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Examining the Impact of Qualitative Data Analysis Software upon the Analysis Process

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Abstract

The dramatic growth in the use of qualitative data analysis software (QDAS) in the qualitative methodological design process is changing how researchers approach analysis. Qualitative researchers are progressively expanding the adoption of QDAS as a tool in the interpretation and analysis stages, and the increasing application has been cited as a major contribution to the rigor and credibility of qualitative research. There has been little systematic discussion, though, of various QDAS functions relevant to educational research. Moreover, software use has also raised concerns that the tools increasingly drive methodological practices. Qualitative data collection, analysis, and reporting require consistent, diligent attention in order to ensure a rigorous study. Most qualitative researchers agree that a steadfast focus on a study's purpose and a consistent adherence to a prescribed conceptual framework are critical to a rigorous study. Fewer researchers agree, however, on the appropriate use of QDAS in this process. As each new generation of qualitative software increasingly alters research methods, there is a need for continuing education of researchers in this dynamic process, and continued critique of methodological innovations. How researchers respond to this challenge will significantly impact our conceptualization of the future of qualitative research.

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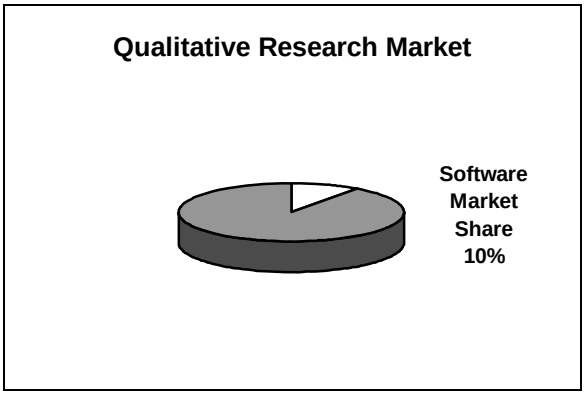
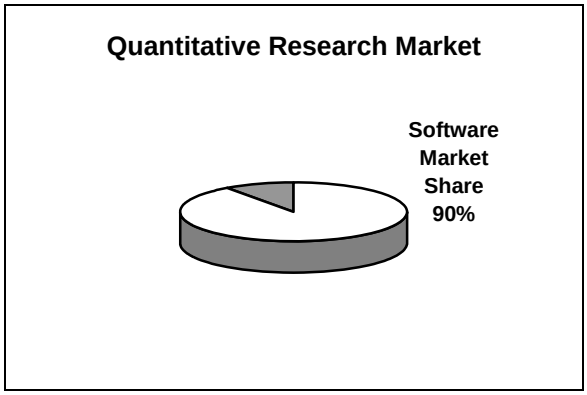
Moving Toward Mainstream Software Adoption

The field of qualitative research is just beginning to fully realize the latent potential of qualitative data analysis software (QDAS). Although QDAS has been in existence for more than 25 years, much of that time was at the novelty stage. The first widely used versions of QDAS were introduced in the early 1980s with programs such as Ethnograph and NUDIST (Tesch, 1990; Weitzman, 2003). Early adopters struggled with the intrusion of technology into an already complex research field. There was significant ideological discussion among software developers during this early stage concerning complexity versus simplicity. The difficulty for developers was anticipating what features users would want in the future – simple code, search and retrieve programs or complex programs with multiple analysis features (T. Richards, personal communication, November 14, 2004). As the field of qualitative research evolved, user demand for increasingly complex, user-friendly software features has risen. Enhancement of the compatibility of technology with research practice has alleviated some of the tension between researcher and computer.

Sophisticated qualitative research methods are rapidly moving to the point of being supported by relatively easy-to-use QDAS tools. Although qualitative researchers are now in the midst of integrating the tool into practice, mainstream usage has yet to occur. As a point of comparison, consider the relationship of SPSS and SAS software embedded within quantitative social science research. We now live with the unwritten assumption that numerical data published in quantitative research studies is analyzed using software. One way to view this trend is to examine usage among social science researchers. The quantitative software industry has reportedly matured to the point of saturating over 90% of the market in distribution and use of quantitative software. Due to this saturation, competition between software companies over quantitative market share has become standard practice. The qualitative market, however, is at a dramatically different stage of maturity. For example, QSR International has over 100,000 licensed research users in 86 countries throughout the world market. This market share represents more than all other qualitative development companies combined. Based on extrapolated market data, QSR International has determined that approximately only 10% of the qualitative academic research market is served by all of the qualitative software development companies. Recognizing this surprisingly low untapped market share, QSR International promotes the methodological use of QDAS and strives to engage the remaining 90% of the qualitative research market (T. Richards, personal communication, November 14, 2004).





