session with Allison, I believe yielded the best and most thoughtful responses with rich descriptions.

Furthermore, the reading and class discussions have been an essential part of my growth. At the time of my first interview, the semester had recently begun and class was only in week five. Based upon the syllabus we were just beginning to cover the interview process. I felt ready to conduct my observations but I feel it was to my disadvantage to begin my interviews at such an early stage of our course. Since each interview was then a week apart, by the third and last interview I had read many examples of good interviews and had the opportunity for peer discussion and consultation.

Lastly, I want to mention what I identify as the growing negotiation ability within the relationship between me and the gatekeeper. The trepidation and cautiousness with which I approached my site seemed natural because I had other research depending on

their cooperation. I did not want GMU to be perceived as placing unreasonable demands upon Green School. Those were of course my perceptions, not necessarily shared by the gatekeeper and the site. As the Program coordinator and I continued to see each other, the overt pressure of the study's requirements seemed to fall away. She was able to convey just how important this research was to her and set appropriate boundaries not restrictions on her teachers' time. In turn, I was able to feel more comfortable making requests. The realization of that give and take of the gatekeeper/site relationship has made the biggest impact on me and my growing skills as a researcher.

Data Analysis

I first looked at the data with an open coding approach, not having set categories. I did want to keep in mind the layers of data. This was an idea I constructed based upon having typed my transcriptions. I began to see the teachers as talking in terms of organizational codes and substantive codes. I still had not labeled them but felt that there were at least two levels. I also wanted to keep in mind etic (my concepts) versus emic (the participants ideas). As a researcher, I needed to be open to not just my thoughts but constructs that burst forth from the stories of the participants, sometimes using their own words.

I felt the best way to keep me on track while I coded using NVivo was to keep notes in a quasi-memo format so that as my codes developed I could change them. Later, I began to date the changes as well as to note the set time that there was a shift in coding. In retrospect, I should have dated from the beginning. I also created a visual of what the data began to uncover. The notes and diagram are in Appendix C. In the beginning, this representation was a pyramid, with the student's needs and learning styles at the base.

The tip, and surprisingly least important, was the teacher's needs at the top of the structure. As I continued to code, the pyramid changed to a water concept, to a phone icon, to a pie graph and finally to a concept map. The original concept map eventually morphed into the final form (Appendix D). More discussion of this concept map will be in the Findings section of this report.

My original coding included basic organization codes of: *background*, *philosophy*, *class*, *technology* and *time*. Under the organization code of *philosophy* two substantive emic codes emerged named "makes job easier for students" and "makes job easier for teachers." Under *class*, the two substantive codes that emerged were "management" and "data collection". With *technology*, the substantive codes were "devices", "decision makers", "cost", "training/support", and "frustration". Both substantive codes of "decision makers", which broke down further into "family involvement", and "training/ support" had the largest metamorphosis. Through the course of analysis, I realized in reading the transcripts that "training and support", originally two separate entities, seemed more accurate when morphed into one category. On the other hand with "decision makers", I only had the one code until that category had the "child" (an VNivo term) of "family involvement" which seemed a more accurate fit.

A lot of time was spent still trying to elicit some induction in the category of technology. At first I had a category for each device. Then I collapsed the coding to devices and AT devices; however I soon realized that I needed one code for all devices. There was no connection **between** devices but with the **usage** of **all** tools so there seemed no point to keeping each device in a separate category.

I was also frustrated by knowing when to code and what to do with the vast amount of novel ideas. Based on the feelings, "It sounds like you would be excited about it." and "I would get excited." technology usage was viewed as a positive. I did not have a feeling category in technology. I thought about the creation of a "child" to technology or place that in the organization category of just technology. Each had its draw backs. If I continued to create new nodes at this rate, I would have 22 by the time I was finished. That seemed high for this small a project. On the other hand, to simply put the feeling under the organizational category missed the intent of the expression and would have been overlooked in examination of all the phrases. Ultimately I realized that I was having trouble because I had begun to uncover my substantive codes. These codes did not fit with the existing set I had developed; they were "underneath" telling me "what was going on-what was the claim." The "feeling" code turned into "positive results." With this huge turn of events that happened to occur after a consultation meeting, I went back to the data.

After the transcripts were reviewed and using the concept maps as a visual guide; I further developed the original organizational. I used the concept maps and their iterations to illustrate connections that developed my substantive codes. While there had been significant sub codes at the organizational level especially in technology, my work with all the sub codes led to a more meaningful connection in developed substantive codes. Substantive codes became: *child learning*, *effective teaching*, *device adoption*, *positive results*, and *parent commitment*. All the codes can be seen in Appendix E, Table 1.

As a review, the research questions for this study were (1) "What were teacher perceptions about technology?" (2) "Given this site, how was technology currently being

used?" and (3) "What were some perceived barriers to technology adoption?" Using an open coding approach as an analysis method helped me look with an open mind at the raw data. By not having predetermined categories, I was better able to look at what the data was saying not just fitting the information into a prefabricated box. By using my evolving concepts map, I was able to see the connections.

