Reflection on qualitative data analysis software - possibilities, limitations and challenges for qualitative educational research[1]

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Abstract: The progressing digitalization is increasingly permeating all spheres of life: also science. It has reached not only natural sciences, but also the humanities, such as qualitative educational research. For example, for the analysis of qualitative data in educational science researchers are increasingly using computer-assisted tools. This so-called QDA (qualitative-data-analyses) software was developed in the early 1980s in the course of the spreading digitalization to support the category based analyzes of qualitative research. Providing an overview about the current literature situation regarding QDA software and the issues addressed a systematical bibliographic research in pertinent databases were conducted. As a result, five different types of literature could be identified. Even though all categories are demonstrated only one is presented in detail. The paper focus on the category in which methodological issues are negotiated and illustrates the therein addressed arguments. Possibilities and limitations of QDA software for educational research are illustrated and past and present discussions regarding this software are outlined. In particular, it is emphasized that so far limitations

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of QDA software are rarely addressed. In order to deal with this void in the future more comprehensively a set of questions is proposed, which allows to reflect the use of QDA software in a specific research project in an extensive manner. Concluding further questions are raised and it is discussed if also sequential analyzes can be carried out with current QDA software or if they need new digital tools.

Keywords: Software (Thesaurus); CAQDAS, computer-assisted-qualitative analyzes, digitalization, QDA, qualitative research, risks and limitations, tool(box) (author's keywords).

Reflexiones sobre el software de análisis de datos cualitativos: posibilidades, limitaciones y desafíos para la investigación cualitativa en educación

Resumen: La digitalización progresiva permea cada vez más todas las esferas de la vida: incluyendo la ciencia. No solamente ha llegado a las ciencias naturales, sino también a las humanidades, como es el caso de la investigación cualitativa en educación. Así, por ejemplo, para el análisis de datos cualitativos en ciencias de la educación, los investigadores han incrementado el uso de las herramientas asistidas por computadora. El software denominado QDA (análisis de datos cualitativos) se desarrolló a principios de la década de 1980, en el transcurso de la difusión de la digitalización que contribuía al análisis basado en categorías de la investigación cualitativa. Teniendo en cuenta, una visión general sobre el estado del arte del software QDA y los problemas abordados, se realizó una investigación bibliográfica sistemática en las bases de datos pertinentes. Como resultado, fue posible identificar cinco tipos diferentes de literatura. Si bien todas las categorías se demuestran, solo una es presentada en detalle. El artículo se centra en la categoría en la cual se negocian los problemas metodológicos y los argumentos abordados en la misma. Se ilustran las posibilidades y limitaciones del software QDA para la investigación educativa, así como también se describen las discusiones pasadas y presentes sobre este software. En particular, se hace hincapié en que hasta ahora las limitaciones del software QDA rara vez han sido atendidas. Con el fin de hacer frente a este vacío de manera más completa, se propone un conjunto de preguntas, que permitan reflejar el uso del software QDA de manera extensa en un proyecto de investigación específico. Se plantean preguntas para concluir y se discute si, además, es posible llevar a cabo análisis secuenciales con el actual software QDA o si es necesario el uso de nuevas herramientas digitales.

Palabras clave: Software (Tesauros); CAQDAS, análisis cualitativo asistido por computadora, digitalización, QDA, investigación cualitativa, riesgos y limitaciones, caja de herramientas (Palabras clave del autor).

Reflexões sobre o software de análise de dados qualitativos: possibilidades, limitações e desafios para a pesquisa qualitativa em educação

Resumo: A digitalização progressiva permeia cada vez mais todas as esferas da vida: incluindo a ciência. Atingiu não apenas as ciências naturais, mas também as humanidades, como é o caso da pesquisa qualitativa em educação. Assim, por exemplo, para a análise de dados qualitativos nas ciências da educação, os pesquisadores têm aumentado o uso de ferramentas auxiliadas por computador. O software denominado QDA (Qualitative Data Analysis) foi desenvolvido no início da década de 1980, no transcurso da difusão da digitalização que contribuiu para a análise de pesquisa qualitativa baseada em categorias. Levando em consideração uma visão geral do estado da arte do software QDA e os problemas abordados, foi realizada uma pesquisa bibliográfica sistemática nas bases de dados pertinentes. Como resultado, foi possível identificar

cinco tipos diferentes de literatura. Embora todas as categorias sejam demonstradas, apenas uma é apresentada em detalhes. O artigo enfoca a categoria na qual são negociados os problemas metodológicos e os argumentos abordados na mesma. As possibilidades e limitações do software QDA para pesquisa educacional são ilustradas, bem como as discussões passadas e presentes sobre esse software. Em particular, enfatiza-se que até agora as limitações do software QDA raramente foram abordadas. Para lidar com essa lacuna de maneira mais completa, é proposto um conjunto de perguntas que refletem o uso extensivo do software QDA em um projeto de pesquisa específico. As perguntas são feitas para concluir e é discutido se também é possível realizar análises sequenciais com o software QDA atual ou se o uso de novas ferramentas digitais é necessário.

Palavras-chave: Software (Tesauros) CAQDAS, análise qualitativa assistida por computador, digitalização, QDA, pesquisa qualitativa, riscos e limitações, caixa de ferramentas (palavras-chave do autor).

Introduction

Due to the increasing spread and implementation of digital technologies, all areas of life have undergone fundamental changes since the end of the 20th century. Digital, like the evolution of the Web 2.0, has become an integral part of everyday life: at the workplace, e.g. craftsmen create invoices on computers, manage their orders, fall back on digitally programmed machines (Larsson & Teigland, 2020), in social work (Kutscher et al., 2020), in teaching (Agaard & Lund 2019; Burow, 2019; Schaumburg and Prasse, 2019) and also in leisure activities, e.g. just think of the digitization of sporting activities and the related "measurement" and "monitoring" of the body, self-presentation practices (Völcker, Landeck, Poltze, Schreck & Heinemeyer, 2020; Völcker & Bruns, 2018). The so-called digital revolution or digital turn (Baum & Stäcker, 2015; Ede, 2019: 252ff.) transforms profoundly our working methods, communication channels, dating and shopping habits, teaching and leisure activities etc. The digital is an all-pervading phenomenon that is difficult to escape (Breiter & Hepp, 2018; Gilbert, Jackson & di Gregorio, 2014: 231), like the expression digital native indicates also on a linguistic level: Digital natives are a generation or population growing up in the environment surrounded by digital technologies and for whom computers and the Internet are natural components of their lives "(Dingli & Seychell 2015: 9).

