12 Collecting, organizing and analyzing multimodal data sets: the contributions of CAQDAS

Victoria Antoniadou[1]

Key concepts: multimodal data, data sampling, CAQDAS, Transana, Altas.ti, NVIVO.

---

1.   Introduction

Reflecting the inter-connected reality of today's world, contemporary education is striving to keep up with the exponentially rapid changes that individuals around the globe are facing. Innovative educational proposals carry labels such as connective learning (Downes, 2006), e-learning 2.0 (Downes, 2005), education 2.0 (Carr et al., 2008), or social learning 2.0 (Dron & Anderson, 2007). Such transformations embody new theoretical premises which postulate that human learning and development are prompted in interaction and distributed across people, tools, time and space (Mercer, 2000, 2004; Mercer & Howe, 2012). Researchers should try to investigate learning processes holistically in order to fully understand the complexity of socially-distributed learning processes (Sfard, 1998). A holistic approach to research in teaching and learning seeks to capture and document learning 'in the making' (Barab, Hay, & Yagamata-Lynch, 2001) and the relationship between processes and outcomes that cross modes and modalities (Antoniadou, 2011, 2013; Dooly, 2011).

Along these lines, this chapter defines multimodality and discusses processes involved in multimodal data collection and analysis, as well as their bearing on scientifically sound qualitative research, endeavoring to embody the aforementioned holistic approach. The term multimodality is used in this chapter

---

1. Independent scholar, Nicosia, Cyprus; vicky.antoniadou@gmail.com

---

to describe research in which interaction takes place entirely or partially online. To tackle the practicalities involved in multimodal data collection and analysis, this chapter describes software packages for efficiently managing multimodal data corpora. Concretely, the readers of this chapter will find a description of Computer-Assisted Qualitative Data Analysis Software (CAQDAS), namely the Transana, Atlas.ti, and NVIVO software packages, their main features, and ways in which they can support efficient storage, management and analysis of vast multimodal datasets. The chapter finishes with some recommendations to guide young researchers in choosing the right software package for their research purposes.

2. Defining multimodal datasets while marking collection processes and complexities

Multiple modalities refer to the diverse modes and tools people use to communicate beyond language. In education, the role that these modalities play in mediating contemporary meaning-making processes, underlying learning and cognitive development acquire particular interest.

Modalities may include image, sound, music, gestures, posture, even the use of space, which is nowadays virtual or blended. Meaning is multimodal, conveyed by image, text, interaction, sound, and music in unique and complementary ways, each adding a particular value to the whole; this added value cannot be deduced or obtained from any of the other modalities. Another example is online communication, be it synchronous or asynchronous and taking place via chat or webcam, while googling information and images in regards to the topic. Meaning, in such cases, is made through the contributions of all these modes and thus needs to be investigated holistically.

Discussing the theoretical assumptions underlying multimodal research, Bezemer and Mavers (2011) point out: (1) the complementarity of modes/resources in meaning-making processes; (2) the ways the mode frames and/or conditions interaction and meaning, which needs to be taken into account for understanding

the deriving meaning-making processes; and (3) the organizing principles underlying the communication and representation in each mode. Multimodal research can shed light on the ways different modes in text and oral interaction come together to afford higher order thinking. Of interest to researchers studying multimodality are the ways the participants in the research context are making use of the symbolic and physical resources available to construct meaning, and how the use of these resources changes over time to become part of the normal cultural practice (Bezemer & Mavers, 2011).

