

## **Using Computer-assisted Qualitative Data Analysis Software (CAQDAS) to Re-examine Traditionally Analyzed Data: Expanding our Understanding of the Data and of Ourselves as Scholars**

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*As diverse members of a college of education evaluation committee one of our charges is to support faculty as we document and improve our teaching. Our committee asked faculty to respond to three qualitative questions, documenting ways in which interdepartmental and cross-department conversations are used to promote reflective thinking about our practice. Three of us investigated the use of CAQDAS to provide an additional level of analysis and how we learned more about ourselves as scholars through this collaboration. Our findings include recommendations regarding the use of CAQDAS to support collaborative efforts by diverse scholars. Key Words: Multi-disciplinary Research, Multiple Perspectives, CAQDAS, Qualitative Research.*

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In this paper we discuss our work on a college-wide evaluation committee, in which we investigated faculty's use of conversation and reflection to demonstrate professionalism in teaching. The three of us, as members of the committee, all are members of different college departments, and had very different perspectives towards research and the use of computers. Linnea is a professor of research methods in a college of education, and primarily teaches qualitative research and action research. Linda had the most experience with "Computer-Assisted Qualitative Data Analysis Software" or CAQDAS, and wanted to bring together Elizabeth and Steve to collaborate on this project. Elizabeth is a professor in the department of special education and primarily teaches math methods, assessment, and disability studies. Elizabeth has a diagnosis of autism and had minimal experience with CAQDAS before this study. Steve is the director of assessment for the college and a professor in the technology department. Steve has extensive experience with quantitative research and with computers, using computers in his quantitative research, but had little experience with qualitative research or the use of computers in qualitative research before this study. Significantly, we wanted to make visible the ability of CAQDAS to assist diverse scholars in collaborating in research and data analysis. We initially conducted the study to highlight the importance of authentic assessment of faculty teaching in an era of accountability that often tends to examine only quantitative assessments, specifically student course evaluation data. But our further work with this data enlightened us to the collaborative benefits of CAQDAS. After completing the data collection (described below), completing a traditional group hand-analysis of the data, and presenting our findings to our college, Linnea wanted to expand the project by inputting the data into CAQDAS. She asked Elizabeth and Steve to join her, because of their unique backgrounds. She knew that Steve had extensive computer experience, and that Elizabeth had extensive qualitative research experience. But, Linnea

wondered how the three of us would be able to work together on a project, and how the use of computers might change our understanding of the data. In essence, we wanted to expand upon the work of the committee's group qualitative analysis; but, more importantly, we wanted to see if three diverse researchers could work together using computer software to assist our collaboration and to see if the three of us would find additional insights into one another's ways of thinking about qualitative data analysis.

### **Research Question and Rationale**

We began our inquiry with the following guiding question:

- When analyzing qualitative data, how will the use of CAQDAS change our analysis and interpretations, compared to our first round of coding an analysis within our larger committee?

However, this question changed over the time of our work together. We naïvely expected that using a computer software program to help us analyze might help us uncover hidden themes and issues, but Elizabeth was skeptical of this because of her reticence to believe that CAQDAS had any value in aiding analysis. Of course data analysis in qualitative research can be daunting, due to the sheer volume of languaged, video, audio and pictorial data that is available. When we investigated the literature on computer software in qualitative data analysis, we changed our question (will follow the rationale) and provide the following rationale as a snapshot of that literature search.

The use of computers to aid in the analysis challenge is fairly new, when compared with the history of qualitative research and traditional analysis through hand-coding, sorting, and memoing. Computer data analysis software for qualitative research was available widely to the public in the late 1990s (compared with the traditional analysis of qualitative data, which began in the anthropological literature and dates back to the work of Boas, 1858-1942; Malinowski, 1884-1942; Mead, 1901-1978 and others. It was adopted by other disciplines seeking to document ethnographies of culture in education in the 1960s and 1970s with the work of Wolcott, and Geertz, followed by Lincoln and Guba, Miles and Huberman, and Corbin and Strauss and others in the 1980s). Interestingly, although NUD\*IST was "born" in 1981 (Richards, 2002), version 2 in 1987 was still only available on mainframes, and not commercially. It wasn't until 1993 that it was available on MACs only, then later on PCs. Atlas ti. released their first commercial version of their CAQDAS in 1993 (<http://www.qualitative-data-analysis.com/atlas-ti-company-history.html>) and the first English version of MAX QDA appeared in 1995 (<http://www.maxqda.com/products/maxqda/history>). Literature on CAQDAS began to appear in the late 1990s, with the majority of literature appearing after 2000 (In a search of EBSCO host databases, we found two references for 1996, one for 1999, and the rest were post-2000). Most of this literature addressed the capabilities of the software and caveats for novice users. Yet we wondered what such programs could offer us as three diverse researchers that might support us as we sought to work together to present an analysis and interpretation of our study? How might the results be expanded? How would the software help us collaborate? What could we learn that will facilitate our cohesive interpretations?