Results

From my analysis, I have created the concept map (Appendix D) to show the connections that ran across all three interviews. There was a direct line that delineated the fact that training and support created the perception of more effective teaching. With more effective teaching, the children made better progress in their learning. Child learning was increased by device adoption and thus led to more positive results and feelings. While child learning and effective teachers were the core components, other important concepts branched off. For example, there was no doubt that parent commitment had an impact on what devices were adopted and the ultimate cost of that device with the pay off being positive results with their child's learning. Frustration also branched off as related to the cost of the devices and how well the staff used them due to lack of time or support or training as defined by the school decision makers. The main areas focused on in the results section were based upon these connections of **positive results** from technology related to feelings of perceived teacher effectiveness and student learning; **parent commitment** with device adoption; and with **training and support** there was less frustration.

Positive Results

The concept that perceived *teacher effectiveness* intertwined with *child learning* ran across interviews. An interesting notion was that the students led the determination of which device to use by their ability level. Looking at the following quotes made me realize that the adoption of each device was about the children's ability to use the technology. The devices discussed during the interviews ranged from assistive communication (AT) devices to walkie talkies to computer programs to practice office work. Regardless of the device, the adoption and technology usage of the teacher stories reflected *positive results*.

Dawn said:

> Others were doing some trials with the one student to see if this would be good for them…I had another student in another classroom I was assigned to, who had the same device. And I saw the same positive results from it.

Dawn continued to talk about the child-centered nature of technology usage and the impact of not having that technology on both student and teacher.

> Right now it's getting repaired. So were seeing some of the same behaviors as before, but when she has the device and the device has word prediction too. Unlike PECS so if there's not an icon for it she's just not able to say it but with the word prediction software, and her being pretty familiar with it. If she doesn't know it and it is not able to be programmed in, then she is able to try and spell it out, which helps the instructor know what she wants knows what she needs. It takes out the well, what you want, and or the I don't understand, it takes away that frustration for her.

Jean concurred in her thoughts of AT devices which provided speech output for non-verbal students or students with severe articulation issues.

> I loved them. They were great, kind of nice to give these kids a voice. You can even program them to go in press a button and get a complete order at McDonalds without anything missing and you are done. It's just has so many capabilities. It's amazing. It's helped an enormous amount for the kids we have introduced them for. To anticipate what these kids want to request. And there are new and exciting fun toys, and I want them to have access to it immediately, to request those things immediately. So if we discover something in the middle of the day it would be great if someone could input it in right then and there, so the child could start and request it.

Allison agreed:

> When he found it and used it and we were so happy about that… I have a student, and his behaviors are treated through an enriched environment. When he is at school, he's constantly listening to music. And we decided to upgrade from a Walkman to an iPod.

Jean used words like "excited" and "I like playing with that kind of stuff" in her discussion of technology. Dawn summed up the teachers thoughts when she stated:

> [Technology] I would think [is] something to assist the teachers and students with their school day.

Parent Commitment

A connected thread was sewn between "cost" and *parent commitment* and the *device adoption*.

Dawn said:

The pair was purchased for the child.

Jean seemed the most vocal in discussing the cost, which can be very expensive depending upon the device.

> I would say more comes from parents. Once we get the parent on board, they're usually pretty willing…Yeah for trial use. If we're considering a device, they have a couple they share in different classrooms, so kids can get a few hours practice with them. But the Program coordinator is really taken over especially with some of these vendors to try and get some demos to see if they're effective for some of the kids…And there's funding, luckily some parents are willing to buy, but not all of them all are and then you have to fight the counties.

Allison said:

> I had a student purchase one…In particular; his parent wanted us to focus….

Clearly, the funds to buy the devices were a concern. The family commitment was weighed in as a factor but it seemed that purchase of the device alone was not enough. Jean, for example, seemed interested in getting parents trained on inputting information into the device as well. She felt:

> The device I work with in my classroom and with parents at home. They go back and forth, but the student who's working with the word prediction. He keeps it here. He has one there, and one that he keeps here. The other kids, they just take them home in their backpacks…And I would like to see parents trained on it. I think a lot of times, even though it does go back and forth. It just sits on the counter and gets plugged in, and that's the end of it if there is something that they need programmed in.

Training and Support

Along with *parent commitment*, the *device adoption* process is impacted by "training and support."

Jean commented on the occasion break down of the AT devices

> It depends upon the nature, if you're able to fix it quickly. It's not a big deal. It is frustrating at times. There seems to be runs where everything is breaking all the time, and then everything is working all the time. So that's what's frustrating, as long as there's a low-tech go to backup device. I'm fine with that. But there are just times when no one can figure it and it is completely frustrating. And it's breaking all the time. And what do you do, ship it out, and it's gone for a couple of months. So it seems that happens a lot, and it can get very frustrating and bothersome, but I've never been one to give up on a device. I'd always rather have it than not.

Even with the frustration of when the device broke down, Jean still wanted and used the technology. Frustration also resulted when there was not sufficient time for training. Allison was the most vocal in this area:

> I think at that point. It was a combination. There was a time constraint. It was given to the person because she had an iPod, and if I knew what to do it or maybe I had been given a longer time…I would've sat down with her and found out how to do it but because of the time constraints. I just passed the task over to her and she did it. I obviously took it out of the wrapping or the packaging that it was in and looked at the direction. Even with that. I feel I am a fairly intelligent person. However I had no idea what to do. It could have been Spanish. I had no idea.

All the teachers seemed very open to further training, even Dawn who seemed the most comfortable with technology. Dawn mentioned in the interview a problem with her internet and how she wanted to receive assistance.