To remain competitive in the world market, qualitative software companies are continually developing program updates that offer significant improvements in software functionality. Major software releases respond to ongoing developments in technology that result in new ways in which the software can support improvements in qualitative analysis. As technological improvements are adopted, market shares increase and the development cycle becomes more intense. This cycle however represents a struggle by developers with the unknown. Although the risk is very exciting for developers, they must acknowledge the reality that product and feature development is based on projections of future user needs (T. Richards, personal communication, November 14, 2004). Staying close to the academic research community is therefore an essential component to software development so that adoption of technological innovations is supported by the user.

The challenge for qualitative software developers is to generate better QDAS products and features that promote adoption by 90% of the qualitative academic social science research market share. Because the segment of the qualitative research community that has not adopted analysis software is extremely high, collaboration between researchers and developers is needed to gain a deeper understanding of the forces shaping this discussion. Growing the market, therefore, directly engages qualitative researchers in defining what role the QDAS tool has in driving methodological practices.

Two important points arise from this discussion. First, the qualitative research community must recognize and adapt to changes in qualitative research analysis. Does the tool drive qualitative analysis or do traditional forms of analysis drive the tool? Second, enlightenment is critically needed within the larger research community regarding the rapidly evolving role of QDAS in methodology. How should graduate education and professional development change to properly prepare qualitative researchers for the future?

Analysis Process and QDAS

Of particular significance to the discussion of dynamic changes in research software is how these changes interact with research practice. The use of the QDAS tool during analysis involves the researcher letting go and immersing him or herself in the analytic process through the tool. At this point, the tool becomes a gateway into what Schram (2003) refers to as the inductive and deductive ebb and flow of inquiry. To the casual observer, qualitative research may look easy from the outside when a single method is being applied. In practice, though, we find that the complexity of methods requires a high level of expertise to do qualitative research with commensurate quality. The qualitative researcher begins with complicated data, and then applies techniques that result in making the data even more complicated. For example, properly applying a flexible emergent design involves a solid theoretical perspective to retain quality and rigor. The researcher must demonstrate the ability to recognize the need for design changes while immersed in the naturalistic setting and to inductively explore the new data. A key advantage of QDAS is that it easily supports the researcher's efforts to pursue and interpret new paths of inquiry.

Although software has the image of making the research process rigid, it actually has the opposite effect. For example, we use memos as bookmarks to help capture our thoughts

involving interpretive investigation. When the time arises to pursue those paths that we set aside earlier, we may find the task to be daunting due to time constraints or the growing complexity of data management. The software, however, facilitates the researcher pursuing these paths by allowing previous work to be saved without loss. The researcher is able to flow and shift between lines of inquiry and loop back into the data instantly with software commands. This functionality provides the researcher with the option to start over at any point exploring new paths of interpretation without the fear of losing previous work. Alternative paths of inquiry generated during member check can be aggressively pursued, thus strengthening validity and minimizing the researcher's concerns over data ownership. Learning what you do not know is no longer feared.

Fear and trust are terms that are not commonly discussed from the perspective of the researcher during the qualitative analysis process, but they are important to consider. Numerous advantages to using QDAS has been discussed in the literature such as data management, increased flexibility, more transparent data analysis, systemized analysis procedures, and rigorous documentation of a visible audit trail (St. John & Johnson, 2000; Bourdon, 2002; Gibbs, Friese, & Mangabeira, 2002; Gilbert, 2000). To maximize usage of these features with QDAS, the researcher must establish an acceptable comfort level with the technology, in a sense creating a degree of trust in the software and the process. In achieving this zone of emotional acceptance, the researcher must gain competency in using the tool to the extent that the use of commands and features remain in the background. This automaticity is similar to our use of word processing. As we generate text, we use a wide range of commands without consciously examining each step. The focus of our thoughts is centered on the main task of writing. In this same way, the qualitative researcher is engaged in analysis which combines several complex skills. Proficiency in using the tool allows the analysis process to flow unhindered by emotional concerns related to the intrusion of technology.

