Davidson, J. (2004, August). *Grading NVivo: Making the shift from training to teaching with software for qualitative data analysis*. Paper presented at the 2004 International Conference on Strategies in Qualitative Research With QSR Software, Durham, UK.

Grading NVivo: Making the Shift from Training to Teaching with Software for Qualitative Data Analysis

Judith Davidson, Ph.D.
Assistant Professor
Leadership in Schooling
Graduate School of Education
University of Massachusetts-Lowell
61 Wilder St.
O'Leary Library, South Campus
Lowell, MA 01854

(978) 934-4611
Judith_Davidson@uml.edu

The development of software for qualitative research analysis has led to the need to integrate the teaching of these new tools within the doctoral preparation of students in diverse fields who will undertake qualitative research for their doctoral dissertations. Teaching these products within the doctoral curriculum requires that instructors understand: 1) the characteristics of various levels of mastery with these tools; and 2) the developmental process by which researchers acquire these levels of skill. Using three case examples from a semester-long course in qualitative research methods that incorporated qualitative research software (NVivo), in this article I explore the ways that levels of performance emerged with the use of the software and the ways students varied in their entry points and paths of use. In my conclusion, I explore the ways this software is changing traditional perspectives on the instructional of qualitative research as well as discussing the implications that experiences with the integration of the software have to broader conversations about the relationship of technology to practice.

Grading NVivo: Making the Shift from Training to Teaching with Software for Qualitative Data Analysis

Over the last few decades the use of qualitative research has increased in acceptability in higher education, and, concurrently there has been an increase in the number of dissertations conducted using this methodology, despite the continuing barriers from various quarters (Miller, Nelson & Moore, 1998). The recent development of software for qualitative research has made it imperative that the use of these new tools be integrated into the preparation of doctoral candidates planning to undertake research using this methodology (Bringer, Johnston, & Brackenridge, 2004; Carvajal, 2002). Integrating the new software within a qualitative research methods course requires one to create a framework for understanding the developmental process by which students gain skill in these new tools, as well as the creation of mental schemes for the various levels of users (novice, apprentice, or adept). Thus, the integration of qualitative research software into preparation programs presents as many if not more challenges to the instructor as it does for the students. While there are a number of texts that have emerged to help users understand this software (e.g.Morse & Richardson, 2002), there are only the tentative beginnings of a literature on how to teach with these tools (QSR International, 2004).

In this article, I present one case example of the process of integrating qualitative research software into a standard doctoral level introduction to qualitative research methods course, focusing in on the work of three students within that course and their response to the use of the software. Although the tension between substance (qualitative research) and technique (software) was never resolved, the case provided the opportunity for important learning about the ways individual students address the issues, as well as raising important implications about the future form of the dissertation itself. While there are many brands of qualitative research software, this article will focus on the use of NVivo as an example of this category of technology.

Training vs. Teaching with Software for Qualitative Data Analysis

As qualitative research software becomes more widely used, the question of how we prepare researchers in its use within the University setting also becomes more pressing. Integrating qualitative data analysis software into a methodology course raises questions for an instructor about the ways these new tools fit with the already existing approach to the way qualitative research methods are taught. For instance, how much time should be devoted to this new topic? Where should it be inserted in the syllabus? From there it is a quick move to what is an even more challenging dilemma—How will we understand students' developmental paths, and how will we assess students' methodological fitness in this new area?

When these new forms of software were first released, training (short sequence focused on the technical aspects, outside of doctoral program requirements) was the only model of instruction available. Making the shift from training to teaching (long-term and inside of doctoral course requirements) requires significant change on many fronts. In

training, an instructor conveys technical skills with little responsibility for the ultimate implementation, outcome, or product of the learner. In teaching, the experience unfolds over time, requiring attention to the understanding of both qualitative research and the new tool. Course instructors must be able to assess students' final products and the level of skill they have attained. Instructors may themselves be conversant with the tool, but understanding students' developmental processes and possessing a critical understanding of the skill levels related to the new knowledge, is considerably different.

Like many instructors of qualitative research methods, my personal saga of involvement with these new software tools has followed a circuitous path. Employed full-time as a researcher on a project studying technology integration in K-12 settings, I was introduced to NUD*IST and tried to use it late in the project sequence to organize and analyze the mass of data collected (over 300 documents) (Davidson, 2003; Davidson & Olson, 2003). Although less than proficient at that time, I did recognize the strength of the program and the importance of such software to the future of qualitative research, if not other worlds as well. Consequently, when I began a new position as an Assistant Professor in a Graduate School of Education, I jumped on the NVivo bandwagon, attending a training in the just-released program about a week before I was scheduled to teach a summer course using it! Across two summers (1999 and 2000), I experimented with the use of NVivo in an Introduction to Qualitative Research Methods course. In both of those intense summer-school sessions (five full days spread across five weeks), we devoted afternoons to using NVivo in a computer lab, working together (in the same room) but individually (on separate projects) with data collected during the week. Simultaneously, I was also continuing to teach a standard Introduction to Qualitative Research Methods course (cut-and-paste qualitative research over a full 12-14 week semester) during the academic year (Fall 1999; Fall 02). Fall 2003, I decided to bite the bullet and redevelop my standard qualitative research methods course so that all parts of it would be fully integrated with NVivo software. The following is a description of what befell me in that process…and the meaning I have extracted from that experience.

Grading NVivo: My Personal Saga or 07.704: Fall 03: Introduction to Qualitative Research Methods

Seven advanced doctoral students signed up for 07.704 in the Fall of 2003, the introductory qualitative research methods course that I teach at the Graduate School of Education, University of Massachusetts-Lowell. Students in our program are required to take a two-semester research methods sequence that is almost entirely devoted to quantitative methods, and the qualitative research course counts as a research elective. This is the one qualitative research course available for students in our doctoral program, despite the fact that fully half of the dissertations now produced in our program are conducted using qualitative research methodology. I would guess that our situation is typical of many doctoral programs in the United States, as well as other countries.