> …with my computer at home, when I tried to install the DSL. I had problems. That was one thing I tried to troubleshoot on my own, but I did have to call for support. [When I called for support] I'm looking for someone to go step-by-step, telling me what needs to be done. I am pretty familiar with some things and I would probably be pretty frustrated at that point, and I would want someone to tell me exactly what I would need to do, because I probably would've already tried a variety of things.

In discussion of further training, Alison brought up:

> The thing I would want to mention is, if I got a brand-new device. Not necessarily a chat, but something, if there was some super duper X 2000 device that came into my classroom that I would want more than just a manual. I would want something to go along with it, because as I mentioned, I am that hands-on learner.

Allison also seemed to sum up the notion that all the staff needed to be trained.

> I think that training, especially for some of the new teachers that I mentioned, would be helpful. It would be really helpful, just the set up as simple as charging the devices. Turning them on and off properly. Things we take for granted, I've really had to focus with them. It would be helpful for me for some of the higher-level stuff. And I think it would be helpful for them for just some of the basic and that's something I took for granted too. I've got several new teachers this year, and I like automatically expect them to know. And one teacher finally said to me.

> I was never taught how to do this. How do you expect me to know when I've never been taught? It was an eye-opener for me, that these things are kind of intimidating. I shouldn't assume that everyone knows how to use them. I think everyone could use some training.

Validity Issues

To address reactivity, I disclosed to the participants all the study parameters at the very beginning of the study through written consent forms (see documentation) and verbally. I went into the project with the idea that this would be the start of my research relationship with these teachers and was very open about my role as a current researcher and as a future researcher. That being said however, there was no doubt that the teachers also knew that their boss, the Program coordinator, would read the final report. Therefore since the final results were not confidential, that could be perceived as a limitation to this study.

While I was pleased with the generated NVivo reports (see document coding reports for Jean, Dawn, and Allison), there was no doubt that coding and recoding took time. In fact, each time I looked at the data set new constructs seemed to appear. As a person new to qualitative research, I often had doubts about if I was creating something new or if what I saw was based upon the evidence. Did that person say that or did they mean something else? My topic of exploring technology perceptions seemed straight forward during the interviews but as I manipulated the data, I got more concerned. I wanted to stay true to the original intent of the person I interviewed. In that light, I completed a member checking procedure, where the participants verified the raw transcripts and had the opportunity to add further input or clarification (see appendix F). I

was also pleased that I was able to conduct two observations (see field notes), so that my data appeared to triangulate with the interviews and the member checking procedure.

My personal bias must be looked at as well. Clearly that while this study did not directly work with the KIHd System, I can not overlook that was the reason the study occurred. I am heavily vested in the project and this was phase three in that project, albeit a baseline study. That being said, since it was looking at the broad arena of technology perspectives and it was a baseline study, there was not as much pressure to come up with pat answers or conclusions. Additionally, as noted, I was able to tape all interviews to minimize any other re-interpretation.

Furthermore, to counterbalance any personal bias, I was able to spend several hours with peers reviewing my conclusions and defending the results. The idea was that if I could not convince these colleagues through the data, then perhaps my conclusions were a bit shaky. I was happy to report each of my two colleagues found all my results in order, although I did have to place additional data support to the text of this report.

Reflections and Implications

The implications of this study at the Green School suggest there was various technology usage ranging from expensive, complex AT devices to less expensive, simple slant boards. In general, the perceptions of technology were positive. Other research questions to examine would be “what would happen with the implementation of a program-wide device?” “Would the perception remain the same?”

Furthermore, the Green School Autism program results suggested the continued need for training and support though the device adoption process. On the flip side, the perceived barriers reflect frustration with the cost of the devices and the types of training

and support. Further research could be done on comparing what types of training and support are most effective at this school. Currently, there was a level of parent commitment. Future research could examine the parent's perspective of technology and the pattern for adoption.

In terms of my overall perception of qualitative research, I was very pleased to be able to read so many examples. The samples helped broadened my views and provided a depth of understanding that I did not possess previously. Additionally, through peer consultation, I was able to see current issues and other studies in various stages of progress. In general, I learned that qualitative analysis takes time and patience. In the case of less experienced researcher, it also takes guidance and practice. In the meantime, recognition of some of the issues was a good first step.

References

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Malone, M. R. (1984). Concerns based adoption model (CBAM): Basis for an elementary science methods course. *Journal of Research in Science Teaching*, *21*, 755-768.

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Appendix A

----- Original Message -----
From: Heidi J. Graff
To: Program coordinator
Sent: Monday, February 27, 2006 4:21 PM
Subject: Re: Visits for March 1 and 8th

Just the interviews are perfect. I'll see you on Wednesday.
Thanks for your help.
HJG
----- Original Message -----
From: Program coordinator
To: Heidi J. Graff
Sent: Monday, February 27, 2006 10:02 AM
Subject: RE: Visits for March 1 and 8th

Hi Heidi,

I have arranged for you to meet with teacher 2 this Wednesday (3/1) at 12:00 and teacher 3 next Wednesday (3/8) at 12:00. Please let me know if you need any observation time prior to your interviews. Thanks!