## **Theoretical Framework**

In conducting a literature search on the usage and issues of CAQDAS, we discovered that with the improvement of software over the last 15 years, authors have written increasingly more about the topic in qualitative research journals. Some offered caveats or implications for continued use of such software (e.g., Bazeley, 2006; Johnston, 2006; Lee & Esterhuizen, 2000; Smith & Short, 2001). Lage and Godoy (2008) presented a review of literature about the benefits and issues of using CAQDAS. Specifically, the authors discuss the literature via a categorization of four themes: (a) “the effectiveness of software data management”; (b) “the increase of researcher’s closeness with the data”; (c) “the ease of researchers’ communication about the data”; and, (d) “the possibility of bias in analytical process” (p. 77, abstract). We were cognizant of these issues as the three of us undertook our analysis with computer software following the committee’s previous analysis of the data. After reviewing the literature, we confirmed to each other our suspicions that we wouldn’t find changes in our analysis (e.g., new themes, differing results), as Linnea knew and Elizabeth and Steve soon understood that computer-assisted data analysis is largely dependent upon our work in entering and coding the data. We wondered, however, after continued searches into the literature, how the software might improve our own trustworthiness and confirmability (Lincoln & Guba, 1985) of our findings, thereby allowing us to perhaps go deeper into the data, and expand our findings. Ryan (2009) wrote about “trustworthiness” in her own study, concluding that while the software did not increase rigor for her work, nor change the analysis, it did allow her to improve her organizational abilities, and she felt the “trustworthiness” of her work increased, due to the linking capabilities of the software in being able to represent her analyses and connect various sources of data to interpretations and themes. Ryan concluded: “Software programs . . . enable researchers to make visible their methodological processes for a more ‘trustworthy’ study” (p. 158). Ryan’s work continued to influence our thinking throughout our analysis, as we felt our diverse perspectives made such “trustworthiness” more complex via our different lenses and our different approaches to qualitative data understanding and analysis. We expand on this issue in our discussion section.

Davis and Meyer (2009) examined the procedures of analysis, comparing hand coding with computer-assisted coding, detailing advantages, disadvantages and common assumptions held in the use of computer-assisted qualitative data analysis in sports psychology research. Particular caveats included the unpredictable malfunctions of computers and the misperception that the program will analyze for the researcher (as quantitative software might). They suggested that it is essential that the researcher learn the software before using it for a project, and that you cannot separate the researcher from the program—that is, the researcher decides which features and codes to use and when; the program will simplify organization, recall of data, and visual representation. As mentioned earlier, Linnea had extensive previous experience with the software, and Steve was computer-proficient in many quantitative analysis programs, so we felt that we had sufficient experience to undertake this project.

Gilbert (2002) further investigated the issue of coding and balancing “closeness” and “distance” from the data. We concur that the use of the software left us feeling “close” or (for some) overly-familiar with the data, sometimes making analysis difficult.

Her emphasis on the “tactile-digital divide” seemed a bit dated for our usage, however. None of us had difficulty working with data in a digital manner from a computer usage perspective.

### **Method of Data Collection/Sampling**

Since our college-level (college of education) committee was charged with assisting faculty in the documentation and reporting of the quality of faculty teaching (college-level constitutional charge), we chose to survey our faculty (using internet-based survey software—<http://www.SurveyMonkey.com>) about their perceptions of their collaborations in reflecting about teaching. We believed that providing faculty with an alternative to student-course evaluations, via the documentation of their professional activities, would provide faculty with additional materials with which to make their case for tenure and promotion. Our tenure and promotion process requires strong documentation and persuasive materials to show how we’ve improved our teaching in the years leading up to tenure application. We sent out a link to an internet-based survey which contained three questions:

1. What is something you have changed in your teaching recently and why have you changed?
2. Do you have conversations within your program about effective teaching? Please provide sample topics.
3. Do you have conversations with others outside of your program about effective teaching? Please provide sample topics.