Of the seven students enrolled, four were matriculated in the Leadership in Schooling program, two in the Reading and Language Arts program, and one student joined us from the Work Environment program. Of these seven, two were significantly high-end technology users with extensive backgrounds in computing, another was very comfortable with technology, two thought they were comfortable but were less so over

the semester, and two were willing to state that they were decidedly uncomfortable. Five of the seven students had previously been in classes that I had taught in which qualitative research methods were introduced (although they were not central), but there had been several years between Fall 03 and these experiences.

My data in this case consists of the NVivo projects (mid-term and final version) created by each student in the course of a semester-long mini or pilot qualitative research project on a self-selected topic. This project requires that students grapple with the issues of research study design, data collection (observations, interviews, and visual data), and data analysis and representation. Another critical piece of data is the mid-term grading rubric created for the course with written responses to the students. Finally, I posses a range of artifacts such as the syllabus and any revisions to it, as well as assignment sheets, and my class notes and other handouts. I carefully reviewed these materials, developing a chronology of NVivo use across the semester, as well as case analyses of the students' work and progress.

For the purposes of this paper I will focus on the processes of three students from the course whom I will refer to as: Jim, Jane, and Sandra. I am grateful to them for their helpfulness and good cheer as we made our way through the course and into the beyond.

Stages of Passage

In reviewing the chronology of the course, it became apparent to me that there were three distinct phases of the course, which I will name: 1) Entering; 2) Mid-way; and 3) Finale. These phases are as much about my understanding of how to bring the two pieces together—traditional instruction in qualitative research methods and the new software—as it is about the development of students' understanding of NVivo.

Entering

Planning for this course created an intense internal struggle for me. Despite my previous experience teaching with the software, I was surprised at the gap that still existed for me between my internalized notion of the structure of the course (the classical qualitative research course) and the reality of the software (the new future). This struggle is symbolically represented in the syllabus in which I presented two separate skill rubrics—one for qualitative research and the other for NVivo (See Appendix A).

In this course, unlike my two summer trials, I had decided that integration meant students must have the software on their own computers, as opposed to coming to the school lab to use it. Thus, prior to the beginning of the course I had made an agreement with QSR, the makers of NVivo, that would allow me to provide students with short-term (four-month or one semester) licenses for it. The classroom in which I taught the course had a computer with an LCD projector, so that I could demonstrate features of NVivo or students could present projects. It was my intention that I would not make use of the school computer lab.

The semester began with great enthusiasm, and, once the software issues had been arranged to everyone's satisfaction, I demonstrated the NVivo basics with the LCD set-up, and then sent the students off to install the software and explore its features. This is where the panic began as students had difficulty with installation, ran into problems with the platform (PC vs MAC), and other technical issues. For students whose software

benchmark is MS Word, NVivo's complexity was more challenging than they had anticipated. This stage of tension and uncertainty, accompanied with a sense of being overwhelmed, continued for most of the students well through the first half of the semester. In class and in email, there were frequent references to how hard they were working and how much of their weekend and evening time this course was consuming. They were frustrated by the textbook with NVivo information (Richards, 2000), a feeling that was related more to their angst than to any identifiable problem with the text. Students stated that they could have used a training experience, which would have focused primarily on the technical issues, that is, all students except for the two with strong computing backgrounds who insisted that a complex software takes time to conquer. Interestingly, these computer-savy students could also give the most specific information about problems they found with the software, and were able to recognize what was their misunderstanding versus the structure of the program.

During this period, the course began to track itself into a bifurcated system, in which one-half of the 2 ½ hour weekly period we discussed a methodological issue (the paradigm debate, ethics, subjectivity, data collection, etc.) and in the second half we discussed an issue related to the NVivo work. The NVivo work most often consisted of students sharing their projects, as they were developed within NVivo, and discussing what they had done and why. These weekly sharings were hugely instructive (once past the complaints), providing students with the opportunity to learn from each other as each project grew and developed. Heterogeneity led to greater understanding of both the software and the concepts of qualitative research.

In regard to heterogeneity, an interesting feature of this course was the presence of a group I call "fellow travelers". In addition to the seven students officially registered in the course, the class also included a group of seven advanced doctoral students who had already taken the course and/or needed additional support in their qualitative research training who sat in on the class, participating in selected parts and then retreating to another room for discussions of their evolving dissertation proposals. Among the "fellow travelers" were members with NVivo training, of whom one had been using NVivo in another funded research project. Their NVivo examples and cheerleading was helpful to the novice group.

In retrospect, during the Entering Period—The students knew me; they trusted me, but at times this trust hung by a thread, and then there was light!

Midway

The Midway point in the semester, marked for me by the mid-term review, was a process of several weeks in which, based upon standards developed in a group discussion, students drafted a compound document that would serve as an interim product. Then they presented their NVivo projects to the class, received feedback, revised projects, and submitted for a mid-term grade. Reviewing full projects required that we master the use of creating back-up copies in NVivo and sending via email. Moreover, it was important we learned to name different versions of the same project in distinct but related ways.

I used a rubric to grade the projects that I developed from these multiple experiences (group discussion, presentations, feedback). I provided students with feedback on the rubric form and/or embedded in the compound document itself. To

assess the grade, I began the review of the project from the compound document, which served as an anchor point from which I worked out into the various dimensions of the project.

Whereas the syllabus provided separate rubrics for qualitative research and NVivo skills and goals, by the mid-term the rubric for the compound document had begun to blend the two. What had not changed, however, was my continued belief that the final product would be a traditional paper describing the methodology and findings, but this too would be confronted before the end of the course (See Appendix B and C).