PC

-----Original Message-----
From: Heidi J. Graff [mailto:heidijgraff@cox.net]
Sent: Thursday, February 23, 2006 10:47 PM
To: Program coordinator
Subject: Re: Visits for March 1 and 8th

PC,
That's wonderful! Just let me know whatever time works best.
HJG
----- Original Message -----
From: Program coordinator
To: Heidi J. Graff
Sent: Thursday, February 23, 2006 12:01 PM
Subject: RE: Visits for March 1 and 8th

No problem, 3 of my head teachers responded to my request for a volunteer to be interviewed. I will check with them and see what time works best for them (their classroom schedules may be slightly different than teacher 1).

PC

-----Original Message-----
From: Heidi J. Graff [mailto:heidijgraff@cox.net]
Sent: Thursday, February 23, 2006 9:42 AM
To: Program coordinator
Subject: Re: Visits for March 1 and 8th

PC,
Dr. Behrmann was very pleased with observations and interview from yesterday. He asked whether it would be possible to do two more interviews? I was thinking perhaps one on Wednesday the 1(at about noon-you indicated that would be a good time-although I'm flexible if it needs to be later or earlier) and the other on Wednesday the 8th. What do you think? As we briefly discussed, I would say the interviews are for an hour, but as it did last time, they may go under. Please let me know when you get a chance.
Thanks so much for my visit yesterday. You have a wonderful school and I'm honored to be able to use your site as a research participant.
HJG

----- Original Message -----
From: Program coordinator
To: Heidi J. Graff
Sent: Wednesday, February 15, 2006 11:33 AM
Subject: RE: Visit

Ok, sounds good. I will set you up in two of my classrooms then. See you next Wed at 10:00.

-----Original Message-----
From: Heidi J. Graff [mailto:heidijgraff@cox.net]
Sent: Wednesday, February 15, 2006 11:38 AM
To: Program coordinator
Subject: Re: Visit

PC,
As long as the classes are within the Autism Program, the rest is very open. At this point, I'm just gathering basline information on technology, looking at current usage and, for the interview, comfort level. Thanks for your help.
Heidi
----- Original Message -----
From: Program coordinator
To: Heidi J. Graff
Sent: Tuesday, February 14, 2006 2:50 PM
Subject: RE: Visit

10:00 sounds good. Do you have an idea of what type of classroom you would like to observe? With regarding to functional level, age range, etc…

PC

-----Original Message-----
From: Heidi J. Graff [mailto:heidijgraff@cox.net]
Sent: Tuesday, February 14, 2006 10:12 AM
To: Program coordinator
Subject: Re: Visit

PC,
The 22nd would be great. I can be at school about 10:00. How does that seem? I think I can easily fit in 2 of the observations (from 10-11 and 11-12) and the interview (from 12-1). If I need to come back for the third observation, I can schedule it for the following week. Does that work? Let me know when you get a chance.
Thanks,
Heidi
----- Original Message -----
From: Program coordinator
To: Heidi J. Graff
Sent: Tuesday, February 14, 2006 9:07 AM
Subject: RE: Visit

Hi Heidi,

A Wednesday would be the best day for you to visit since they are half days for us. It would not be possible for you to interview a head teacher for an hour on another day due to staffing and our busy IEP season. You could observe in the morning and interview one of the teachers at 12:00. Would the 22nd work for you?

PC

-----Original Message-----
From: Heidi J. Graff [mailto:heidijgraff@cox.net]
Sent: Monday, February 13, 2006 3:48 PM
To: Program coordinator
Subject: Re: Visit

Hi PC,
I hope you're having a good February. I was wondering if I might be able to come to Green Schoolsometime toward the end of February to conduct some basic classroom observations (about 3) and one teacher interview (for about an hour)? I would be asking (in the interview) about perceptions of current technology usage. This would give us some baseline information for our project. Feel free to call (703) 938-5559 or e-mail to let me know if this is alright. I'm very flexible about days and would work around the school's schedule.
Thank,
Heidi