We received 39 responses (out of approximately 148 full-time education faculty). Data were copied and transcribed from the internet survey software, and initially organized by each of the three questions.

### **Methods of Data Analysis**

Initially, each of the six members of the original committee (representing six different departments in the college of education) was asked to reflect on the responses. At our May, 2010 meeting, we chose to break into three groups, each group further examining one of the three questions. We came back together as a group to share our themes from our group coding, and reviewed all three questions as a group. We agreed upon themes from each of the questions, and wrote about it in an executive summary to the entire faculty. We chose the themes (Table 1) for each question based upon our small group analysis.

Table 1. Themes from Hand-Analysis

Question (n=39)		Themes from small group hand-analysis
Question 1: What have you changed in your teaching and why have you changed?		Technology: faculty are weaving technology into their teaching in a wide variety of formats
		Diverse Learners: Faculty are incorporating universal design, differentiating instruction, and using literature specific to learners
		General Things: Faculty are incorporating theoretical frameworks, such as Darling-Hammond; changing expectations; chanting texts; using topics outside of texts; altering assignments, using current events; incorporating more discussion
Question 2: Have you had conversations in your department or program about effective teaching?	83% said “yes”	Curriculum: Conversations surrounding curriculum and curriculum issues dominated this category
		Pedagogy: Faculty also discussed issues of pedagogy and meeting the needs of all learners
		Assessment: Some faculty found issues with assessment in their courses—how to accurately and adequately assess learning
Question 3: Have you had conversations outside of your department or program about effective teaching? (participants indicated they have conversations with PK-12 school personnel, friends/family, people outside of work, and colleagues in national organizations)	80% said “yes”	Our teaching: This topic dominated the findings for this question, indicating that many faculty discuss teaching with other faculty or others outside of their department or program
		The nature of teaching: This indicates that some faculty engage in philosophical discussions about what it means to teach in higher education and to teach future teachers
		Research, and other tasks related to teaching: Some faculty discuss other tasks of being a higher education professor, specifically their research and issues related to it
		Policy/issues of education: Some (but few) indicated conversations about education policy and other issues in education

For Elizabeth, this was a new adventure in learning and doing simultaneously, as she was learning to use and trust the software, and learning to work with Linnea and Steve as collaborators. Not only was Elizabeth skeptical that the software would be capable of providing added value, but she had nagging doubts from her traditionalist ethnographic upbringing that using technology in any way might “taint” the nature of the analysis in ways that “doing it by hand” (tantamount, in her mind, then, to “organically”) would not. Elizabeth knew that Linnea was aware of these doubts but also believed that talking about them would have the possibility of tainting the data in another direction, so for her part, she proceeded with the study in the spirit of seeing what would happen, shelving, for the moment, her extremely binary-minded nature.

We initially broke out the data into the three questions (similar to the original committee’s work, as indicated above). However, each of us looked at the responses to each question, and began to create “tree nodes” as we noted them in each response. In this way computer initial coding is very similar to the work we did as a larger committee to analyze the data in that we each assigned meaning to parts of responses. At first the meanings, or “tree nodes” were descriptive in nature. For instance, if the respondent said that they talked with other colleagues at national conferences about teaching methods within a similar course, we would assign that a tree node of “conversations about pedagogy”.

We thought back to Gilbert’s (2002) study. She identified a third stage of coding awareness that she calls a “metacognitive shift” (p. 220). During our analysis and coding sessions, we found it helpful to include reflection on our own biases—especially in our choosing of “tree nodes”. While we felt our “node” choices were descriptive, they still represented our “choices”, seen through our lenses. Significantly, all three of us include our lens as “education” faculty. As faculty in a college of education, we are part of teacher preparation programs that strive to cultivate reflective thinking in our graduates. We would also hope to see the same qualities, such as reflective thinking, modeled by our faculty. Gilbert cautions novice software users to reflect “about how and why one works in a particular way” (p. 220). It was important for increasing trustworthiness for us to acknowledge and reflect upon our biases and the ways that we incorporated our own situational awareness as part of the college of education into our analysis of themes and issues.

## **Discussion**

### **Interpretations and Findings**

In this section we discuss what we consider to be significant findings for us as faculty from diverse departments working on a collaborative project. First, we found that a unique aspect of using CAQDAS vs. hand-coding/analysis was the ability of the program to create visual representations of data—charts, graphs, trees—that helped us in our analysis (we elaborate below) and potentially can help readers to more deeply understand our interpretations. Part of this aspect is the ease and agility with which such graphics can be made. Second, we discussed how when several of us had coded by hand in the past, it was often difficult to justify the work involved in changing and re-arranging codings and categories, or to try out new arrangements, due to the nature of “paper and

pencil” and the “messiness” that such changes often created, as described below. In CAQDAS, it is easy to move things around and try different coding categories and groupings.