Accordingly, researchers and their activities are also penetrated and influenced by the digital. This does not only refer to natural-scientific or technology-oriented subjects (e.g. Ferreira et al., 2020), but also to (digital) humanities and cultural sciences (Jannidis, Kohle & Rehbein, 2017), as well as to empirical qualitative education and biographical research (e.g. Baillot & Busch, 2017; Epp, 2017a; Leh & Ochs, 2017). Before the massive digitalization qualitative researchers "had to rely on index or system cards to hold and catalog data and research notes" (Salmona & Kaczynski, 2016: 16). Hence, in the course of the increasing spread of personal computers and the new technical possibilities associated with them, efforts were made in qualitative social and educational research at the end of the 1980s to use the "new" digital devices for the analysis of qualitative data (Gilbert et al., 2014: 225f.). Consequently, a large number of programs with an extraordinary range of features and functions was developed worldwide (Fielding & Lee, 1998; Weitzmann & Miles, 1995: 27ff.; for a detailed historical summary see Gilbert et al., 2014: 225ff.). According to Davidson and di Gregorio (2011) after the "Post-Experimental Inquiry" only three programs extract (MAXQDA, Nvivo, Atlas.ti).

Concerning the digitization of science, Drenth (2001) points out that the digital revolution has made considerable progress in a wide range of scientific fields possible. Many research projects would not be feasible without any computer support (e.g. analyzing big data). There are enormous advantages and potentials. However, aspects

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of the dependency of research operations on the digital world as well as associated dangers and risks are less taken into consideration. From the point of view of various authors, this also applies to digital humanities. They accuse the researchers of tending towards an uncritical affirmation of the technical and thereby undermining the values of the humanities (e.g. Baum & Stäcker, 2015). A critical science is precisely called upon not only to deal with the considerable scientific advances and achievements of the digital. In the contrary, it should also deal with the consequences of it on the operation of science and the accompanied generation of new knowledge and findings from a critical distance (cf. King 2011; Lazer et al., 2011).

In order to implement the above mentioned scientific principles, in this paper I will take a critical look at the possibilities, limitations, risks and challenges which come with the increasing use of computer-based programs for the analysis of qualitative data in educational science. For these programs the general term QDA[i] (qualitative data analysis) software became established (Kuckartz, 2009: 715). Over the past decade they did not only mushroom but also underwent a continuous further development.

Following the bibliographic research about QDA software is illustrated. Subsequently possibilities, limitations, risks and challenges using QDA software are reflected. Subsequently recommendations are given to reflect the use of QDA software in future more comprehensively. Finally, further questions are raised and the development of QDA software for non-category based methods is discussed.

Method

To get an insight into the current debate about QDA software and an overview of the historical development and the current state of art, a systematic literature research (Roos & Leutwyler 2017: 30ff.) in pertinent databases were conducted (e.g. GVK Plus, PsycINFO, KVK, PSYNDEX) under the keywords QDA, QDAS, CAQDAS and computer-assisted qualitative analyze. The result was a multiplicity of publications which could be assigned to five categories:

- Research reports in which QDA software was used (e.g. Feuerstein, 1997; Lauber-Pohle, 2018)
- Manuals and teaching introductions (e.g. Jackson & Bazeley, 2019; Kuckartz, 2014; Rädiker & Kuckartz, 2020)
- Conference reports (e.g. Delaney, 2005; Silver, 2013)
- Country specific focal points (e.g. Osorio, 2006; Rodik & Primorac 2015)
- Addressing methodological questions and reflections of conducting qualitative research with QDA software (e.g. Evers, 2011; Gilbert et al., 2014)

A closer look unsheathes that the majority of the identified publications only addresses QDA superficially (e.g. illustrate which QDA software was used in a research project). Further, a vast number of manual and teaching introductions of several QDA software (e.g. MAXQDA, Nvivo) exist. However, in around 80 publications aspects could be identified which addressing methodological issues and reflecting the use of QDA software. Especially the latter are the focus of interest.

Thus, publications were selected in which methodological questions and reflections are comprehensively discussed and not only briefly addressed in one paragraph. To illustrate the historical discourse older and current literature was considered, but also (key) literature that has been much-cited and rather less. With this, the intention

was pursued to give also rather less recognized works a voice. The reflections of the systematical literature research in the discussion section are further consolidate with systematical observations of workshops the author conducted and of his own research projects in which he used QDA software.

Reflections and discussion

Analytical tools and its possibilities

QDA programs guarantee to analyze different types of data, such as different variants of qualitative interviews, observation protocols, documents, video data, images, etc. They enable the management of large amounts of data types that can, for instance be sorted and organized on the basis of certain criteria according to (sub)groups. The programs provide fast access to text passages or already coded text passages as well as lexical search for words, word combinations or character strings. Furthermore, categories or category systems can be developed flexibly, hyperlinks between text passages can be created and memos written and managed. A variety of QDA software also facilitates the combination of qualitative and quantitative evaluation procedures, offers to implement new data sources from the Web 2.0, visual data (e.g. photos, maps, film recordings) and geo-location data (Cisneros-Puebla, Jara Labarthe & Ballesteros Velázquez, 2018; Einspänner, Dang-Anh & Thimm, 2014; Fiedling & Cisneros-Puebla, 2009; Gilbert et al., 2014: 222f.; Gläser-Zikuda, Hagenauer & Stephan, 2020: 17; Jung and Elwood, 2010; Kuckartz & Rädicker, 2019). The functional scope of current QDA programs contains a large number of tools that can be used profitably for the analysis of qualitative data and opens up various possibilities (e.g. Gilbert et al, 2014: 227; Kuckartz, 2010). These tools are not only useful for analyzing and managing qualitative data. They are further gainful to make things visible, which was not possible with non-digital tools (e.g. like the visualization of the thematic progression in an interview or a summary view of the generated categories in all interviews – see figure 1).