In this light, educational researchers interested in studying multimodality are called to adjust and refine their methods and techniques in order to adequately and sufficiently represent this current reality of human-computer interaction and the intellectual benefit that stems out of it. Video recordings have been widely used in mainstream qualitative research as rich forms of representation of multimodality in classrooms and other settings; the researcher can use video to capture and discern the pedagogical value of these multiple modes in promoting meaning-making and higher order thinking (Hackling, Murcia, Ibrahim-Didi, & Hill, 2014). In mainstream ethnography, audiovisual recordings of face-to-face interactions have been primary resources, and unquestionably useful for providing "fine-grained information on the moment-to-moment conduct of people in social interaction" (Erickson, 2006, p. 177). To overcome the degree of bias associated with the presence of a camera during an interaction – known as the observer's effect (Labov, 1972) – qualitative researchers have argued that, with time, the effect of the camera and other recording devices gradually disappears, as the participants gradually come to perceive and accept the observation equipment. That is, they eventually consider the camera and audio recorders as part of the setting and not as threats, and maybe even as motivating elements (see Antoniadou, 2013; Moore & Llompart, this volume).

With the rise of virtuality and online interaction, and the increasingly multimodal research milieu, García, Standlee, Bechkoff, and Yan Cui (2009) emphasize that researchers need to refine their skills in order to be able to collect, analyze and interpret complex textual and audiovisual material. In virtual ethnography,

the setting and data collection practices, e.g. participant observation, have become necessarily mediated. The researcher may no longer be physically (directly) present in the online field, but observes the happenings indirectly (García et al., 2009; see also Antoniadou & Dooly, this volume). Social media tools serve as online repositories of data and thus facilitate the data collection process (Onwuegbuzie, Leech, & Collins, 2010). The qualitative researcher/ ethnographer can download data without necessarily participating in the interactions that generated this data. On the one hand, this may mean that online data are easier to collect. Nevertheless, other considerations must be made, e.g. new ethics that may apply to online settings (see Dooly, Moore, & Vallejo, this volume), using participants as a resource in the data collection process, and finding ways of receiving and storing large data files. Collecting online data is challenging from a technological point of view. This is not a petty concern, since technological breakdowns (in the case of synchronous tele-collaboration for example) can jeopardize the process, the quality of collected data and therefore the research itself. It is also important to bear in mind that online ethnographies have tended to favor text data over audiovisual recordings that would also require transcription (García et al., 2009). Participants themselves can be of valuable help in overcoming this challenge. Instructing participants to save data, e.g. using online recorders to record synchronous video interactions, save chat interactions, along with time stamped screenshots, will ensure the quality of data collected (Antoniadou, 2013). Hackling et al. (2014) discuss the needs and challenges of comprehensive transcription methods for multimodal data, and offer examples of multimodal transcripts that include contextual information, timestamps, transcripts of discourse, and descriptions of semiotic resources such as gestures, role plays, manipulations of equipment, and images as well as short video clips. With this type of transcript, researchers can gather and examine the relationships between the multiple modes used to convey instructional content and the pedagogical value that these modes carry for intellectual development, as mentioned above.

With the vast data corpora that typically characterize qualitative and ethnographic research, it is very important to keep track of people, roles and tools in what has been called an 'audit trail' of the data collection and analytical and interpretative

process. This audit trail serves to enhance dependability and confirmability of results, and transferability of methods and techniques as basis for further empirical work (Dörnyei, 2007; Lincoln & Guba, 1985; for an example see also Antoniadou & Dooly, this volume).

3.   Purposeful data sampling in qualitative research involving multimodal datasets

In order to efficiently and effectively manage the data, the researcher is required to define purposeful sampling schemes for identifying and selecting focal datasets. Purposeful sampling, in qualitative research, is referred to as a technique for identifying and selecting information-rich cases in order to make the most effective use of limited resources (Patton, 2002). The criteria for this selection should align with the research objectives and be clearly stated in the methodology section of the research output (see Dörnyei, 2007 for a thorough account of how to draft purposeful sampling schemes in mixed-method research projects). Briefly, there are various strategies that can be used for purposeful data sampling in qualitative research. These strategies may involve theoretical sampling, criterion-based sampling, maximum variation sampling, snowball sampling, and sampling contrasting cases (Palinkas et al., 2013). Theoretical sampling involves finding manifestations of a theoretical construct and using them to elaborate on the construct and examine its variations. According to Patton (2001), criterion sampling involves selecting, reviewing and studying "all cases that meet some predetermined criterion of importance" (p. 238), previously set by the researcher. Purposeful sampling may also be the selection of cases of maximum variation, which, as its name denotes, serves the purpose of documenting unique or diverse variations that resulted from adapting to diverse conditions. It is useful for discerning common patterns across variations. In snowball sampling, the researcher locates and identifies cases of interest from sampling people through other people that have similar characteristics. The strategy of sampling contrasting cases involves focusing on both exemplary and deviant cases, and shedding light on the characteristics of each case (Palinkas et al., 2013; see also Antoniadou & Dooly, this volume for an application of