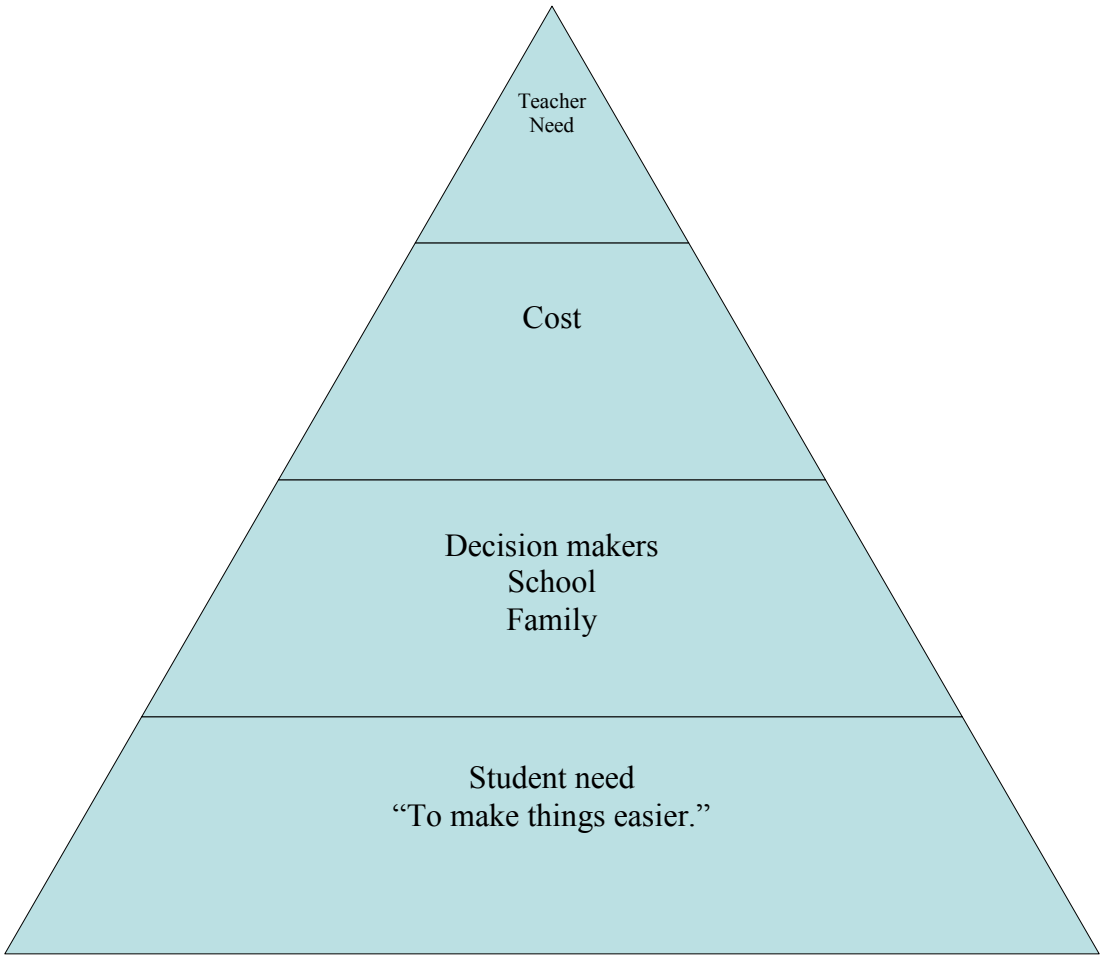
Appendix B
Timeline

Completed	
2/13	Initial e-mail contact
2/14	E-mail response from PC setting Feb 22nd as first visit
2/14	E-mail from HJG setting of time to confirm visit on Feb 22nd Class consultation on idea
2/15	E-mail clarification from PC
2/15	E-mail confirmation from HJG
2/21	Submission to the GMU HSRB
2/22	School visit. Met with PC, review the protocol and consent forms. Signed Green School consent form and confidentiality agreement Signed consent form with Emily and observed class Signed consent form with Jean and observed class Interviewed Jean Summary discussion with PC. Brought up issues of further interviews based upon discussion with Dr. Behrmann.
2/23	E-mail from HJG to set up further interview Thank you for being so welcoming Set up more school visits for March 1 and March 8
2/23	E-mail confirmation by PC
2/23	E-mail verification of time by HJG
2/27	E-mail specifications of which teachers and when by PC

2/27	E-mail confirmation by HJG
3/1	School visit. Time with PC reviewing schedule for this week and next. Signed consent form with Dawn. Interview with Dawn. Summarize with PC.
3/7	Class consultation on interview process HSRB requests changes
3/8	School visit. Time with PC, establishing member checking procedure and reviewing all teachers e-mail addresses. Signed consent form with Allison. Interview with Allison. Summarized with PC and discussed time frame for finalizing study. HJG submits changes to HSRB
3/21	HSRB approves study
3/24	Transcriptions of interviews completed
3/26	Send transcriptions to teachers for further comments
3/28	Begin coding with NVivo
4/4	Consultation for 812-show current codes ask for assistance with others
4/11	Begin write up of detailed analysis
4/30	Conclusion of analysis
5/7	Draft for sharing
5/10	Corrections
5/12	Prepare presentation
5/16	Final projects
5/20	Send final report to participants and HSRB

Appendix C
Notes

Process:
Devices to assistive to broader again
Decision maker not just limited to school, linked to family and school
Philosophy begins to emerge to make thing easier for them-both students and teachers