Finale

The Mid-term review of the projects taught me much. In particular, I was thrilled by the function of the compound document, and the way it served to allow me work in an efficient manner through a review of a project. As we drew close to the end of the semester, several students asked if they could submit another compound document with their project rather than completing a traditional paper. Despite my enthusiasm for the compound document I worried that they needed experience analyzing their data to be structured within a traditional paper. If I threw out the paper was I shortchanging them of critical skills they would need for the dissertation? Quite frankly, however, the compound documents had a vibrancy and depth (connected as they were to all the data in the project) that I seldom see in a traditional paper, and I was hard put to come up with a good excuse for not changing the assignment.

My compromise (with them and myself) was to offer both options. Five of the seven students elected to create a second compound document that would serve as an extended analysis memo. In so doing, they would describe their progress from the mid-term review and then zero in on a selected issue of interest that had emerged from the project. In grading the last product, I dispensed with a rubric, placing my comments directly in the compound document.

Three Learners in Passage

In this section I describe the process of three learners—Jim, Jane, and Sandra--as they moved through the stages of the course. For all three, this was the last course of their doctoral program, prior to undertaking the dissertation process. Jim and Jane designed projects that would examine issues related to middle school teaming—their passion. Sandra's project related to technology use in higher education.

Jim

Entering

A career educator and school district administrator, Jim matriculated into the program four years ago. A dedicated MacIntosh user, he was a prolific emailer and net surfer but had less experience with software exploration. As a colleague he is known for his positive outlook, something he needed in abundance as he navigated NVivo in this early period.

In undertaking NVivo, Jim was faced with the need to leave his comfortable MacIntosh world for an IBM PC. He made the shift, but with doubt and longing for his old machine. Initially, he was overwhelmed with NVivo's complexity. Try as he might

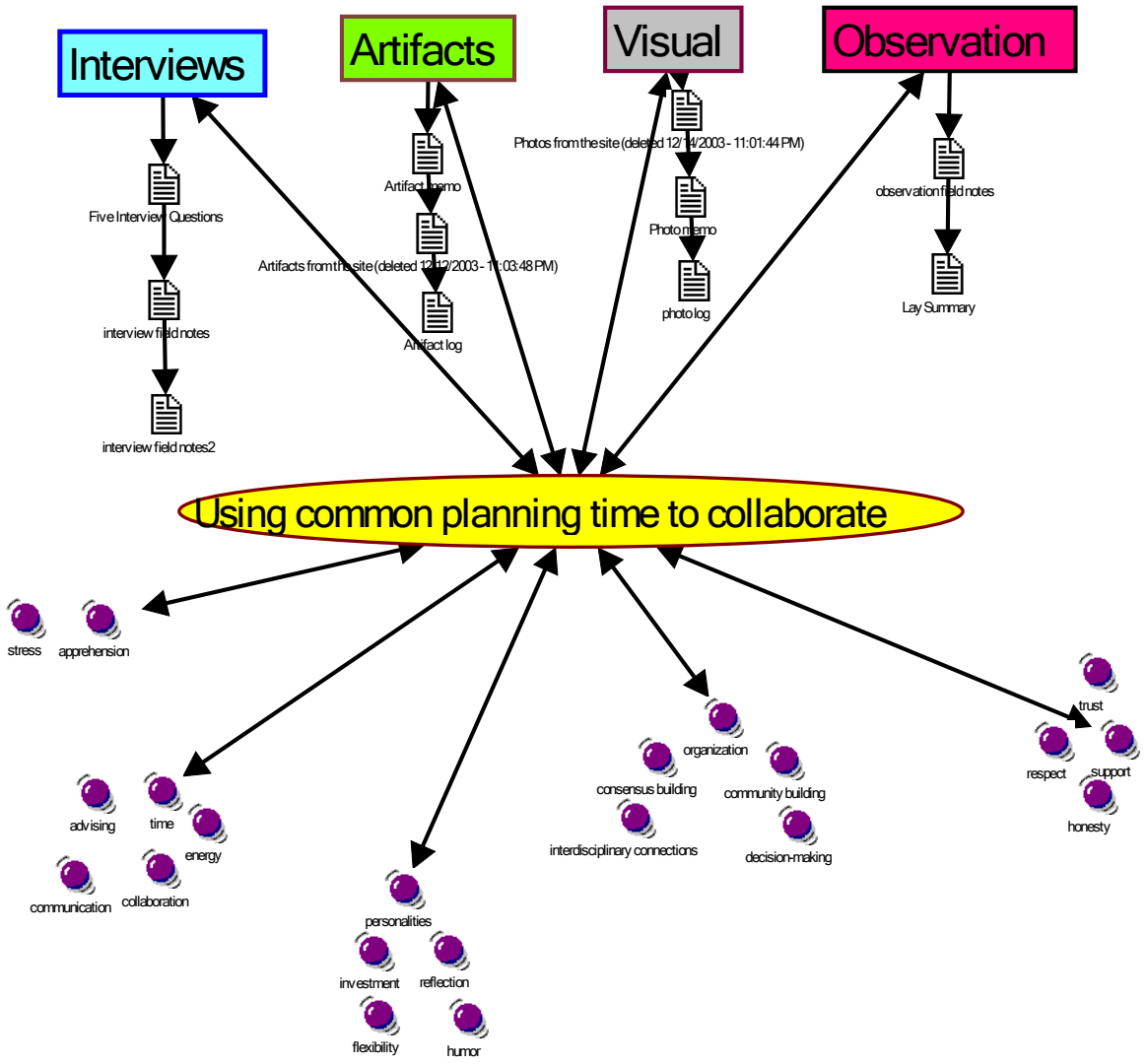
he didn't feel like he was getting it. In his Mid-term document he describes the early phase this way: "As excited as I was about the field observation notes, I was dejected over my inability to fully grasp the power of the software tool NVivo. Progress was quite slow, even after repeated attempts to master the program. I thought seriously about signing up for a very expensive two-day NVivo workshop in November." (Jim, Compound Document I, Fall 03)

Midway

The compound document he presented for his Mid-term review is one that on reflection I would now consider typical of an NVivo novice. It is littered with document links and data bites, demonstrating a kind of 'over learning' phase of early development. Nodelinks were not created. In tandem with the issues in the compound document, a review of his document bin revealed that it was full of an array of bits and pieces of various sizes and values that appeared like a large undifferentiated mass.