data sampling in virtual ethnographic multiple-case study research in blended learning environments).

The following sections describe how three different types of CAQDAS can be used to manage the complexity of qualitative research and assist the analysis of multimodal data, as well as purposeful data sampling, as described above.

4.   CAQDAS: tools and processes for efficiently managing qualitative research

CAQDAS, or Qualitative Data Analysis Software (QDAS), are packages of multiple tools that are designed to provide valuable practical support to an otherwise, complex, messy and time-consuming qualitative research process. These software packages enable researchers to store and code text, graphic, audio and/or video data, search content, locate and explore relationships between codes, and link visual to audio and text data.

Through CAQDAS, the researcher can store all data in one single repository so that s/he can access, at any time, the context of what s/he is focusing on in order to discover and establish meaningful relationships in the data and create themes and categories (Bazeley, 2009). Latest versions of this software also allows researchers to collaborate in real time with colleagues at geographical proximity or over distance.

The following sections present and discuss Transana, Atlas.ti, and NVIVO in order to introduce researchers into the world of CAQDAS. Transana is often preferred by qualitative researchers who want to focus on the analysis of audiovisual data (ELAN and CLAN might also serve this purpose, see Moore & Llompart, this volume). NVIVO and Atlas.ti provide additional functions; they allow researchers to organize and code the literature review, during all phases of the research pre- and post- analysis and they may also incorporate quantitative (numeric) data and take quantitative approaches to qualitative data, assisting the purposeful data sampling scheme, explained above.

These three software packages are only a few of the software packages currently available in the market, and are amongst the most popular ones used by qualitative researchers. Readers can read up on CAQDAS at: http://www.surrey.ac.uk/sociology/research/researchcentres/caqdas/support/choosing/.

4.1.   The Transana software

Transana offers multimedia integration and tools for transcription and analysis of audiovisual data. It is distinguished from other software packages that tend to favor textual analysis (https://www.transana.com/).

With Transana, researchers can isolate analytically interesting portions of audio and video files (their raw data collected on-site), transcribe them and create clips, i.e. episodes of their overall data, which they can use as their analytic units. Researchers can also compare clips and codes across episodes and can assign keywords to these clips, code them, and categorize them under themes. They can also arrange them in the order that they deem appropriate to their research objectives. For better visualization, researchers can also take screenshots from these videos and add them to their analysis, including still images taken on-site. These still images can also be coded and analyzed as part of larger media files and/or standalone, and added to the final research output.

The standard version limits the analytical process to single file processing (one document/media file at a time, i.e. videos, audios, transcripts, and still images) while the professional version supports multiple-file and multiple user simultaneous analysis (supports overlapping documents during analysis e.g. 2+ transcripts, 2+ videos, 2+ audios). There is also a Transana multi-user version that enables real-time collaboration between multiple researchers, working on the same project from a distance or in physical proximity.

4.2.   Atlas.ti

Atlas.ti (similarly to NVIVO below) supports large volumes of data sources in multiple formats, including websites and social media. This support of multiple

formats means that researchers do not need to transform the format of their primary data, should they be word documents, PDF documents, or websites. This saves time and keeps the research practical, while the data remain intact for the analysis phase. The researchers work with primary data as they were collected from the field, without alterations in terms of format or layout. Atlas.ti tools and functions include transcription, codification of text, image, audio and video materials. Cloud views (see http://atlasti.com/product/features/) are particularly useful for visualizing most-recurrent codes and keywords and re-arranging relationships as appropriate; the codes can be arranged or re-arranged alphabetically or according to frequency, or for whatever research objective, and can then be exported to Excel.