Student need
Decision maker
School family cost

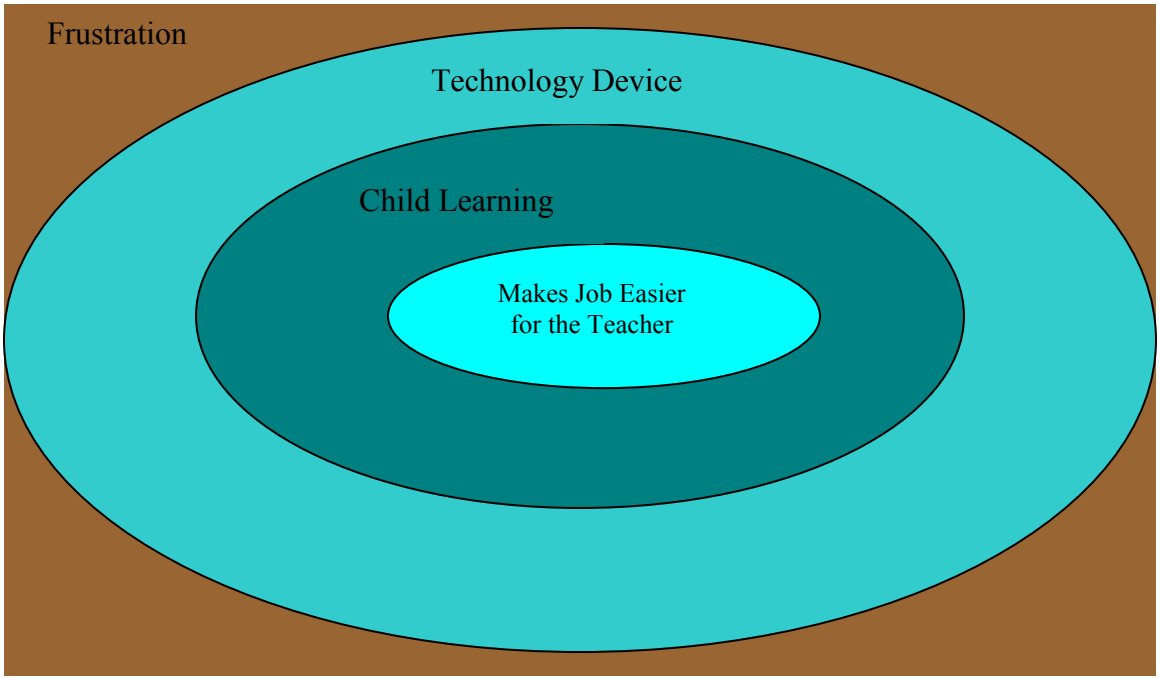
To make things easier
4-7 Move from training to broaden category of training/Support
Moved from specific assisted device to broader of just devices
Philosophy also moved into help for teachers with "make things easier" for teachers

And "make things easier" for students

Family involvement-where do the students fit in- are they the biggest decision maker based upon how well they do with a device and how effective the implementation
4/20/06
Frustration tied with makes job easier for teacher
Frustration tied with makes job easier for student

Example of walkie talky eased frustration for teacher
Example of say it Sam eased frustration for student

Almost like a waterfall or ripple effect- frustration leads to trying new things like a device which (if the correct device-although that is not stated here) which leads to less frustration for the child which make the teachers job
easier



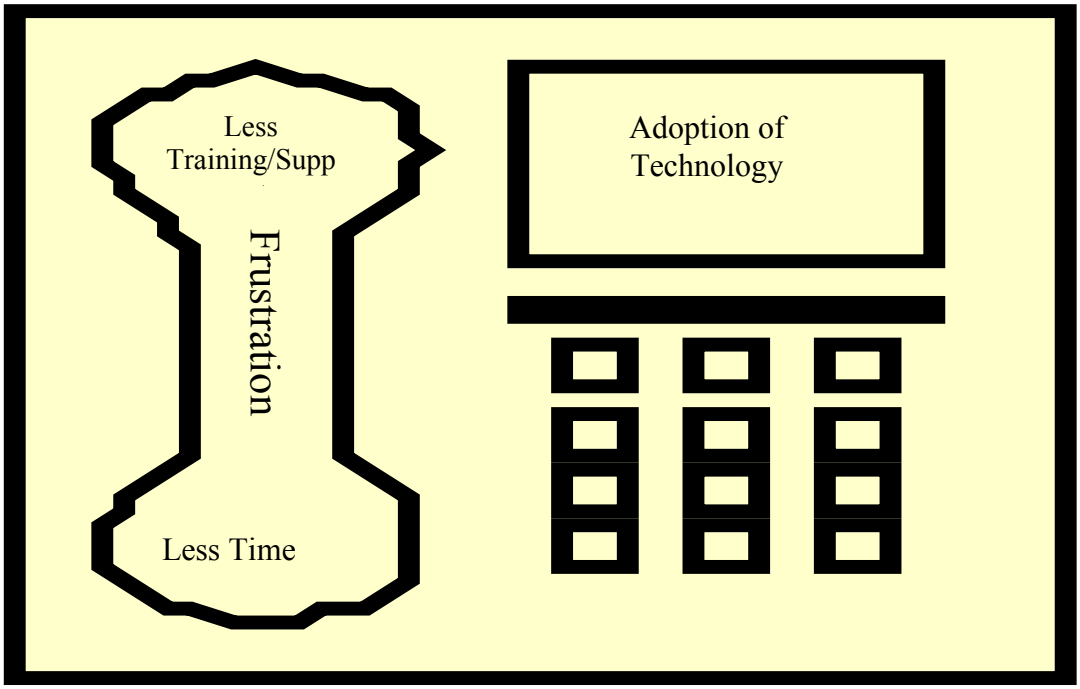
Therefore potentially more time to learn (for the child) and more time to instruct for the teacher.

4/21/06
Feeling came up again-I will need to create a category for the emic code of "positive results." I will recode Kimmy with this in mind as this was a concept I still did not have a grasp upon when I worked on her transcript.

Connection in “giving a voice” makes it better for students and teachers and so using a device has “positive results.”