A third and final issue we discuss here is related to the nature of the software to increase the ability of three diverse researchers—different departments, different teaching areas, and different learning styles—to be able to work together to come to a group understanding of the issues found within our data. Steve felt that it would be important for the three of us to be as diverse as our survey respondents (in his quantitative world of reliability and validity), as we were also members of the group (college of education) being studied. That we were as diverse in our areas of expertise as our working paradigms helped us to represent ourselves and our participants but also caused divergent thinking about analysis and themes. However, the use of CAQDAS helped us to understand each other’s viewpoints, and work to represent multiple perspectives in our analysis. We elaborate on this aspect below.

In addressing the first issue and thinking about the visual aspects of CAQDAS, we offer this example from our analysis sessions. When we were analyzing Question 2 (“Have you had conversations about teaching within your department or program?”), we decided to try a few graphs. We created a tree-cluster by word similarity, and the words “curriculum,” “pedagogy,” and “assessment” came up frequently, as we expected based upon our initial, group hand-coding. However, the tree node allowed us to visualize subcategories by grouping similar words together under the umbrella words. The visual offered a striking presentation that illustrated the wealth and depth of the conversations. Linnea found the visual helped her to think about all of the themes (nodes) as part of a larger collective—almost like a family. Grouped together were phrases from participants that are part of teaching or pedagogy, such as:

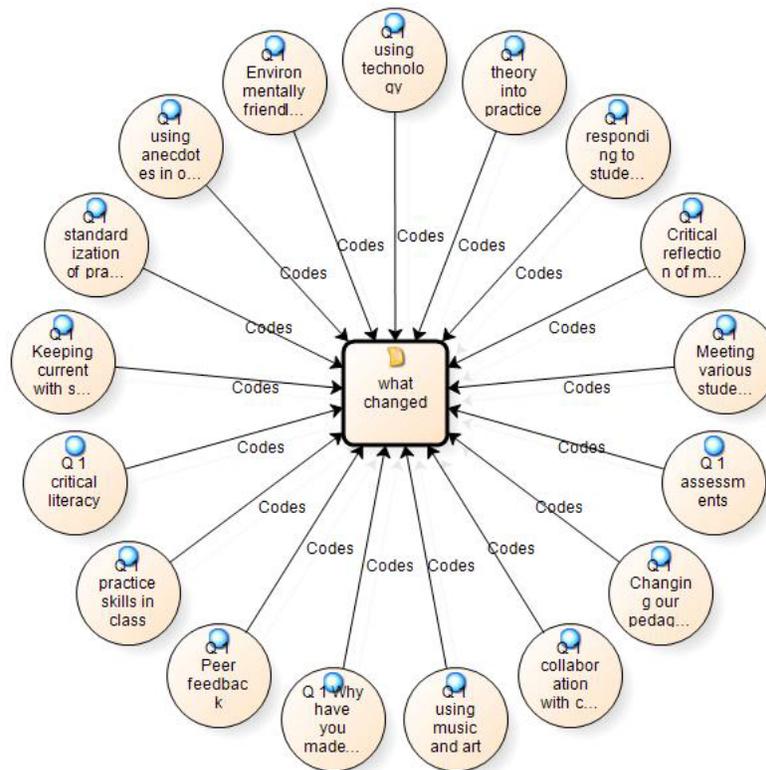
- Collaboration with colleagues about curriculum
- Sharing classroom materials and resources
- Conversations about program contexts
- Strategies for teaching
- Incorporating philosophy and theory into teaching
- Blending theory into practice
- Using technology in pedagogy
- Meeting diverse student learning styles and needs

These phrases, and more, demonstrated the vast array of topics about which our faculty converse, think about, and reflect upon with each other. While we saw these across the responses when we hand-coded on several pieces of paper, our intent at that time was more of the quality of data ordering (Charmaz, as cited in Seidel, 1998, p. 4). However, as we were able to return to the mass of data responses in a visual way, via the tree graph, we were able to concentrate on the depth of responses around a single theme or issue—that of conversations about our teaching or pedagogy. The striking visual display inspired our thinking about the reflective opportunity we had given faculty through the tool of this survey.