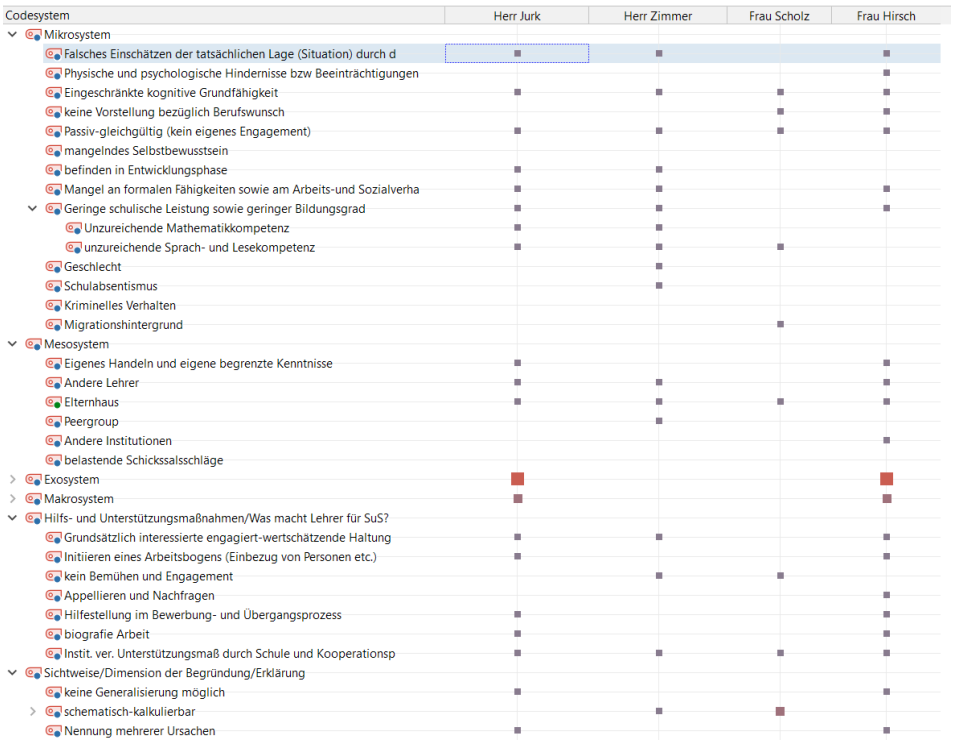

Figure 1: Code-Matrix-Browser in MAXQDA – Visualizing the data

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However, it should be mentioned that most of the functions are only of a supporting nature, as QDA programs do not perform automatic analysis. The intellectual evaluation work must be done by the researchers themselves. Generally, it can be said that computer-based analysis allows researchers to analyze, visualize, organize etc. a larger amount of data more efficiently (Kuckartz, 2009: 715ff.; 2010; Kuckartz & Rädicker, 2019).

Limitations, risks and challenges

Since the influence of QDA software on the concrete analysis cannot be seen as unconditional as computer-based analysis does not represent a neutral approach, just as qualitative methods itself (Scheele, 1988: 11; Soeffner, 2014: 41f.), it must be reflected that both can never grasp the object of research without any prerequisites, but are always constitutive of the object, i.e. influence the analysis (cf. Aebli, 1980: 26f.).

Even though software developers improve continuously QDA programs and thereby not only take into account current research trends such as popularity of the mixed-methods-approach but also wishes and suggestions of scientist qualitative researchers have to deal with the QDA software they use in an investigation more comprehensively. There is not only a danger because of the defined (programmed) and therefore limited and generally speaking inflexible functional scope and connections of the programs but also of the ignorance of the users about the analytical functions and their consequences. In this way researchers are restricted (digitally) in their analysis activities and attitudes without being aware of it and maybe they are also completely curtailed. In brief, QDA software can influence researchers at various levels and thus how they think about data. In the following, some of these dangers are illustrated.

A possible danger, which can accompany with QDA software, is that researchers will be forced into a certain direction of analysis, namely into those that the programs specify: The defined analysis tools only allow particular structures to be mapped and only specified analysis steps are possible. The researchers are urged into the expression and analysis attitude of the QDA software respectively (digitally) guided by its functional scope. Thus, if QDA software is used for the analysis of qualitative data, there is a fundamental risk that the direction of analysis of the researchers is merely within the shape and cut of the corset of QDA programs. It is necessary that researchers are aware of these limitations and emancipate themselves from them by realizing that they are not making any progress with the range of functions offered. They should then fall back on other tools and break up with the defined analysis tools of QDA software. This has not only consequences on the analysis attitude and the results, but also an overall effect on the creativity of the researchers (Epp, 2018a). In my methodological consulting, for example, I once had to deal with a person who conducted a biography analysis. The person had used the QDA software to work out certain thematic blocks, but was dissatisfied with its functional framework in relation to the analysis. He mentioned that the analytical tools of the software with which he is familiar are not productive at all and he was worried how he can solve this with the analytical frame of the QDA software. This example shows that the person has only thought within the functional framework of the QDA software, encouraged by the advice of his supervisor to use a QDA program for analysis.

The artistic approach of qualitative research which complements the technical aspect is emphasized by various researchers (see e.g. Knoblauch, 2008, 2014; Strauss & Corbin, 1996: 4ff.). Using one's own creativity in a productive way to gain knowledge is reflected in the most diverse stages of the qualitative research process: Falling back on the creative-artistic potential is not only important in the analysis and theory formation, but also in the presentation of scientific research results (see e.g. Jones et al. 2008; Strübing, 2018). Even though quantitative standardized research also depends on certain creativity, it is not the same extent as qualitative research, i.e. their intensity is different. The defined functionality of QDA programs, which allows only a certain degree of flexibility, can

be seen as a restriction and suppression of creativity: Therefore, we can speak of a certain standardization of the analysis, albeit in weakened forms, since the critical artistic potential is restricted.