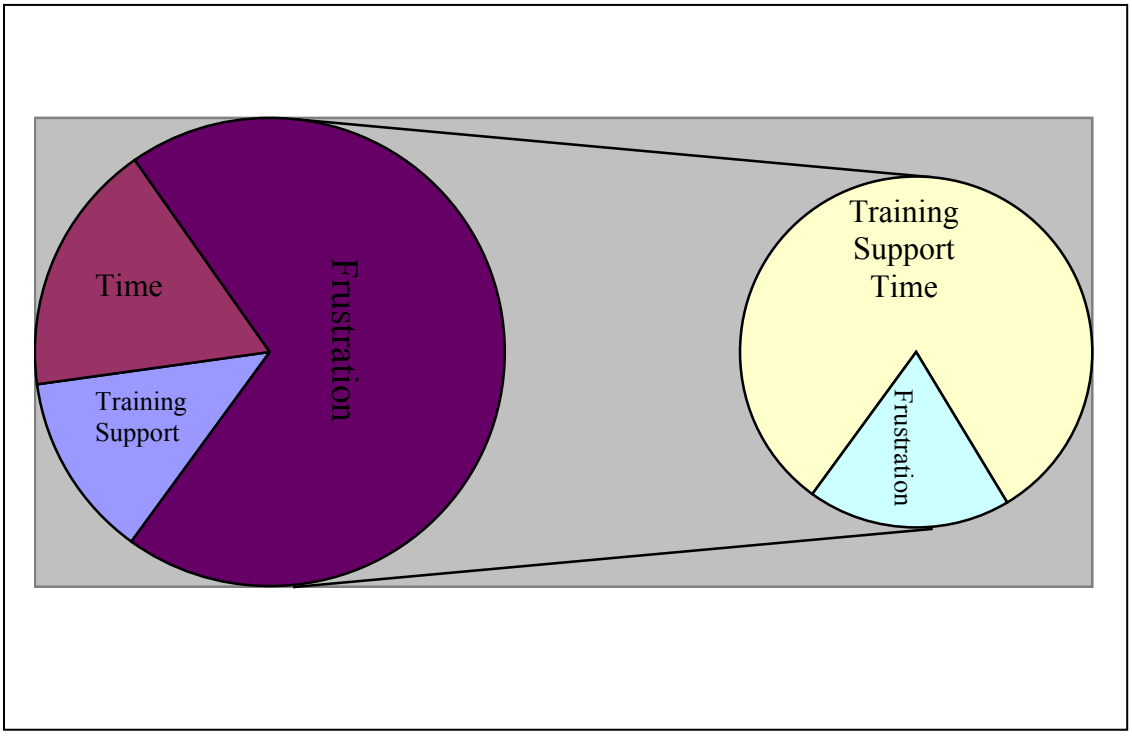
Training/Support Steps: Hand-on time to explore device, manual, on-line tutorial, call for tech support.

4/22/06
There is a connection with time and frustration and training/support. With less time there is a need for more training and support. Without the proper support and training there is a great deal of frustration.



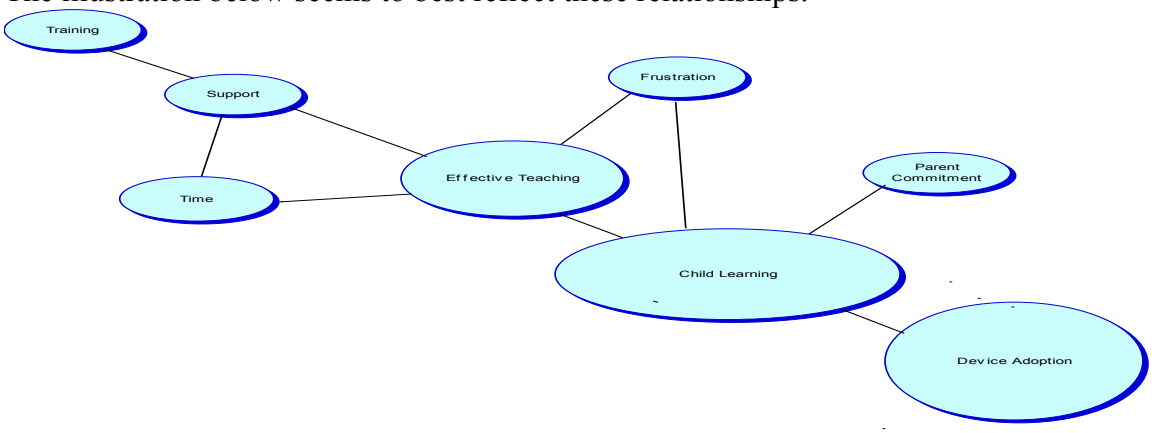
More training and support less frustration
More time less frustration

4/23/06
Decision makers provide a certain level of training and support.
Training once a month
Lecture and hand-on
Kinesthetic learners