A second issue in coding is that of “trying out” changes in coding categories. While hand-coding, we were hesitant to make many changes, as the volume of data

causes a “chaotic moment”, when the data is re-connected randomly, as in pre-coding. For Elizabeth the process of creating a graph via the push of a button initially caused a “fear” response. She asked, “Wait, can you get the other idea back?” When she realized that we could “try out” endless possibilities of visual connections and representations, she was excited. We were all impressed with the versatility of the graphics, being able to “try out” various graphics, yet still have the group’s foundational analysis from which to work. Thinking back to our original work analyzing the data with the use of a group of six committee members, we found that most committee members were hesitant to question the initial analysis of the pairs of the committee members that we set up. When each committee pair brought back their coding categories to the whole group, the group accepted them without question, and moved towards a broader picture of the data through thematic categorization. However, with CAQDAS we were able to try out different themes and key coding categories, without the worry of losing our initial categories. The trying out actually is a technique supported by several data analysis theorists, as a means of rigorous attention to the data as the foundation (our own thinking and experiences) from which we chose our themes (Corbin & Strauss, 2008; Mertens, 2005; Miles & Huberman, 1994). CAQDAS allowed us to re-arrange categories, while still keeping our initial thematic categories. In fact, we were able to look at them side-by-side in a visual representation. We also created visual representations of all of the codes used in a question (Figure 1).

Figure 1. Coding Categories for “What have you changed in your teaching?”



Graphics like that in Figure 1 assisted those of us who tend to be more visual, and helped us to work at making meaning and understanding within visual learning styles, which could then be translated back to language understanding such as is represented within this paper. As mentioned earlier, Gilbert (2002) cautioned CAQDAS users to be wary of the digital learning curve when using software, and we felt that this particular caveat did not apply to us. However, a more applicable caveat that is related to the difference in users as mentioned by Gilbert is that of the difference in learning styles—learning that is represented by the way we, as researchers, read and understand our data. In writing more recently about his seminal Multiple Intelligences (Gardner, 1983) theory, Gardner and Moran (2006) posited that “the intelligences can be grouped together for various purposes” (p. 228). This is, perhaps, what happened with the use of CAQDAS and the visual representations—we, as separate and distinct researchers, with unique learning styles, were able to come together and find understanding of each other and the data, as well as represent understanding through the software.

A third finding is that of being able to easily utilize multiple researchers in a single project. The ease with which we were able to share suggestions and coding categories with each other capitalized on the ability of the software to offer data presentation in multiple ways. We discovered that we could incorporate all three researchers within one file, share it electronically (via an electronic server), and continue coding. However, this was somewhat hampered by the way our university has purchased the product—we only have 10 licenses for faculty. The remaining licenses are on the server, and can only be accessed in the university computer labs. While one of us had the full software on her own work computer, the remaining two researchers had to access the software via the computer labs, limiting work time to office time. Since we are a university that serves primarily working adult commuters, we have multiple campuses, and faculty often teach at multiple locations traveling throughout a metropolitan area, and in addition to working from home, these reduced our ability to make use of the computer labs.

## Implications

We realized as we began this project that we probably wouldn’t find “different” themes, and this realization was confirmed as we began to work together. We knew that the hard work of coding qualitative data still comes from within the mind of the researcher and is intricately tied to the perspective of each researcher (Coffey & Atkinson, 1996), which in our case proved to be vast, as we each represented vastly different learning styles and different perspectives within education. However, we were pleasantly surprised at how CAQDAS allowed *easy storage* and *easy access* to large amounts of language (and other types of) data. We also appreciated the ease with which we could manipulate and change around categories, themes and codes. Both of these points confirmed Ryan’s (2009) findings of the software’s ability to increase the researcher’s organizational abilities.

Still, using any new software, even for those who commonly work in computer-mediated environments, requires time. We found it difficult to negotiate enough time to teach the novice members of our group how to work with the software. It was enlightening, however, to try different features of CAQDAS and find that these “trial and

error” efforts resulted in helping us view the data in new and different ways (i.e., the graphs mentioned above) and to understand each other as diverse scholars. The “trying out” resulted in unique moments for each of us that expanded our understanding of what another member was trying to express related to data analysis or interpretation. Our suggestion is for researchers to allow sufficient time to “play around” with the software, and to try to look at their data from multiple perspectives. Additionally, we suggest diverse scholars can work together through the medium of CAQDAS to provide more opportunity for collaboration in data analysis and interpretation.

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