The containment of creativity by QDA software can have the effect that researchers subordinate themselves without exception to the structures of the software. They then develop neither their own paths of analytical organization and penetration of the data, nor paths that are independent of the programs. To put it pointedly: Researchers no longer think for themselves or outside the functional scope of the software. It is not (no longer) questioned as an analytical tool (as the example above illustrates). They only think in the given analysis patterns and orders. The limited or firmly defined scope of functions may also lead to a kind of self-censorship of researchers, since possible analysis paths and ideas are not thought of or even suppressed and not permitted. This is because the scope of QDA programs does not allow for that. If researchers cannot "break out" of the static framework, the corset of QDA software and emancipate themselves from the binding structures, they run the risk of repeating something already known in a mechanical manner (Epp, 2018a).

Due to the containment of creativity another danger comes with the use of computer-assisted analysis programs. Researchers no longer develop an interpretive analytical attitude or that attitude is restricted. Interview extracts are only subsumed under categories instead of looking at them in context and dimension. In the late 1990s Fiedling & Lee (1998: 119) already warned that the extensive use of computer-assisted analysis would lead to the fact that the analysis is replaced by coding and that researchers would lose sight of the actual phenomenon.

> The use of hypertext, and beyond that multimedia approaches, facilitates 'untutored use'. Although we do not use the term 'untutored' in a pejorative way, nevertheless we suspect that there is an issue about what background one might need to produce meaningful interpretations from a hypertext resource. In other words, hypertext may make it feasible for anyone to create the appearance of an ethnographic text, but a text which its creator finds impossible to explain or defend. If we understand Coffey et al. correctly, it is the originating ethnographer who chooses items for expansion and reference and who specifies links through the hypertext database. However, it is precisely this which may subvert the very polyvocality Coffey et al. wish to facilitate. Faced with an apparently smooth and user-friendly resource offering all manner of subsidiary and supporting information, the naive user may feel that it contains 'all there is to know' about the topic at hand. A resource seen by its architects as encouraging a sophisticated appreciation of the very contingency of social knowledge will instead be received and used as watertight, supremely- and ironically-authoritative. Alternatively, the tendency of hypertext to blur distinctions between 'data', 'analysis', 'interpretation' and so on may for some be simply a recipe for confusion and indecision produced by a maze of links and connections going nowhere in particular. (Lee & Fiedling 1996: 4.4)

Thus the categories and structures worked out are not or only slightly related to each other. There is simply no further discussion of the conceived categories, since the category system is seen as a result. Roberts & Wilson (2002: 15) emphasize that "Computer techniques of logic and precise rules are not compatible with the unstructured, ambiguous nature of qualitative data and so it may distort or weaken data or stifle creativity".

A further danger is the lack of sensitivity of users in the handling of the individual work tools of QDA software. For example, the function of automatic coding (see figure 2) can be used to filter out certain terms, keywords and/or text passages from the data material - almost ingenieurally. Some of them are no longer even considered and are subsumed under a category without further thinking. Automation not only puts creativity in chains but also the resistance of qualitative research and contributes to an increasing standardization - in the sense of quantitative procedures - of this (Knoblauch 2013: 18).

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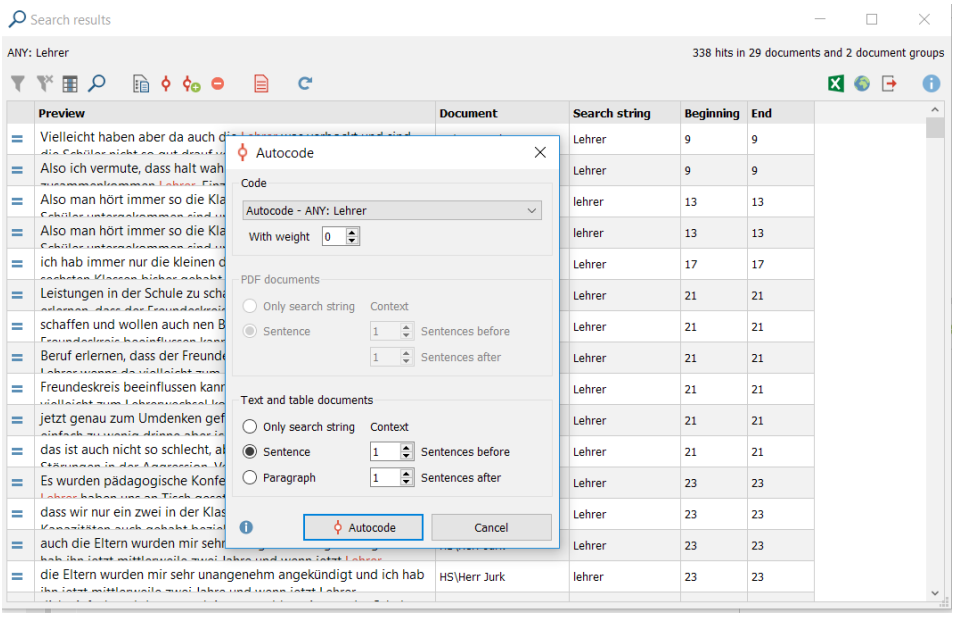

Figure 2: Autocode function in MAXQDA – automatically coding in MAXQDA through keywords

Concerns and disputes – Reflections on past and present discussions

The increased spread and use of QDA programs in the 1990s raised a wide variety of discussions and concerns. Among other things, it was considered whether computer-assisted analysis is an independent methodology or whether it is merely a tool. According to Kuckartz (2009: 729), computer-assisted analysis represents a new style of analysis, but at the same time it is also a tool with which other methods of the pre-computer age can be realized. Kuckartz further argues that only the appearance of the analysis has changed due to QDA software but not the evaluation methodology itself: methods such as qualitative content analysis can only be carried out in another medium (Kuckartz, 2009: 728f.).