Jim had created a hefty list of free nodes, but he found himself stymied by the notion of the tree node. Interestingly, using the modeling tool he had created a graphic that showed the kinds of data he had gathered and how it was organized, along with a picture of the ways he would cluster the nodes in like categories. Seeing this, I ecstatically told him that this was the tree for which he was searching.

Figure 1
Model by Jim



Jim's NVivo epiphany came about two weeks before he submitted this assignment. Having struggled mightily on his own, he spent a day with Jane, his class colleague, who shared her knowledge with him. With this boost, he made a significant transition toward becoming a user. From this point on he felt confident of his ability to technically manipulate the program and had stronger understanding of the overall organization of the program and its value to his work.

Finale

In the final project and the embedded compound document, Jim had moved to a new level of NVivo proficiency. His document was organized with headings and throughout it doclinks and databites were used sparingly and appropriately. One thing I particularly liked was his findings section, where his list of succinct statements was supported by docklinks and nodelinks to appropriate materials (nodelinks had not been used in his first compound document). In the interim between the mid-term and the final

submission, he had also re-organized many of his documents to make them easier to find—consolidating logs and using color icons. Despite his growing control of NVivo, for his special emphasis, Jim chose to write about his subjectivity, an issue that did not require much discussion of NVivo.

Jane

Entering

Jane is a health educator and middle school instructor. Very well organized, hard working, critical, but generous in her enthusiasm, Jane was initially quite frustrated with NVivo. A woman who did not like to be bested, she spent hours at her computer trying to master the intricacies of the program. In the first part of the semester she experienced a hard drive crash with subsequent data loss and then a glitch with project naming in Nvivo that also caused serious losses. Despite the difficulty, however, she was attracted to the software and his various capacities, seeing great potential in it.

Midway

Jane titled her compound document "The NVivo Roller Coaster":

> The process of learning and working with NVivo simulated a ride on a new roller coaster. It has peaks and valleys and hidden curves while some parts you learn with lightening speed and others chug along slowly with dreaded anticipation. That first ride on a roller coaster is often one long scream as you confront the apprehension and fear of the unknown. The first few weeks of entries in my log mirror that same screaming and apprehension. As you progress through the log you can see that while the learning curve was slow at first, after several attempts (or rides) the apprehension drifted away and a more comfortable excitement emerged that facilitated the speed of the learning curve. (Jane, Compound Document I, Fall 03)

Unlike Jim, by midway, Jane was already in full swing with many features of creating rich text, using size, style, color, font to make her points. The notions of qualitative research and NVivo skills were closely integrated, the description of NVivo serving in many cases as the description of the methodology.

In Jane's compound document, I was able to discover what I would label 'meta-cognitive moments' with NVivo, where she came to grips, for instance, with the layering effects of NVivo. She was also able to describe the way she manipulated NVivo for her desired ends, as when she described trying to bring her timeline document into NVivo, which led her initially to figure out how to link an external file through a databite, and then later how to put the visual model into the actual document using a databite link.

Stepping out of her compound document into the actual project, I was impressed with the ways she had organized her documents. She used both colored icons and sets to make the documents visually distinctive. She was a dynamic creator of models, and by midway had a tree of 39 nodes with 2 free nodes. She understood the concept of parent and sibling node and her coding categories were two and three levels deep.

Figure 2

Node Report: Jane

NVivo revision 2.0.161 Licensee: GSE

Project: Team Leader Final Project User: Administrator Date: 7/5/2004 - 2:47:03 PM

NODE LISTING

Nodes in Set: All Tree Nodes

Created: 12/6/2003 - 2:25:17 PM

Modified: 12/6/2003 - 2:25:17 PM

Number of Nodes: 43

1 (1) /Leadership Theory
2 (1 1) /Leadership Theory/distributed leadership theory
3 (2) /Issues and Concerns
4 (2 1) /Issues and Concerns/concerns
5 (2 2) /Issues and Concerns/ethical issues
6 (3) /Project Format
7 (3 1) /Project Format/plan
8 (4) /Future topics for research
9 (5) /Literature
10 (5 1) /Literature/Books
11 (5 1 1) /Literature/Books/Project
12 (5 1 2) /Literature/Books/Class
13 (5 1 2 1) /Literature/Books/Class/Glesne
14 (5 1 2 2) /Literature/Books/Class/Maxwell
15 (5 2) /Literature/Research Studies
16 (5 3) /Literature/Dissertations
17 (5 4) /Literature/Professional Literature
18 (5 4 1) /Literature/Professional Literature/NMSA
19 (5 4 2) /Literature/Professional Literature/ASCD
20 (6) /Search Results
21 (6 1) /Search Results/Single Text Lookup
22 (6 2) /Search Results/Single Node Lookup
23 (6 3) /Search Results/Single Node Lookup 2
24 (6 4) /Search Results/Single Node Lookup 3
25 (7) /Leadership
26 (7 1) /Leadership/Decision Making
27 (7 2) /Leadership/Communication
28 (7 3) /Leadership/Student Success
29 (7 4) /Leadership/Teacher Success
30 (7 5) /Leadership/Skills
31 (8) /Structural
32 (9) /Management
33 (9 1) /Management/Activities
34 (9 2) /Management/Paper Work
35 (9 3) /Management/Scheduling
36 (9 4) /Management/Budget
37 (10) /Curriculum

38 (11) /Team Building
39 (11 1) /Team Building/Professional collaboration
40 (11 2) /Team Building/Team Spirit
41 (11 3) /Team Building/Team environment
42 (11 4) /Team Building/Trust and Respect
43 (11 5) /Team Building/Humor

Finale

By the end of the semester Jane was making use of all possible tools in the use of the compound document, and the document provides a thoughtful guide to where things are and how they were created. In this document, even more than the earlier one, the issues of qualitative research and NVivo methodology are merging into one. Indeed a large part of her methodological discussion is a description of her steps and changes within NVivo.