Network views are also available, which allow the researcher to visualize relationships between codes, which, in turn, help break down complex concepts in simpler chunks of information, thus facilitating understanding and interpretation.

The researcher can then manipulate and present the relationships on the networks as s/he deems appropriate for better serving their research and objectives. Such functions facilitate analytical processes such as comparison and contrast between data sources, e.g. interview transcripts, web content and other supported formats, thus supporting interpretative processes and reporting of the findings.

Very importantly, researchers can also use Atlas.ti to organize, code and add annotations to literature reviewed prior to engaging in data analysis. They can later link literature codes and annotations to the data codes. Atlas.ti also supports geographical data from Google Earth so that researchers can connect to Google Earth from Atlas.ti, take snapshots, code them, add comments and annotations, and use them as primary research data.

4.3.   NVIVO

The NVIVO database can be deployed easily and very intuitively, given its resemblance to the Word interface. Researchers can use NVIVO to process

multimodal data e.g. transcribe audiovisual data, format interviews and discussion groups, download data from the Internet, create projects, import sources, and link data to external sources and analyze images. NVIVO also supports diverse formats of data i.e. text, multimedia, PDFs, images, Excel surveys, notes, websites and social media such as Facebook, LinkedIn, Twitter, YouTube videos and Survey Monkey. These documents can be stored and organized in different folders in the software itself (and not another file on the computer, which is the case in Atlas.ti).

An NVIVO project can also be linked to external information such as websites or other files saved on the computer, and used to make cross-references across documents in order to facilitate access to them, and to compare, analyze and annotate them. For example, researchers can use this software to code literature references (also provided by Atlas.ti). NVIVO query and annotation tools can be used to identify and code key themes and concepts in the literature; this way researchers can develop an analytical framework and document their own thoughts about how these themes relate to their own research. They can compare and critically evaluate the work of various authors on a specific topic and identify gaps that their research can breach. Through this process, the researchers can refine their research questions.

Researchers can use NVIVO to code and categorize data in line with the 3-cycles proposed in grounded theory methodology (Charmaz, 2006). They include free nodes (for open and verbatim coding for making sense of the setting) and tree nodes (for axial and theoretical coding for focusing research). Other facilities allow researchers to create cases. This is compatible with single and multiple case study methodology (Yin, 2003) and with assigning attributes for further classification.

Search tools are also available in order to manage large volumes of data and also frequency measures that researchers can use to locate keywords in the data and produce cloud visualizations. NVIVO models, tables and networks help researchers present an overall visualization of the research design, analysis, relationships and findings (Figure 1 and Figure 2).

Figure 1. Analytical tools on the NVIVO interface (sources, nodes, cases, sets) – data from the thesis of Antoniadou (2013)
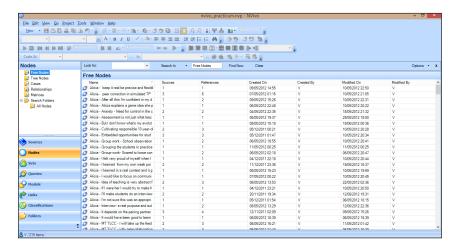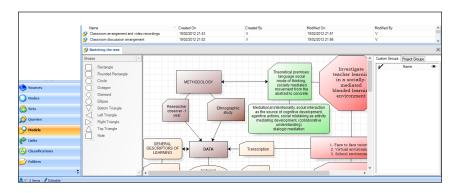

Figure 2. Models in NVIVO – data from the thesis of Antoniadou (2013)

Tools for note- and memo-taking support researchers in keeping an "audit trail" of the analytical process (Dörnyei, 2007, p. 62), allowing researchers to take notes documenting their thoughts and decisions during coding. This, in turn facilitates the interpretive process, and guides researchers into creating a storyline of the experience (Charmaz, 2006; Glaser & Strauss, 1967; Lincoln & Guba, 1985).