Furthermore, concerns were expressed that the technical possibilities would lead to a "new orthodoxy" of qualitative methods. This is because those methods that evaluate based on codes are more suitable for a computer-assisted analysis than those which do not work in that way. According to the argumentation, this would push the analysis of qualitative data in a codebased direction and others e.g. sequence-analytical methods could be forced out (Coffey et al., 1996). However, according to Epp (2018a) these concerns have not yet come true which is illustrated by the development of biographical research in various disciplines such as sociology, educational sciences, history, German studies etc. (see among others Krähnke, Finster, Reimann & Zschirpe, 2017; Krüger & Marotzki, 2006; Puchert, 2017; Trescher & Bröner, 2017) or in particular the biographical professional research in educational science (e.g. Epp, 2019a; Kunze, 2013; Kraul, Marotzki & Schweppe, 2002).

According to Kuckartz the discussion regarding the "new orthodoxy" was already put aside because of the extensive distribution of QDA software. However, according to Epp (2018a) the discussion must be taken up again because of the danger that researchers, despite the multi-layered scope of the program, will be pushed into a certain direction of analysis or guided by the programs. This could then contribute to a certain standardization of qualitative research in the sense of quantitative research.

There is uncertainty as to whether QDA programs influence the choice of methodology. Therefore, it cannot be said whether they have pushed qualitative analysis in a code-based direction and therefore sequential methods have become secondary. However, with regard to the analysis of codebased methods, one can very clearly speak of a "new orthodoxy". One of the reasons for the unbroken and unprecedented popularity of QDA programs is that it makes the working process more economical. Their use and application in the research process belongs to a "good form", to a certain set standard. If at all, there is only made a slight critical approach to it. Alternative tools such as paper and pen or the in the introduction mentioned index and system cards experience a marginal consideration and application. Codebased analysis tendency is predominantly based on a computer-supported analysis and other aids receive only insignificant attention. Even though there are no statistical results regarding the use of QDA software in educational science it can be carefully assumed that its use increased. This is brought to light by own observations during research workshops and discussions with colleagues, who either report about their own research or the ones they supervise, by research publications in which the use of QDA is mentioned but rarely reflected (e.g. Epp, 2017b, 2018b; Guevara, 2009; Kleikamp, 2017; Schnell, Dunger & Schulz-Quach, 2019), the massive development of QDA programs and the expansion of QDA related workshops. The spread and application of QDA software thus has less influence on the choice or preference of codebased or sequential methods, but rather on the direction of the analysis of codebased methods. This is the reason why one can very well speak of a "new" orthodoxy in this respect (Epp, 2018a).

Kuckartz (2009: 729) argues that not only the appearance of the analysis has changed through computer-assisted analysis, but also the analysis attitude and behavior. With the change in appearance there is also a change in perception, like investigations in educational science illustrate (Hollstein, 2008: 2605). People with a suit or ball gown are also perceived differently in public than people wearing sweatpants. With the change of the garment the attitude and the view towards these people also changes. The same applies to the tools used to analyze qualitative data. Unfortunately, this is too often ignored and must necessarily be reflected during the research process.

Consequences: Reflections on QDA software within a research project

The previous remarks make it clear that it is mandatory to reflect the use of QDA software in research projects. Consequently, during, before and after the research project, scientists must ask themselves a variety of questions that help to reflectively penetrate the use of QDA software and become aware of its impact on analysis and theory building. In my opinion, the following questions have proven to be helpful:

- How did I come up with the idea using QDA software for my research project? What is the personal motivation to use QDA software?
- Why do I use QDA software in this particular research project (and not in another)?
- In which steps of the analysis the QDA software is useful and supportive? Are there steps where it can have an inhibiting effect? Are there steps or phases in which the use of QDA software is not necessary? To what extent are other and/or additional tools suitable for (individual steps of) data analysis?
- What is the fit between the method(ology) used and the QDA software? Do certain analytical steps of the method have to be modified? What changes and deviations arise with regard to the methodological procedure?
- What influence does the QDA software have on the cognitive process and the presentation of results? (Epp, 2019b)

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In order to ask the illustrated questions and to produce good qualitative research it is necessary that scientists have an elaborated knowledge about qualitative research and QDA software. "QDA software programs support qualitative research, but still require knowledge and skill on the part of the user to produce good qualitative research" (Gilbert et al., 2014: 222). Consequently, universities are encouraged to supply an appropriate methodical training to avoid and not support an un-reflected use of QDA software. If novice's researchers left without training and guidance in academic course on qualitative methods it may entail "to the unfortunate misconception that the software determines the method, or even worse, that software is a method" (Gilbert et al., 2014: 229).

Conclusion

It would be too brief and narrow-minded to do qualitative research only without the help of QDA software; just because of the criticism and the risk of incapacitation associated with it. As mentioned they also possess certain potentials which can be fruitful for the analyzes. Researchers should always consider and think about alternative and different analytical tools or even combine them, taking into account and reflecting the advantages and dangers associated with them. Undoubtedly, if researchers fall back on computer-assisted analysis, they must necessarily deal more intensively with the question of whether they pursue analytical strands and procedures in a self-determined manner or whether they merely obey and submit to the firmly defined framework of QDA programs or the advertising slogans of corresponding software companies.

All in all, QDA software is not a neutral tool but always contributes to constitute a research object. A reflective attitude which depends on maturity can therefore be regarded as central in order to consciously develop the research actions and procedures using the tools involved. Moving forward in the 21st century, where the use of digital applications is accepted to unquestioningly as a daily phenomenon this is in particular important for researchers reflecting on the digital devices and the relationship between software and methodology. Further, the new tools raise questions regarding ethnical and privacy related issues that need reflected as well (Gilbert et al. 2013: 231ff.).