For her emphasis issue, Jane selected one node, discussing the sub-topics in detail, making full use of the strength of NVivo to provide her with the sorted data. I was impressed with the way that Jane began to discuss how she leveraged clusters of NVivo features, such as the way that colored icons, show tool, and nodes could be used together to better understand the project.

Of particular interest to me, I noted that Jane recognized how parent and sibling nodes are actually dynamic representations of the relationships among data. She thought with care about the patterning of data within each coded area. Her coding showed how she was thinking across different forms of data.

Sandra

Entering

Of the three learners described here, Sandra is not a K-12 educator--she works in a four-year state college where she is a computer science instructor. Highly familiar with the process of learning a new software, for her, the technology was the easy part.

Sandra immediately recognized NVivo's possibilities, and after some exploration began to see ways that the use of the software could be extended into other domains. It was Sandra who suggested that students should begin using NVivo from the beginning of their doctoral program, entering all their class notes, reading notes, and papers into its database and coding them. In this way, students would begin to quickly and naturally think across the content of their program. In addition, as they prepared their dissertation proposal, they would be able to easily draw upon their earlier material. She enjoyed the modeling tool and found it fit her style to begin with a model as a way to work into the development of nodes. Her thoughts about the ways one might extend the use of the tool prompted my own ideas on this topic (Davidson, 2003).

Initially, Sandra was highly comfortable with the software, but had difficulty with sorting out the focus of her project. I was ruthless in forcing her to clarify her question, and in an email written shortly before midnight from the school library, Sandra described an ah-ha that solved the problem as she shifted her focus from understanding the paperless classroom to exploring the integration of technology.

Midway

By the middle of the semester, Sandra was able to produce a compound document that made strong use of NVivo's broad range of organizational features from font and color to formatting. She made sparse but efficient use of the various linking devices. Her notes about the problems she confronted in NVivo sound more like an engineer doing a quality control review of a product, than a struggling graduate student. More than any other student, Sandra had strong control of what were, at that point, the most esoteric range of features.

When I looked into her actual project, the only word I could use for her document system was 'elegant'. She had even included a key to describe her color choices for the icons. Her use of NVivo features to organize the visual data assignment was highly efficient and a good model for the class (logs, databites and external files working together). Unfortunately, the slow points, again, were with the actual hands-on part of the project, and participants who were not available for interviews.

Like Jim and Jane, Sandra also created a model to show me, the reader, what data had been collected and how it was connected. In all cases, I found these model overviews of the project to be extremely helpful as a tool for understanding the components.

Finale

In her final submission, Sandra spent less time than the other two reviewing the past work accomplished, preferring instead to make this a true update of the latest developments in the technical and conceptual changes in the project. She focused most of her energy on what she had learned about the use of NVivo to analyse data and identify patterns. Her discussion focused on a question that had plagued her throughout the semester, "What's the end Product?" "As I was learning more and more of the basics of NVivo (creating documents, nodes, codeing, modeling, generating reports), I still could not see how a researcher could use this coded data for analysis" (Sandra, Compound document II, Fall 03).

Sandra found her answer as she began to work with the report format. She exported reports to an Excel spreadsheet, and was thrilled with the results as she began to see how she could employ a range of new software tools to map out the patterns in her data. Her experiments demonstrated for her the importance of creating a robust node structure. "The node list has to be examined and re-examined before, during, and after coding. This needs to be done before the analysis stage. I see the node structure as the backbone to this entire project." (Sandra, Compound Document II, Fall 03).

Throughout the semester Sandra had agonized over her future dissertation topic. "I couldn't get NVivo out of my mind. I found that I was telling anyone who asked how my doctoral courses were going about NVivo. I realized that no one had any idea of what I was talking about. The notion that here is something that could truly change how things were done in the past is what convinced me I had finally found my dissertation topic." (Sandra, Compound Document II, Fall 03). Sandra compared the epiphany of recognizing NVivo as her dissertation topic to the rapture of finding a soulmate or partner in life!

Discussion: What was learned

The experience of this course and the struggle to deal with assessment of students' skill with this tool has reaffirmed for me that understanding how qualitative research software works and understanding how to teach it are related but distinctly different forms of knowledge. Over the course of this semester, my learning curve was every bit as steep as that of my students as I struggled to understand their developmental processes and to create for myself a scheme of the various levels of competency. In reviewing that process, I will focus in on two areas of my learning that were particularly important to me in thinking about the notion of assessing students—the first has to do with the tool, the second with learners and instruction.

The Tool: NVivo

In regard to the tool, there are three critical areas in which developmental progress was particularly apparent—progression in acculturation to the tool; the use of the modeling tool, and the use of the compound document.

Progression in acculturation to the tool

As students progressed through the course and begin to build on knowledge acquired through exploration of the software tool, I began to notice a series of technical issues that I flagged in my mind as examples of the developmental process of learning this tool. Three of special interest to me are: 1) Overlearning; 2) Leveraging a feature and clustering feature use; and, 3) the ability to organize efficiently in a conceptual/visual mode.

Jim was my strongest example of overlearning, when in his first compound document he sprinkled doclinks and databites throughout the document, like candy on a cake. For the reader, it was like driving on an obstacle course. You no sooner finished one databite than you were confronted by another. You were loath to pass one over, fearing you might miss something important, but when all was said and done, few offered much important information. Despite my tongue-in-cheek description of this phenomenon, it seemed a critical stage of learning. As an instructor, my goal in the future would be to flag the problem in discussing the assignment and making it clear in assignment instructions and grading rubric that students need to think through this aspect of their documents.