4/26/06

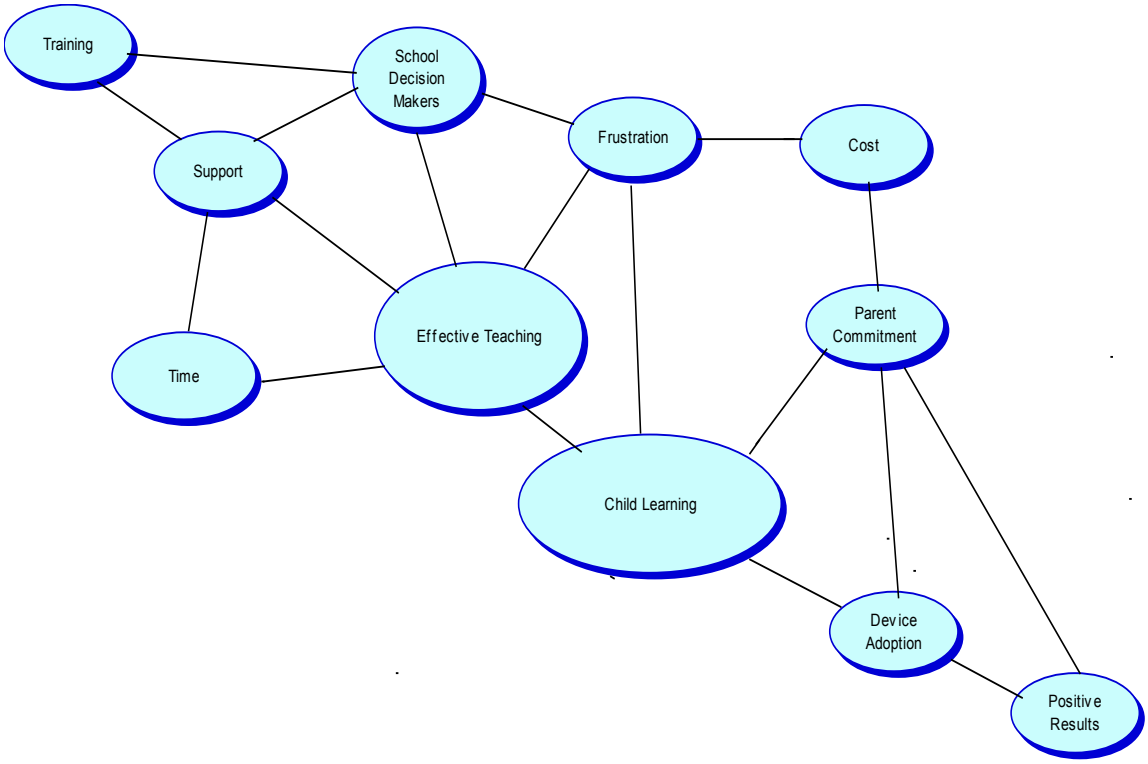
I am finding that there is a direct line between training, support, effective teaching, child learning, and device adoption. There is also a triangulation between support, time, and effective teaching as well as effective teaching, parent commitment, and child learning. The illustration below seems to best reflect these relationships.



4/28/06

Added are the cost of the equipment and the school decision makers. The school decision maker impacts teacher support as well. The cost factor adds to the frustration of which device to adopt and is a big influence with parents. Final in Appendix D

Appendix D
Concept Map



From my analysis, I have created this concept map (Appendix D) to show the connections that ran across all three interviews. There was a direct line that delineated the fact that training and support made more effective teaching happen. With more effective teaching, the children made better progress in their learning. Child learning was increased by device adoption and thus led to more positive results and feelings. While child learning and effective teachers were the core components, other important concepts branched off. For example, there was no doubt that parent commitment had an impact on what devices were adopted and the ultimate cost of that device with the pay off being positive results with their child's learning. Frustration also branched off as related to the cost of the devices and how well the staff used them due to lack of time or support or training as define by the school decision makers. The main areas focused on in the results section were based upon these connections of **positive results** from technology related to feelings of perceived teacher effectiveness and student learning; **parent commitment** with device adoption; and with **training and support** there was less frustration.

Appendix E
Table 1 Codes

Red-Organizational
Blue Sub-Organizational
Purple-Substantive

background	philosophy job for student job for teachers	class management data collection	Technology devices decision makers family cost training support frustration	time
	effective teaching child learning		positive results device adoption parent commitment	

Appendix F

Member Checking

----- Original Message -----
From: PC
To: heidijgraff
Sent: Monday, April 03, 2006 3:41 PM
Subject: RE: transcriptions
Ok, shouldn't be a problem, we're on spring break next week, so hopefully they can look at them b/f fri.

> -----Original Message-----
> **From:** heidijgraff [mailto:heidijgraff@cox.net]
> **Sent:** Monday, April 03, 2006 3:39 PM
> **To:** PC
> **Subject:** Re: transcriptions
>
> PC,
> I would think within the next week or so would be great (with the drop dead date of 4/14 but sooner is better). Teacher 1 has already replied.
> Thanks so much for your help,
> HJG
> ----- Original Message -----
> **From:** PC
> **To:** heidijgraff
> **Sent:** Monday, April 03, 2006 10:48 AM
> **Subject:** RE: transcriptions
>
> Heidi,
>
> Thanks for sending me a copy of all the transcripts. Is there a due date that you need to hear back from the teachers?
>
> PC
>
> > -----Original Message-----
> > **From:** heidijgraff [mailto:heidijgraff@cox.net]
> > **Sent:** Thursday, March 30, 2006 3:21 PM
> > **To:** Teacher 2
> > **Subject:** transcriptions
> >
> > T2,
> > Attached is the transcript from your interview. Please note that grammar and punctuation are not synonymous with a word by word transcription. Please e-mail back after you have read over the document. In the return e-mail just note that the transcript has been reviewed. You may also feel free to write any other input that you feel was not clear or other thoughts that you decided you wanted to add. Once again, thank you so much for your assistance. The final paper will be e-mailed to those that requested a copy by the end of May or beginning of June.
> > Heidi
> > Please note as stated in the confidentiality section of the consent form, any quotes used in the final report will be used with a pseudonym and will be corrected for proper grammar and punctuation.