Since QDA programs were originally developed for code-based, i.e. category-based analysis procedures, questions must be addressed as to whether they can also be used for non-code-based or non-category-based procedures such as the autobiographical-narrative interview analyzes or documentary method. In this respect, not only the analytical possibilities have to be dealt with, but also the dangers that the use and application involve. Can the autobiographical-narrative interview analyzes or documentary method in its methodical procedure be applied without more ado in combination with QDA software? Are there changes and variations of the methodical procedure necessary due to the defined functional scope of the programs or do new programs need to be developed? These are only a few questions that have to be dealt with in future.

References

Aebli, H. (1980). *Denken – Das Ordnen des Tuns. Band I: Kognitive Aspekte der Handlungstheorie.* Stuttgart: Klett-Cotta.

Agaard, T. & Lund, A. (2019). *Digital agency in higher education: transforming teaching and learning.* London: Routledge.

Bailott, A. & Busch, A. (2017). Vernetzung – Erzählung – Kollation. Digitale Methoden in der Biographieforschung. In: *Oral History und Lebensverlaufsanalysen. Zeitschrift für Biographieforschung,* 30, (1+2): 22-29.

Baum, C. & Stäcker, T. (2015). Methoden – Theorien – Projekte. In: Baum C and Stäcker (eds) *Grenzen und Möglichkeiten der Digital Humanities. Sonderband der Zeitschrift für digitale Geisteswissenschaften.* (= Sonderband der Zeitschrift für digitale Geisteswissenschaften, 1). text/html Format. DOI: 10.17175/sb001_023 (accessed 22 December 2017).

BMBF. (2016). *Digitale Chancen nutzen. Die Zukunft gestalten. Zwischenbericht der Plattform „Digitalisierung in Bildung und Wissenschaft".* Available at: https://www.bildung-forschung.digital/files/BMBF_Digitale_Bildung_Zwischenbericht_A4_webRZ.pdf (accessed 22 December 2017).

Breiter, A. & Hepp, A. (2018). Die Komplexität der Dataizierung: Zur Herausforderung, digitale Spuren in ihrem Kontext zu analysieren. In: Katzenbach C, Pentzold C, Kannengießer S, Adolf M and Taddicken M (eds.) *Neue Komplexitäten für Kommunikationsforschung und Medienanalyse: Analytische Zugänge und empirische Studien.* Berlin : Böhland & Schremmer Verlag, pp. 27-48.

Burow, OA (ed.). (2019) Schule digital – wie geht das?: wie die digitale Revolution uns und die Schule verändert. Weinheim: Beltz.

Cisneros Puebla, CA., Jara Labarthe, V. & Ballesteros Velázquez, B. (2018). Produciendo datos en Twitterposibilidades y límites del análisis con software de computación cualitativa. Un ejemplo a partir del caso de "La Manada". In: Santoveña S (ed.) Enredados en el mundo digital. Sociedad y redes sociales. Madrid: UNED, pp 87-116.

Coffey, A., Holbrook, B. & Atkinsons, P. (1996). Qualitative Data Analysis: Technologies and Representations. In: *Sociological Research Online* 1 (1).

Davidson, J & di Gregorio, S. (2011) Qualitative research and technology: In the midst of a revolution. In: Denzin N K and Lincoln Y S (eds.), *Handbook of qualitative research.* Thousand Oaks, CA: Sage Publications, pp. 627–643.

Delaney, S. (2000) Conference Report: "Strategies in Qualitative Research", the Second International Conference on Software Development by "Qualitative Solutions and Research". In: *Forum Qualitative Sozialforschung/Forum: Qualitative Social Research,* 1(3).

Dewey, J. (1934/2014) *Kunst als Erfahrung.* Frankfurt a. M.: Suhrkamp.

Dingli, A. & Seychell, Dy. (2015). *The New Digital Natives. Cutting the Chord.* Berlin: Springer.

Drenth, PJD. (2001). Die digitale Revolution in den Wissenschaften: ein „mixed blessing". *Festvortrag an der Universität Heidelberg,* gehalten am 8.12.2001. Available at: URL: http://www.uni-heidelberg.de/presse/news/ 2112drent.html (accessed 17 December 2017).

Eds, A. (2019). *Technology and Society. A World History.* Cambridge: Cambridge University Press.

Einspänner, J., Dang-Anh, M. & Thimm, C. (2014). Computer-Assisted Content Analysis of Twitter Data. In: Weller K, Bruns A, Burgess J, Mahrt M and Puschmann C (eds.) *Twitter and Society.* New York: P. Lang, pp. 97-108.

Epp, A. (2017). (Un-)Möglichkeit computergestützter Narrationsanalyse. Zur Anwendung von QDA-Software in der Biographieforschung. In: *Oral History und Lebensverlaufsanalysen. Zeitschrift für Biographieforschung,* 30, (1+2): 30-43.

rev.electron.educ.pedagog
Vol.4,No.6(Enero-Junio)2020/Pasto-Colombia
ISSN:2590-7476(En línea) /pp.22-38
DOI: http://dx.doi.org/10.15658/rev.electron.educ.pedagog20.05040604

Epp, A. (2017b). *Von der Schule in die Berufsausbildung – Soziale Konstruktionen durch Lehrkräfte über ungünstige Faktoren in der Bildungsbiografie von Schülerinnen und Schülern.* Opladen: Barbara Budrich.

Epp, A. (2018a). Förderliches Hilfsmittel oder neue Orthodoxie? - Der Einfluss von Analyse-Software am Beispiel der QDA-Software. In: Leineweber C and de Witt C (eds.) Digitale Transformation im Diskurs. Kritische Perspektiven auf Entwicklungen und Tendenzen im Zeitalter des Digitalen. Hagen: Fernuniversität, pp. 216-140.

Epp, A. (2018b). Subjektive Theorien von Lehrkräften über ungünstige Faktoren in der Bildungsbiografie von Schülerinnen und Schülern - Wie konstruieren Lehrkräfte den Übergang von der Schule in die Berufsausbildung? In: *Zeitschrift für Erziehungswissenschaft,* 21: 973-990.