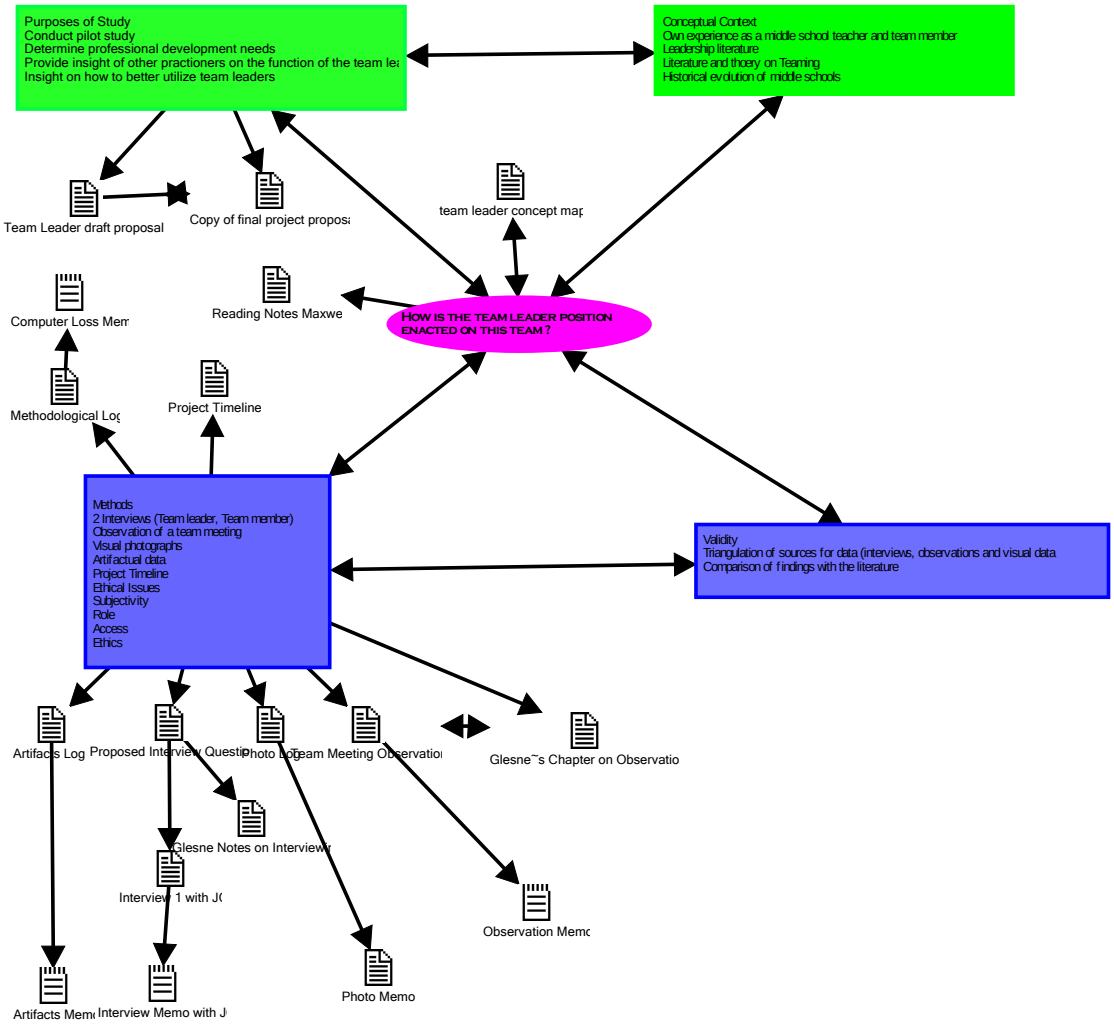
As students progressed, a sign of their growth, was their ability to leverage clusters of software features to get to their desired ends. Thus, free nodes and tree nodes are used in conjunction with models and show tool to create deeper understanding of the relationship among pieces of data. Nodes and reports are examined back and forth to ensure validity. In this process, the notion of 'rediscovery' was important, as, in later stages of work, students returned to features they had encountered earlier with richer understanding and greater flexibility.

Over time, students developed sharper and clearer ways of organizing both their documents and their nodes. As they did so, they demonstrated to me their expanding knowledge of how their presentation of the organization of the project was itself a model of understanding. Document organization would become clarified through the use of

colored icons and sets. Students learned how best to develop logs (as separate documents or as one document). Nodes shifted from free to tree and differentiation of levels occurred.

Modeling

Students entered the use of the modeling tool from different points. For some, the modeling tool was a more accessible location from which to start exploration of their project than a textual memo. For others, node development started here. Others, such as Jim, did extensive coding with free nodes, but could not shift to the tree node until they had explored the clustering of nodes in a model. In one case, Jane, used Maxwell' s four-part planning model with the modeling tool to create a graphic that outlined the directions of her project (Maxwell, 1996).



An important use of models that several students spontaneously developed on their own was the creation of a model that pictured the project, its data, and the relationship of the various forms of data. In the future, I plan on requiring this kind of model as one of the products to be submitted for a mid-term and final project.

Our group owes fellow student John a hand of applause for his statement: "It's all a model…the memos, the models, everything…it's all a form of modeling." His insight

radicalized my understanding of the software, and I continue to think about the meaning of his statement.

The Compound Document Emerges

In all respects, the compound document comes out as the winner in this study; a new organization-central and/or end-point to the process of qualitative research. When I started the course, I thought the traditional paper held this position, but by the end of the course I had come to a new realization that the compound document offered a richer and more dynamic way to represent and demonstrate understanding. Over the course of the course, I began to understand the compound document as a genre and looking across students attempts to develop a sense of what were good examples and less good examples of the genre. A good compound document, I now believe, mixes the features of traditional papers, web page design, and the unique features of NVivo to provide a reader with a multi-leveled experience of the project. A reader should be able to slice down through a project as well as stop to savor at one of several levels of depth.