5. Selection criteria for choosing the right package for you and your research

Weitzman (2000, pp. 810-815) proposes that the researcher answer the following questions when in the process of choosing software packages: (1) What kind of computer user am I?, (2) Am I choosing for one project or for numerous projects over the next few years?, (3) What kind of project(s) and database(s) will I be working on?, and (4) What kinds of analyses am I planning to do?

Evidently, the choice of software will primarily depend on the research project, the type and format of data used, objectives and ambitions and to the extent to which the software package can efficiently address them. At the same time, selection criteria may adhere to subjective criteria such as software price and research budget, on-campus accessibility of software, available training for each software package, or mere individual preference. For packages that offer similar tools, facilitate comparable tasks and account for similar results such as the NVIVO and Atlas.ti, the choice might come down to a matter of personal preference and the interface the researchers find themselves more comfortable with.

The amount of collaboration required in order to effectively carry out the project's objectives would also be a factor to consider. Standard and professional versions are available for each software package. There are also versions that do or do not support collaboration between multiple users and can therefore be used by individuals or by teams. These functionalities carry significant price differences.

Either way, it is essential for the researchers to receive training in order to take full advantage of the affordances of the software. Researchers can find their way through the above-mentioned software packages using freely available online resources such as tutorials, video manuals and forum discussions. There are also formal workshops that offer tours around the features and affordances of each of these software packages, as well as hands-on experience under the guidance of expert researchers.

6.   Data analysis: transcription conventions

As a final note, when audiovisual data is included in an online ethnography, the transcription of that data should be based on a transcription key (see Moore & Llompart, this volume), examples of which can be found in books or online (Agha & Wortham, 2005; Hutchby & Wooffitt, 2008; Sacks, Schegloff, & Jefferson, 1974).

7.   Other considerations

The era of increased inter-connectedness and media convergence calls for qualitative research that draws from multiple and diverse data sources in order to accurately investigate and represent reality. CAQDAS help to efficiently manage large volumes of multimodal data timely and effectively. Authors highlight that modern CAQDAS allow not only an easy access but also a systematic exploration of the corpus, and, very importantly, a tidy printable output of coded data to facilitate interpretation. Nevertheless, and this has been multiply and repeatedly highlighted, the computer cannot replace the human mind in detecting and interpreting meanings and relationships in the data.

It is also very important to keep in mind that the package itself might pose limitations to researchers' plans and ambitions (García-Horta & Guerra-Ramos, 2008). It is useful for researchers to remain aware of these constraints throughout the research, and to detect and document them in their written project. Good old traditional paper can still be a useful support tool during computer-assisted data analysis. Keeping and referring back to supporting tools such as the research questions or keywords of the research being conducted, written down on paper and kept on the side throughout the process of codification and analysis, will help researchers/analysts to maintain focus on the aims and objectives of the research, which can easily get lost in large-scale, multimodal research projects.

Last but not least, training for the skills needed to design qualitative investigations and take advantage of the analytical possibilities of qualitative software

packages is highly recommended. Researchers may find that a literature review of the philosophical, epistemological and methodological traditions prior to embarking on research (Guba & Lincoln, 1994), as well as specific case studies in education, can also lend valuable support to their methodological decisions (see for example Antoniadou & Dooly, this volume).

Works cited

Agha, A., & Wortham, S. (2005). Discourse across speech-events: intertextuality and interdiscursivity in social life. *Special Issue of the Journal of Linguistic Anthropology*, 15(1).

Antoniadou, V. (2011). Virtual collaboration, perezhivanie and teacher learning: a socio-cultural-historical perspective. *Bellaterra Journal of Teaching & Learning Language & Literature*, 4(3), 53-70.