Epp, A (2019a). Considerations on triangulation of biographical narrative interviews and expert interviews: methodological modifications and extensions to identify relations between biography and practical theory. In: *Zeitschrift für Qualitative Forschung,* 20 (1): 191-206.

Epp, A. (2019b) Der Einfluss von QDA-Programmen auf den Forschungsgang – Ein Erfahrungsbericht. In: Bauer R, Hafer J, Hofhues S, Schiefner-Rohs M, Thillosen A, Volk B and Wannemacher K (eds.) *Vom E-Learning zur Digitalisierung – Mythen, Realitäten, Perspektiven.* Münster: Waxmann, pp. 296-298.

Evers, JC. (2011) From the Past into the Future. How Technological Developments Change Our Ways of Data Collection, Transcription and Analysis. In: *Forum Qualitative Sozialforschung/Forum: Qualitative Social Research,* 12(1).

Ferreira, J., Lopes, F., Dougmeingts, G., Sousa, J., Mendonça, JP., Agostinho. C. & Jardim-Goncalves, R. (2020). Empowering SMEs with Cyber-Physical Production Systems: From Modelling a Polishing Process of Cutlery Production to CPPS Experimentation. In: Jardim-Goncalves R, Sgurev V, Jotsov V and Kacprzyk K (eds.) *Intelligent Systems: Theory, Research and Innovation in Applications.* Cham: Springer Natrue, pp.139-177.

Feuerstein, TJ. (1997). Biographie- und netzwerkorientiertes Case Management. Ein computerunterstütztes Verfahren für die Praxis der Sozialarbeit am Beispiel der beruflichen Bildung benachteiligter Jugendlicher. In: *Neue Praxis,* 27 (4), pp. 363-371).

Fielding, NG. & Lee, RM. (1998). *Computer Analysis and Qualitative Research.* London: Sage Publications.

Fielding, NG. & Cisneros-Puebla. (2009). CAQDAS-GIS convergence: Toward a new integrated mixed method research practice? In: *Journal of Mixed Methods Research,* 3: 349–370.

Gilbert, LS., Jackson, K.& di Gregorio, S. (2014) Tools for Analyzing Qualitative Data: The History and Relevance of Qualitative Data Analysis Software. In: Spector J M, Merril M D, Elen J & Bishop (eds.) *Handbook of Research on Educational Communications and Technology.* New York: Springer, pp. 221-238.

Gläser-Zikuda, M., Hagenauer, G. & Stephan, M. (2020). The Potential of Qualitative Content Analysis for Empirical Educational Research. In: Forum Qualitative Sozialforschung/Forum: Qualitative Social Research, 21(1).

Guevara, HM. (2009). Identidades estudiantiles, conocimiento y cultura. Percepciones de jóvenes universitarios y universitarias de Cuyo, Argentina. In: *Revista Latinoamericana de Ciencias Sociales,* 7 (1): 209-234.

Hollstein, B. (2008). Der Anteil der Lehrer an der Reproduktion sozialer Ungleichheit: Grundschulempfehlungen und soziale Selektion in verschiedenen Berliner Sozialräumen. In: Rehberg K-S (ed.) *Die Natur der Gesellschaft: Verhandlungen des 33. Kongresses der Deutschen Gesellschaft für Soziologie in Kassel 2006.* Teilbd. 1 u. 2. Frankfurt am Main: Campus Verl., pp. 2605-2613.

Jackson, K.& Bazeley, P. (2019). *Qualitative data analysis with NVivo.* Los Angeles: Sage.

Jannidis, F., Kohle, H. & Rehbein, M. (2017). *Digital Humanities.* Eine Einführung. Stuttgart: J.B. Metzler.

Jones, K., et al. (2008). Performative Social Science. In: *Forum Qualitative Sozialforschung/ Forum: Qualitative Social Research* 9(2). Available at: URL: http://www.qualitative-research.net/index.php/fqs/issue/view/10 (accessed 17 December 2017).

Jung, J. & Elwood, S. (2010). Extending the qualitative capabilities of GIS: Computer-aided qualitative GIS. In: *Transactions in GIS,* 14 (1): 63–87.

King, G. (2011). Ensuring the data-rich fututre of the Social Sciences. In: *Science* 311 (6018): 719-721.

Kleikamp, T. (2017). *Akademikerpaare werden Eltern: Rollenfindung, Bewältigungsstrategien, Belastungsfaktoren.* Opladen: Barbara Budrich.

Knoblauch, H. (2008). Qualitative Methoden am Scheideweg. Jüngere Entwicklungen der interpretativen Sozialforschung. Mittagsvorlesung, 4. Berliner Methodentreffen Qualitative Forschung, 4.-5. Juli 2008. Available at: http://www.qualitative-forschung.de/methodentreffen/archiv/texte/texte_2008/knoblauch.pdf (accessed 8 July 2017).

Knoblauch, H. (2013). Qualitative Methoden am Scheideweg. Jüngere Entwicklungen der interpretativen Sozialforschung. In: *Forum Qualitative Sozialforschung/Forum: Qualitative Social Research* 14(3): 257-250.

Krüger, H-H. & Marotzki, W. (2006). *Handbuch erziehungswissenschaftliche Biographieforschung.* Wiesbaden: VS Verlag für Sozialwissenschaften.

Krähnke, U et al. (2017) *Im Dienst der Staatssicherheit: eine soziologische Studie über die hauptamtlichen Mitarbeiter des DDR-Geheimdienstes.* Frankfurt a. M.: Campus-Verlag.

Kraul, M., Marotzki, W. & Schweppe, C (eds). (2002). *Biographie und Profession.* Bad Heilbrunn: Klinkhardt.

Kuckartz, U. (2009). Computergestützte Analyse qualitativer Daten. In: Buber R and Holzmüller HH (eds) *Qualitative Marktforschung. Konzepte – Methoden – Analysen.* Wiesbaden: Gabler.

Kuckartz, U. (2010). *Einführung in die computergestützte Analyse qualitativer Daten.* Wiesbaden: VS Verlag für Sozialwissenschaften, pp. 713-730.