The Learner

Software tools for qualitative research analysis are complex and multi-faceted, as I was reminded weekly throughout the course. Educators have varied levels of access to technology and varieties of experience with its use, and, thus, they will come to the use of complex, new software with a range of technical expertise and comfort. For some, the technical aspects may overwhelm (at least initially), while for others technical strength will tide them over discomfort with the newness of qualitative research and its challenging concepts.

As in all teaching, it was essential to leave space for the individuality of the learner and acknowledge the multiple entry points by which they might start their journey with the software and qualitative research. In this process, the importance of dialogue cannot be underestimated. The heterogeneity of the course participants, with the emphasis on dialogue among them, provided all members with multiple opportunities to learn from others and to teach others—each according to their strengths or needs. While each individual worked with NVivo within a unique individual zone of proximal development (ZPD), in regard to the software, there was also a group ZPD defined by the outer limits of our corporate understanding (Vygotsky, 1978). I could not have taught this course without access to all these others, the learners, whose experiences of constructing meaning with the software were the critical connecting text for the course.

As I reviewed the course materials, I was particularly struck with the ways emotion played a role in learning. Jane described the experience as being on a roller coaster. Sandra saw the software as her soulmate. Others, well—the words technical frustration must have evoked could not be used in class! There is considerable emotion involved in learning such a complex tool, and the tool comes to accrete meaning that combines these emotional responses. These emotions are present in class, in the papers, and in the interactions, and they must be factored into the instruction. In regard to assessment, it was necessary for me to step aside from the excitement I felt when students shared my passion or the irritation I felt when they dug in their heels in reaction against the software and examine the actual learning that was taking place. Sometimes

enthusiasm hides thin learning or, conversely anger can obscure significant, important change from view.

Implications

As is often the case with new learning, at the beginning of the process, lacking experience, we also lack understanding of the nuances of performance. For instance, a first-time opera goer will not have the skills or understanding to appreciate some of the finer moments of the performance that will become apparent after many exposures. This is the argument for connoisseurship (Eisner, 2002) and attention to voice in the richest sense of that term (Lawrence-Lightfoot & Davis, 1997), that is, the need for a broad and deep understanding of the tool, its possibilities, and the ways different users might employ it. The newness of the tool has meant that much of the available work on NVivo use focuses on description (how to do it) rather than interpretation (of what significance is this way of doing it). Through the process of looking hard at student's work I was able to grasp an increasing number of basic features that I would focus on in understanding students' skill levels with the tool (the organization of documents and nodes, the use of models, and the strength of the compound document). The structure and length of the course precluded strong use of attributes, search tools, or reports, but in the future I think it would be critical to find ways of better preparing students in these areas, which would necessarily entail better understanding of assessment issues.

The process of acquiring skills jointly in qualitative research and qualitative research software is a complex one. My three examples demonstrate that background and experience, technological savy, and methodological depth all interact in varied ways to produce a range of starting points, modes of approach, and ultimate endpoints. Students have different needs and different goals or aims. Their styles vary as writers, thinkers, and researchers. Thus, assessment, as always, is not a simple act.

My anxiety about grading this new area of learning set me scuttling back for new resources on assessment. I found much support in the latest wave of assessment research, particularly in the area of authentic and portfolio assessment (Parsons, 2002; Wiggins, 1993; Wiggins & McTighe, 1998). Evidence of my attention to this lies in the proliferation of rubrics that have emerged from the course. In addition to the rubrics in syllabus and mid-term, I have also established like standards for data collection assignments, and have found, overall that this has led to better student performance. As often happens, this deeper understanding of assessment has been of benefit to me in all my courses, demonstrating to me the importance of the instructor defining the qualities of skilled versus unskilled performance in a clear manner and translating those standards to students. So, whereas the initial presenting problem was how to grade the qualitative research course in light of the introduction of this software, the underlying issue was—how do I assess learning and why do I assess it that way?

In speaking of assessment, as was noted earlier, Sandra pointed out early on in the course that NVivo has the potential to serve as a unique tool for the development of student electronic portfolios. Indeed, the NVivo project, conducted across a semester, does have strong resemblance to a portfolio on the learning of qualitative research methods. There are many interesting possibilities for thinking about portfolio development with this tool—itself a form of assessment (Belanoff & Dickson, 1991;

Campbell, Cignetti, Melenyzer, Nettles & Wyman, Jr. 2004; Kilbane & Milman, 2003; Mabry, 1999).

The quest to integrate qualitative research software into qualitative research instruction led me to the dilemma of assessing the use of that software in the integrated classroom, and the software continues to lead me down new and unexpected paths. When the semester began, it was my assumption that I would teach all the qualitative research skills that I had previously taught in the more classical design of the class, from the philosophical underpinnings, identification of problem and formation of a question, and design of a simple proposal to data collection (interviews, observations, visual data and artifacts), concluding with attention to analysis, representation, and validity. When we finished, I believe we touched upon all of these, but the orientation to the topics had shifted considerably, and I would attribute that in large part to the software. Granted, we had to include attention to teaching the software—demonstrating it, troubleshooting technical problems—but what was more profound in regards to reorienting the class was the way that the software allowed us to be in the whole project at any one time. If the student had the project available in some form, we could put it up for all to view and discuss the issue through the representation of the project provided by NVivo. This to me seemed very different than looking at one or another piece of data separately. We did look individually at particular kinds of data, for instance a portion of a session was devoted to examining each students' observation and discussing the pros and cons of their form, style, and content. I did this in the old cut-and-paste format, but in the future I could see distributing the observations by email or from our course website (a private site through the campus Intralearn agreement) asking each member to code it within NVivo and then share it back with course members by printing it out with coding stripes. By creating a mini-project to code the document, students would be able to create a back-up copy and send it electronically to classmates with the new coding, which would be handy in the case of an online course.