A variety of coding techniques exist in the field of qualitative research supporting a diverse range of theoretical orientations. Subtle differences in meanings occur with terminology such as the 3- stage process of open, axial and selective coding, as well as content analysis and inductive analysis (Patton, 2002). Different analytic approaches apply these terms in different ways. For example, open coding may be a first cut at the data or it could be used further along in the analysis process. How the researcher conducts the analysis process determines and shapes these fine distinctions. As the researcher codes deeper into the study, he or she constructs layers of codes. Consequently, the analytic process of moving from open coding to constant comparison draws upon an impressive combination of theoretical and analytic skills (Ryan & Bernard, 2003). As stated by Basit, "It is a dynamic, intuitive and creative process of inductive reasoning, thinking and theorizing" (2003, p.143). The interpretive process requires the researcher to actively engage in constructing and managing multiple meanings throughout the coding process. The process is further complicated each time the researcher pursues a new path of inquiry at the expense of not pursuing other paths. As a result, the coding process potentially becomes a web of inquiry as the researcher works back and forth between data and idea (Schwandt, 2001). This analytic process of shifting between data management and thought management allows the researcher to rebuild data for deeper sense making interpretations.

As the researcher addresses discrepant and deviant case analysis, QDAS allows the researcher to effectively both manage and analyze. This process demonstrates the complexity of responding to the inductive and deductive ebb and flow of qualitative inquiry. The qualitative researcher does not ignore such data; discrepancies are not considered outliers. Rather, this inductive ebb in the analysis process may provide a fresh perspective to paths of inquiry worthy of further consideration. Methodological challenges associated with discrepant case analysis are easily addressed using QDAS without fear of losing the first cut at sense making. Discrepant cases should not be forced into a code tree structure, rather, they should be allowed to stand apart, free to flow with the analysis process. Another way of considering this shifting of perspective can be seen in the way software, specifically NVivo, supports a free node and tree node coding structure. The freedom of moving between free nodes and tree nodes is similar to shifting between inductive and deductive paths of inquiry. The tree nodes may represent the axial and selective coding stages of grounded theory or a more prescribed code book reflecting a deductive path of inquiry. On the other hand, free nodes can be represented in the open coding stage and lack hierarchical organization. Free nodes can be seen as points of significance erupting from the data where the researcher can park stray ideas and keep them from getting lost (L. Richards, personal communication, November 13, 2004). QDAS provides the flexibility for the researcher to think in both a top-down and bottom-up manner, shifting between deductive hypothesizing about the relationships between concepts and inductively interpreting emerging ideas.

The interplay of the complex analysis process when the researcher engages the QDAS tool is, as yet, not fully understood. Concern exists that the integration of technology into traditional qualitative analysis practice can potentially threaten the distinctive nature of qualitative research (Gibbs, Friese, & Mangabeira, 2002; Welsh, 2002). However, as the researcher explores multiple paths of inquiry using QDAS, there is a substantial benefit afforded by advanced thought management. QDAS offers the researcher a stable platform to better understand complexity by creating a manageable working environment that enhances immersion and grounding in the data. As innovative analysis techniques evolve from technology based practice, the researcher will discover that the software tool is working for him or her in ways that we have not yet considered. As a result, qualitative researchers must contend with inevitable changes to traditional methodologies.

With software programs becoming more sophisticated and the technological skills of qualitative researchers' progressing, the QDAS tool will increasingly become a nonintrusive partner in the analysis process. Increased utilization of QDAS in social science research is a given. As a result, the qualitative research community must recognize and adapt to changes in qualitative research analysis practices. The question before us is not about controlling the technological role in analysis, rather, how should the qualitative research community best position the discussion regarding methodological changes.

The Need for Methodological Reform

As previously discussed, social science research is at a crossroads with quantitative market usage saturated at 90% and the qualitative market at only 10%. Over the past 25 years, software development has institutionalized the use of software in analysis. The presence of the computer as a research tool has become commonplace among all researchers, regardless of conceptual

orientation. Researchers, as a whole, by and large recognize the value of using the computer for statistical analysis, word processing and text management. A small percentage of qualitative researchers are actively using the computer for nonnumerical data analysis. Given this assessment, what would happen if quantitative researchers increasingly used QDAS to enhance their findings?