Antoniadou, V. (2013). *Expanding the socio-material spaces of teacher education programmes: a qualitative trace of teacher professionalization through blended pedagogy in Catalonia*. Unpublished PhD dissertation. Universitat Autònoma de Barcelona.

Antoniadou, V., & Dooly, M. (2017). Educational ethnography in blended learning environments. In E. Moore & M. Dooly (Eds), *Qualitative approaches to research on plurilingual education* (pp. 237-263). Research-publishing.net. https://doi.org/10.14705/rpnet.2017.emmd2016.630

Barab, S. A, Hay, K. E., & Yagamata-Lynch, L. C. (2001). Constructing networks of action relevant episodes: an in-situ research methodology. *The Journal of the Learning Sciences,* 10 (1&2), 63-112. https://doi.org/10.1207/S15327809JLS10-1-2_5

Bazeley, P. (2009). Integrating data analysis in mixed methods research. *Journal of Mixed Methods Research, 3*(3), 203-207.

Bezemer, J., & Mavers, D. (2011). Multimodal transcription as academic practice. *International Journal of Social Research Methodology,* 14(3), 191-206. https://doi.org/10.1080/13645579.2011.563616

Carr, D., Crook, C., Noss, R., Carmichael, P., & Selwyn, N. (2008). *Education 2.0? Designing the web for teaching and learning: a commentary by the technology enhanced learning phase of the teaching and learning research programme*. London: Teaching and Learning Research Programme, Institute of Education, University of london.

Charmaz, K. (2006). *Constructing grounded theory: a practical guide through qualitative analysis*. London: Sage.

Dooly, M. (2011). Divergent perceptions of telecollaborative language learning tasks: task-as-workplan vs. task-as-process. *Language Learning & Technology*, 15(2), 69-91.

Dooly, M., Moore, E., & Vallejo, C. (2017). Research ethics. In E. Moore & M. Dooly (Eds), *Qualitative approaches to research on plurilingual education* (pp. 351-362). Research-publishing.net. https://doi.org/10.14705/rpnet.2017.emmd2016.634

Dörnyei, Z. (2007). *Research methods in applied linguistics: quantitative qualitative and mixed methodologies*. Oxford: Oxford University Press.

Downes, S. (2005). *E-Learning 2.0*. https://doi.org/10.19173/irrodl.v6i2.284

Downes, S. (2006). *Learning networks and connective knowledge*. http://philpapers.org/archive/DOWLNA.1.pdf

Dron, J., & Anderson, T. (2007). Collectives, networks and groups in social software for e-learning. In T. T. Bastiaens & S. Carliner (Eds), *Proceedings of world conference on e-learning in corporate, government, healthcare, and higher education* (pp. 2460-2467). Chesapeake, VA: Association for the Advancement of Computing in Education (AACE).

Erickson, F. (2006). Definition and analysis of data from videotape: some research procedures and their rationales. In J. L. Green, G. Camilli, P. B. Elmore, A. Skukauskaiti & E. Grace (Eds), *Handbook of complementary methods in education research* (pp. 177-192). American Education Research Association: Lawrence Erlbaum.

García, A. C., Standlee, A. I., Bechkoff, J., & Yan Cui. (2009). Ethnographic approaches to the Internet and computer-mediated communication. *Journal of Contemporary Ethnography*, 38(1), 52-84. https://doi.org/10.1177/0891241607310839

García-Horta, J. B., & Guerra-Ramos, M. T. (2008). The use of CAQDAS in educational research: some advantages, limitations and potential risks. *International Journal of Research & Method in Education,* 32(2), 151-165. https://doi.org/10.1080/17437270902946686

Glaser, B., & Strauss, A. (1967). *The discovery of grounded theory: strategies for qualitative research*. Chicago: Aldine.

Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. In N. Denzin & Y. Lincoln (Eds), *Handbook of qualitative research* (pp. 105-117). Thousand Oaks/London/New Delhi: Sage.