To date, my work with NVivo has been in off-line classes, while, ironically, I have I have been doing an increasing amount of work teaching qualitative research on-line using traditional methodological procedures (a hard-copy perspective translated into a virtual world). It would require yet another technological transition to consider teaching qualitative research online using software for qualitative research as the basis for the course. This transition would raise yet more questions about assessment of students' use of the tool.

Throughout the course, I struggled with the tensions and conflict that were raised for me between the methodological technologies into which I had been socialized as a doctoral student and the new methodological technologies represented by these forms of software. Ironically, thinking about the tension that arises with the adoption of new technologies is something I have long had an interest in--as a reading researcher thinking about the technologies of literacy (Davidson, 2000), and through my investigations into the field of technology integration (Davidson & Olson, 2003). I would agree with Idhe's point that we have always been technological (Idhe, 1990), and rather than become stuck on the particular form of technology (hard copy vs software for analysis) I find it more productive to think about technology as a continuum embedded within communities of practice, focusing more on the function of the tool. We could find rich resources for thinking about the effects of NVivo on our understanding of qualitative research

methodology in the literature on the philosophy or sociology of technology (Haraway, 1991; Smith & Marx, 1994).

Conclusions

The move from the cut-and-paste world of qualitative research to a new era dominated by qualitative research software is a profound shift for researchers. This is a dramatic transition for our community of practice, as we reorganize the technological ensemble that constitutes that practice (Davidson, 2001). As the use of the software migrates from the outer fringes to the center of the preparation of qualitative researchers, the process creates new challenges for learners and instructors, as I and my companions in 07.704 of Fall 03 will testify. As this useage becomes the traditional or standard practice for our field, there will need to be increasing attention to the issue of the qualities of the work produced with these tools—what is good and what is not so good? Why do we think so? How do we know so? I hope that my reflection on this issue will be of benefit to fellow qualitative research instructors struggling with this issue as I have.

References Cited

Belanoff, P. & Dickson, M. (Eds.) (1991). *Portfolios: Process and product*. Portsmouth, NH: Boynton/Cook Publishers, Inc.

Bringer, J., Johnston, L., Brackenridge, C., (2004). Maximizing transparency in a doctoral thesis: the complexities of writing about the use of QSR*NVIVO within a grounded theory study. *Qualitative Research,* 4 (2): 247-265.

Campbell, D., Cignetti, P., Melenyzer, B., Nettles, D., Wyman, Jr., R. (2004). *How to develop a professional portfolio: A manual for teachers, 3rd ed.*, Boston, Pearson Education, Inc.

Carvajal, D. 2002. The artisan's tools, critical issues when teaching and learning CAQDAS. In *Forum: Qualitative Social Research*. 3 (2) http://www.qualitative-research.net/fqs/

Davidson, J. (2000). *Living reading: Exploring the lives of reading teachers*. New York: Peter Lang Publications.

Davidson, J. (2001, April). *The technology ensemble: Making sense of technological transactions in the networked school.* Paper presented at the Annual Meeting of the American Educational Research Association, Seattle, WA.

Davidson, J. (2003). A new role in facilitating school reform: The case of the educational technologist. *Teacher's College Press*, 105 (5), 729-752.

Davidson, J. (2003b). NVivo as a tool for reading instruction: Speculating on the possibilities-a research note. *Qualitative Research Journal*. Special Issue, 2003, pp 57-63.

Davidson, J. & Olson, M. (2003). School leadership in networked schools: Deciphering the impact of large technical systems on education, *International Journal of Leadership in Education,* 6 (3), 261-281.

Eisner, E. (2002). *The educational imagination: On the design and evaluation of school programs, 3rd ed*. Upper Saddle River, NJ: Pearson Education, Inc.

Haraway, D. (1991) *Simians, Cyborgs and Women: The reinvention of nature*. New York: Routledge.

Idhe, D. (1990). *Technology and the life world: From garden to earth*. Bloomington, IN: Indiana University Press.

Kilbane, C. & Milman, N. (2003). *The digital teaching portfolio handbook: A how-to guide for educators.* Boston: Pearson Education, Inc.

Lawrence-Lightfoot, S. & Davis, J. H. (1997). *The art and science of portraiture.* San Francisco: Jossey-Bass Publishers.

Mabry, L. (1999). Portfolios plus: A critical guide to alternative assessment. Thousand Oaks, CA: Sage Publications.

Maxwell, J. (1996). *Qualitative research design: An interactive approach*. Thousand Oaks, CA.: Sage Publications.

Miller, S., Nelson, M., Moore, M. (1998). Caught in the paradigm gap: Qualitative researchers' lived experience and the politics of epistemology. *American Educational Research Journal, 35,* 3, pp. 377-416.

Morse, J. & Richards, L. *ReadMe First for a user's guide to qualitative methods*. Thousand Oaks, CA: Sage Publications

QSR International (2004). *QSR teachers' handbook: Resources for teaching with QSR software: NUD*IST & NVIVO*. Melbourne, Australia: QSR International.
Parsons, B. (2002). *Evaluative inquiry: Using evaluation to promote student success*. Thousand Oaks, CA: Sage Publications.
Richards, L. (1999). *Using NVivo in qualitative research*. Melbourne, Australia: Qualitative Solutions and Research Pty.Ltd.
Smith, M. & Marx, L. (1994) *Does technology drive history? The dilemma of technological determinism.* Cambridge, MA: MIT Press.
Vygotsky, L.S. (1978). *The mind in society: the development of higher psychological processes.* Cambridge, MA: Harvard University Press.
Wiggins, G. (1993). *Assessing student performance: Exploring the purpose and limits of testing.* San Francisco: Jossey-Bass Publishers.
Wiggins, G. & McTighe, J. (1998). *Understanding by design*. Alexandria, VA: Association for Supervision and Curriculum Development.