The following scenario suggests that mainstream adoption of QDAS could be driven by researchers engaged in mixed method, blended design studies. The possibility of fully realizing mainstream adoption increases with rising interest in evidenced based research and usage of mixed method design. Efforts are underway by the research community in overcoming the schism between quantitative and qualitative research in support of mixed methods research as the third research paradigm. Skepticism remains in the research community whether the paradigm wars have ended between quantitative and qualitative advocates. As Patton points out, "not everyone has adopted a stance of methodological enlightenment and tolerance" (2000, p. 68). This lingering tension is now further complicated by growing interest in promoting mixed methods research. Johnson and Onwuegbuzie contend "It is time that methodologists catch up with practicing researchers! It is now time that all researchers and research methodologists formally recognize the third research paradigm and begin systematically writing about it and using it" (2004. p. 22). Given this course of events, it is reasonable to propose that increased utilization of QDAS will likely be driven by quantitative researchers who are conducting blended studies that have either a dominant quantitative design or maintain a balanced design. Dominant qualitative blended studies conducted by quantitative researchers are unlikely.

A significant methodological implication to research analysis emerges from this discussion. Quantitative researchers who are attempting to apply qualitative research methodology by using QDAS need to consider larger conceptual framework concerns. QDAS is a very useful tool that supports a wide range of analysis tasks including building and constructing multiple meanings. Can the researcher use this tool while maintaining a quantitative orientation? The answer is most definitely, yes. What we must grasp is that just because the researcher is working with a qualitative tool the research inquiry is not necessarily qualitative. The software is a tool that requires proper use by the researcher. QDAS can not make bad research good, nor can the software convert a quantitative orientation into rigorous qualitative methodology.

Future Considerations

We must acknowledge that enlightenment is critically needed within the larger research community regarding the rapidly evolving role of QDAS in methodology. Two areas demand immediate attention as we prepare for the future. First, qualitative researchers need to actively engage in discussion with software developers to refine the fit of the tool with qualitative analysis. Second, graduate education and professional development reform is needed to properly prepare qualitative researchers for the future.

Software developers are exploring new ways in which QDAS can immerse the qualitative researcher in a deeper, more personal connection with the data. Technology offers pathways of connecting a wide range of senses with the analysis process. Imagine hearing the voices and seeing the setting from multiple views while you code the text. In the future, immersion in the

data will take on a whole new meaning. To further complicate matters, as the software changes and evolves, so does the data. Almost all data can now be converted into a digital format. Digital convergence offers "a range of new approaches both to data collection and to data analysis" (Gibbs, Friese & Mangabeira, 2002, p. 28). Virtual ethnography goes one step further by introducing the qualitative researcher to a digital culture. Instant messaging and chat rooms represent a digital social community as a nexus of interaction. As we enter into this new world we may find that "The ethnographer may even be said to create a community simply by virtue of studying certain people and by implying that the links he or she has perceived among them constitute a society" (Angrosini & Mays de Pérez, 2003, p. 121). From a traditional perspective, Wolcott (1999) cautions:

> I suspect we will bemoan a loosening of standards as we watch a new generation of qualitative researchers conduct studies seated in front of their computers while an older generation fails fully to appreciate the significance of the remarkable opportunity technology offers for interacting both with and within a worldwide web of correspondence. (p. 55)

Clearly, critical discourse in the qualitative research community is needed regarding analytic methodology. In addition, how we define the qualitative research community needs to be broadened to support discussion with software developers so that the fit of the tool with qualitative analysis can be refined.

Graduate faculty are faced with the challenging task of staying current in this rapidly changing environment. Graduate students are quickly adapting to and applying technology in increasingly creative ways. An indicator of this growth is the increased demand for technical training workshops in QDAS. A national network project based in the United Kingdom has noted a marked increase over the past 5 years, "…and as such, they [graduate students] are acting as the driving force in increasing awareness and usage in the UK academic sector" (Silver & Lewins, 2004, p.4). This growth is represented in both the increased number of participating graduate students and the diversity of disciplines represented. A very difficult situation emerges for the graduate student with a supervisor or dissertation chair who does not use QDAS and imposes traditional paper analysis or advises the graduate student improperly in the use of QDAS. A proactive response to these challenges requires reform of current practices in graduate education and professional development. The immediate solution for professional development is the promotion of seminars and workshops designed to inform graduate students and faculty in technical skills, methodological integration and academic mentoring. An example of responding to this professional development need is the University of Wisconsin sponsored conference, *Teaching Qualitative Methods with QSR Software* (2004). The focus of this innovative conference is on issues surrounding teaching with qualitative research software.

We must also confront the more demanding long-term task of preparing the qualitative research community for the future. Curriculum reform involves a critical review of current instructional practices from the standpoint of strengthening mixed method, blended design studies and the integration of QDAS with qualitative methodologies. As members of the research community, we must advocate for and initiate the reform of graduate education and actively promote professional development.

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