Hackling, M., Murcia, K., Ibrahim-Didi, K., & Hill, S. (2014). *Methods for multimodal analysis and representation of teaching-learning interactions in primary science lessons captured on video*. https://www.esera.org/media/esera2013/Mark_Hackling_04Feb2014.pdf

Hutchby, I., & Wooffitt, R. (2008). *Conversation analysis* (2nd ed.). Chichester, U.K.: Polity Press.

Labov, W. (1972). *Sociolinguistic patterns*. Oxford: Blackwell.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Thousand Oaks/London/New Delhi: Sage.

Mercer, N. (2000). *Words & Minds: how we use language to think together*. London/New York: Routledge. https://doi.org/10.4324/9780203464984

Mercer, N. (2004). Sociocultural discourse analysis: analysing classroom talk as a social mode of thinking. *Journal of Applied Linguistics*, 1(2), 137-168. https://doi.org/10.1558/japl.2004.1.2.137

Mercer, N., & Howe, C. (2012). Explaining the dialogic processes of teaching and learning: the value and potential of sociocultural theory. *Learning, Culture and Social Interaction*, 1(1), 12-21. https://doi.org/10.1016/j.lcsi.2012.03.001

Moore, E., & Llompart, J. (2017). Collecting, transcribing, analyzing and presenting plurilingual interactional data. In E. Moore & M. Dooly (Eds), *Qualitative approaches to research on plurilingual education* (pp. 403-417). Research-publishing.net. https://doi.org/10.14705/rpnet.2017.emmd2016.638

Onwuegbuzie, A., Leech, N., & Collins, K. M. (2010). Innovative data collection strategies in qualitative research. *Qualitative Report*, 15(3), 696-726.

Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2013). Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Administration and Policy in Mental Health and Mental Health Services Research,* 42(5), 533-544. https://doi.org/10.1007/s10488-013-0528-y

Patton, M. Q. (2001). *Qualitative research and evaluation methods* (2nd Ed.). Thousand Oaks, CA: Sage Publications.

Patton, M. Q. (2002). *Qualitative research and evaluation methods* (3rd ed.). Thousand Oaks, CA: Sage.

Sacks, H., Schegloff, E. A., & Jefferson, G. (1974). A simplest systematics for the organization of turn-taking for conversation. *Language*, 50(4), 696-735. https://doi.org/10.1353/lan.1974.0010

Sfard, A. (1998). On two metaphors for learning and the dangers of choosing just one. *Educational Researcher*, 27(2), 4-13. https://doi.org/10.3102/0013189X027002004

Weitzman, E. (2000). Software and qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds), *Handbook of qualitative research* (2nd ed.) (pp. 803-820). Thousand Oaks/London/New Delhi: Sage.

Yin, R. K. (2003). *Case study research: design and methods* (3rd ed.). Thousand Oaks/ London/New Delhi: Sage.

Recommended reading

Bazeley, P. (2009). Integrating data analysis in mixed methods research. *Journal of Mixed Methods Research, 3*(3), 203-207. https://doi.org/10.1177/1558689809334443

Charmaz, K. (2006). Constructing grounded theory: a practical guide through qualitative analysis (1st ed.). London: Sage.

Dörnyei, Z. (2007). *Research methods in applied linguistics: quantitative, qualitative and mixed methodologies*. Oxford: Oxford University Press.

Saldaña, J. (2009). *The coding manual for qualitative researchers*. London: Sage.

Websites with resources mentioned

Altas.ti (Windows, Mac, iPad, Android, need to purchase a license, free trial available): http://atlasti.com/

NVIVO (Windows and Mac, need to purchase a license, free trial available): http://www.qsrinternational.com/

Transana (Windows and Mac, need to purchase a license, free trial available): http://www.transana.org/

Qualitative approaches to research on plurilingual education (English)
Enfocaments qualitatius per a la recerca en educació plurilingüe (Catalan)
Enfoques cualitativos para la investigación en educación plurilingüe (Spanish)

Edited by Emilee Moore and Melinda Dooly