Kuckart, U. (2014). *Qualitative text analysis: a guide to methods, practice and using software.* Los Angeles: Sage.

Kuckartz, U. & Rädicker, S (2019). *Analyzing qualitative data with MAXQDA: text, audio, and video.* Cham: Springer.

Kunze, K. (2013). *Biographie und berufliches Handeln eines Waldorflehrers: Rekonstruktionen zum Wechselverhältnis von Biographie und Profession.* Opladen: Verlag Barbara Budrich.

rev.electron.educ.pedagog
Vol.4,No.6(Enero-Junio)2020/Pasto-Colombia
ISSN:2590-7476(En línea) /pp.22-38
DOI: http://dx.doi.org/10.15658/rev.electron.educ.pedagog20.05040604

Kutscher, N., Ley, T., Seelmeyer, U., Siller, F., Tillmann, A. & Zorn, I (eds.). (2020). *Handbuch Soziale Arbeit und Digitalisierung.* Weinheim: Juventa Verlag.

Larrson, A. & Teigland, R (eds.). (2020). *The digitaltransformation of labor: Automation, the gig economy and welfare, Routledge Studies in Labour.* London: Routledge.

Lauber-Pohle, S. (2018). Soziale Netzwerkbildung und Online-Lernen – Reflektionen zur Arbeit mit sozialen Netzwerken als Aufgabe erwachsenenpädagogischen Handelns In: Feld TC & Lauber-Pohle S (ed.) Organisation und Profession. Felder erwachsenenpädagogischer Forschung. Wiesbaden: Springer VS, pp. 307-323.

Lazer, D et al. (2011). Computational Social Science. In: *Science* 323: 721-722.

Lee, RM. & Fielding, N. (1996). 'Qualitative Data Analysis: Representations of a Technology: A Comment on Coffey, Holbrook and Atkinson'. In: *Sociological Research Online,* 1(4).

Leh, A. & Ochs, E. (2017). Digital Humanities und biographische Forschung. Positionsbestimmungen und Analysen. Einleitung zum Schwerpunkt. In: *Oral History und Lebensverlaufsanalysen. Zeitschrift für Biographieforschung,* 30, (1+2): 3-6.

Osorio, F. (2006). The Effects of Computer Assisted Research on Chilean Academics. In: *Forum Qualitative Sozialforschung/Forum: Qualitative Social Research,* 7(4).

Puchert, L. (2017) *Männliche Ingenieurstudenten: eine Biographieanalyse ingenieurwissenschaftlicher Studienfachwahl - mit einem Gendervergleich weiblicher und männlicher Ingenieurbiographien.* Opladen: Verlag Barbara Budrich.

Rädicker, S. & Kuckart, U. (2020). *Análisis de Datos Cualitativos con MAXQDA. Texto, Audio, Video.* Berlin: MAXQDA Press.

Roberts, KA. & Wilson, RW. (2002). ICT and the Research Process: Issues Around the Compatibility of Technology with Qualitative Data Analysis. In: *Forum Qualitative Sozialforschung/Forum: Qualitative Social Research* 3 (2).

Rodik, P. & Primorac, J. (2015). To Use or Not to Use: Computer-Assisted Qualitative Data Analysis Software Usage among Early-Career Sociologists in Croatia. In: *Forum Qualitative Sozialforschung/Forum: Qualitative Social Research,* 16, (1).

Roos, M. & Leutwyler, B. (2017) *Wissenschaftliches Arbeiten im Lehramtsstudium: recherchieren, schreiben, forschen.* Bern: Hogrefe.

Salmona, M. & Kaczynski, D. (2016). Don't Blame the Software: Using Qualitative Data Analysis Software Successfully in Doctoral Research. In: *Forum Qualitative Sozialforschung/Forum: Qualitative Social Research,* 17(3)

Schaumburg, H. & Prasse, D. (2019) *Medien und Schule.* Theorie – Forschung – Praxis. Bad Heilbrunn: UTB.

Scheele, B. (1988). Warum gleich ein Forschungsprogramm? – Persönliche Antworten. In: Groeben N et al. (eds) *Das Forschungsprogramm Subjektive Theorien. Eine Einführung in die Psychologie des reflexiven Subjekts.* Tübingen: Francke, pp 1-10.

Schnell, M W., Dunger, C. & Schulz-Quach, C. (2019). *Behandlungsabbruch am Lebensende. Die Beziehung zwischen kurativer und palliativer Behandlung – Eine Grounded Theory.* Wiesbaden: Springer VS.

Silver, C. (2013). Conference Report: CAQD Conference 2013. In: *Forum Qualitative Sozialforschung/Forum: Qualitative Social Research,* 14, (2).

Soeffner, H-G. (2014). Interpretative Sozialwissenschaft. In: Mey G and Mruck K (eds) *Qualitative Forschung. Analysen und Diskussionen – 10 Jahre Berliner Methodentreffen.* Wiesbaden: Springer VS, pp 35-54.

Strauss, A. & Corbin, J. (1996) *Grounded Theory: Grundlagen Qualitativer Sozialforschung.* Weinheim: Psychologie Verlags Union.

Strübing, J. (2018). *Qualitative Sozialforschung: eine komprimierte Einführung.* Berlin: De Gruyter Oldenbourg.

Trescher, H. & Börner, M. (2017). *Behinderung als Praxis: biographische Zugänge zu Lebensentwürfen von Menschen mit ‚geistiger Behinderung'.* Bielefeld: transcript.

Völcker, M., Landeck, S., Poltze, K., Schreck, M. & Heinemeyer, D. (2020). Dating-Apps im intersubjektiven Geschehen: Tinder, Grindr und Co. als Optionen der Beziehungsinitiierung. In: *Zeitschrift für Qualitative Forschung* (in print).

Völcker, M. & Bruns, A. (2018). Digital Self-Presentation: The Subjective Meaning of Selfies for Adolescents and Young Adults. In: *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research,* 19 (3).

Weitzman, EA. & Miles, MB. (1995). *Computer Programs for Qualitative Data Analysis.* Newbury Park: Sage Publications.